Danish Ministry of the Environment
Environmental Protection Agency

Survey of fragrance substances

Part of the LOUS review

Environmental project No. 1712, 2015

Title:

Survey of fragrance substances

Editing:

Dorthe Nørgaard Andersen, DHI
Tina Slothuus, DHI
Karl-Heinz Cohr, DHI
Dorte Rasmussen, DHI
Poul Bo Larsen, DHI

Published by:

The Danish Environmental Protection Agency
Strandgade 29
1401 Copenhagen K
Denmark
www.mst.dk/english

Year:

2015

ISBN no.

978-87-93352-25-4

Disclaimer:

When the occasion arises, the Danish Environmental Protection Agency will publish reports and papers concerning research and development projects within the environmental sector, financed by study grants provided by the Danish Environmental Protection Agency. It should be noted that such publications do not necessarily reflect the position or opinion of the Danish Environmental Protection Agency.
However, publication does indicate that, in the opinion of the Danish Environmental Protection Agency, the content represents an important contribution to the debate surrounding Danish environmental policy.

While the information provided in this report is believed to be accurate, The Danish Environmental Protection Agency disclaims any responsibility for possible inaccuracies or omissions and consequences that may flow from them. Neither the Danish Environmental Protection Agency nor any individual involved in the preparation of this publication shall be liable for any injury, loss, damage or prejudice of any kind that may be caused by persons who have acted based on their understanding of the information contained in this publication.

Sources must be acknowledged.

Contents

Preface

Background and objectives

The Danish Environmental Protection Agency's List of Undesirable Substances (LOUS) is intended as a guide for enterprises. It indicates substances of concern whose use should be reduced or eliminated completely. The first list was published in 1998 and updated versions have been published in 2000, 2004 and 2009. The latest version, LOUS 2009 (Danish EPA, 2011) includes 40 chemical substances and groups of substances which have been documented as dangerous or which have been identified as problematic using computer models. For inclusion in the list, substances must fulfil several specific criteria. Besides the risk of leading to serious and long-term adverse effects on health or the environment, only substances which are used in an industrial context in large quantities in Denmark, i.e. over 100 tonnes per year, are included in the list.

Over the period 2012-2015 all 40 substances and substance groups on LOUS will be surveyed. The surveys include collection of available information on the use and occurrence of the substances, internationally and in Denmark, information on environmental and health effects, on alternatives to the substances, on existing regulation, on monitoring and exposure, and information regarding ongoing activities under REACH, among others.

On the basis of the surveys, the Danish EPA will assess the need for any further information, regulation, substitution/phase out, classification and labelling, improved waste management or increased dissemination of information.

This survey concerns perfumes. This substance group was included in LOUS in 2009. The reason for the inclusion in LOUS is that there may be concerns related to environment and health and particularly the allergenic potential of many perfumes. Perfumes are often not necessary for the main function of a product, and in many cases their presence implies an unnecessary exposure.

The main objective of this study is, as mentioned, to provide background for the Danish EPA's consideration regarding the need for further risk management measures.

The process

The survey has been undertaken by DHI from April 2014 to November 2014. The project team was:

- Dorthe Nørgaard Andersen, DHI, Project Manager
- Tina Slothuus, DHI, Main contributor
- Karl-Heinz Cohr, DHI, Contributor
- Dorte Rasmussen, DHI, Quality supervisor
- Poul Bo Larsen, DHI, Quality supervisor

The work has been followed by an advisory group consisting of:

- Sidsel Dyekjær, Danish EPA, Project Manager
- Bettina Ørsnes Larsen, Danish EPA
- Lærke Ambo Nielsen, SPT
- Nanna Rosted Vind, Danish Working Environment Authority
- Jakob Lamm Zeuthen, Dansk Erhverv

Data collection
The survey and review is based on the available literature on the substances, information from databases and direct inquiries to trade organisations and key market actors.

The data search included (but was not limited to) the following:

- Legislation in force from Retsinformation (Danish legal information database) and EUR-Lex (EU legislation database);
- Pre-registered and registered substances from ECHA's website;
- Ongoing regulatory activities under REACH and intentions listed on ECHA's website (incl. Registry of Intentions and Community Rolling Action Plan);
- Data on harmonised classification (CLP) and self-classification from the C&L inventory database on ECHAs website;
- Data on ecolabels from the Danish ecolabel secretariat (Nordic Swan and EU Flower) and the German Angel.
- Date on production, import and export of substances from the Nordic Product Registers as registered in the SPIN database;
- Reports, memorandums, etc. from the Danish EPA and other authorities in Denmark;
- Reports published at the websites of:
  - The Nordic Council of Ministers, ECHA, the EU Commission, IARC, WHO, and the Basel Convention;
  - US EPA
- PubMed and Toxnet databases for identification of relevant scientific literature.

Besides, direct enquiries were sent to Danish and European trade organisations and a few key market actors in Denmark

Summary and Conclusion

Fragrance substances are compounds with a characteristic and usually pleasant odour. According to the English dictionary perfumes are defined as "*substances that emit and diffuse a fragrant odour, especially a volatile liquid distilled from flowers or prepared synthetically*". Perfumes are composed of a mixture of several fragrance substances, e.g. mixtures of essential oils or aroma compounds, fixatives and solvents i.e. also substances which do not constitute to the scent of the perfume. In fact a perfume may be composed of ten to more than 300 basic components.

The group of fragrance substances includes a large number of different substances; the largest group being the terpenoids (e.g. limonene, farnesol, retinol etc.). In fact there are so many known fragrance substances (several thousands) that they could not all be examined within the framework of this project. Thus, the numbers of substances which were to be covered in this project had to be limited. The aim of this project has been to perform an overview of the substance group which could still only be a preliminary survey of this large group of substances (time and economy did not allow otherwise) and also to provide insight into both the well-known allergenic effects of some of these substances as well as other potential hazardous effects, and to describe the main product groups in which perfumes are used.
In this survey it was decided to focus on harmonised classified substances registered under REACH AND included in the list of fragrance substances developed by IFRA. By using this approach there is a risk that some of the most commonly used fragrance substances may have been discarded from the survey. In addition, the survey revealed that not all substances identified as human contact allergens are classified as such so the approach may also have deselected substances with potentially health effects. However, this has additional been covered by using the list of known human allergens developed by SCCS in the chapter describing human health.

A data search was performed in order to define which substances constitute the group "perfumes". Also the classifications addressing human health and the environment were examined and lastly the uses of these substances were evaluated, both regarding the tonnage of substance applied (in Denmark) and the numbers of preparations on the Danish market which contain the substances.

According to IFRA, the International Fragrance Association, approximately 3,000 substances are used within the perfume industry. According to the ECHA database on registered substances, 827 substances, with a use tonnage above 1 ton, are registered within the product category "PC28" which constitutes "fragrances/perfume". However, only approximately 40% of the registered substances are included in the list from IFRA. Part of the reason that all registered substances are not on the IFRA list could be that the list from IFRA is dated back to 2011 and the registration data are retrieved in 2014. Perhaps, new fragrance substances have been taken into use during the last three years. Another explanation could be that some of the substances registered within the product category PC28 is only used in the production phase of perfumes (intermediates) and therefore not contained in the final product. Another explanation that could explain some of the discrepancy between the two list may be that a large amount of substances on the IRFA list are not registered because they are not produced or imported in an amount which triggers a requirement for registration (currently 100 tonnes; by 2018 1 ton).
According to IFRA 90 of 100 fragrance materials, used in annual volumes higher than 175 tons in perfume formulations, are applied as scents and the remaining ten are used for other functions such as solvents or antioxidants.

Classification and other regulation
The C&L inventory was searched in order to find both harmonized and notified hazard classifications according to Annex VI of Regulation (EC) No 1272/2008 (CLP Regulation) for the 827 fragrance substances. These data are presented in Appendix 1.

The findings from the data presented in appendix 1 were that:

- 401 of the 827 substances have a notified classification which addresses CMR properties and/or sensitisation and/or environment.
- out of the 827 registered substances, in total, 99 of the substances have a harmonised classification.
- 88 substances have a harmonised classification addressing human health
- 43 substances have a harmonised classification addressing the environment.
- some substances are both subject to harmonised classification for human health and environment.
- regarding human health classifications 38 of the 88 substances are included in IFRAs list covering 3,059 fragrances in use.
- regarding environmental health classification 20 of the 43 substances are also included in IFRAs list.

Totally 44 substances with a harmonised classification were also included in the IFRA list and these were identified for further assessment.

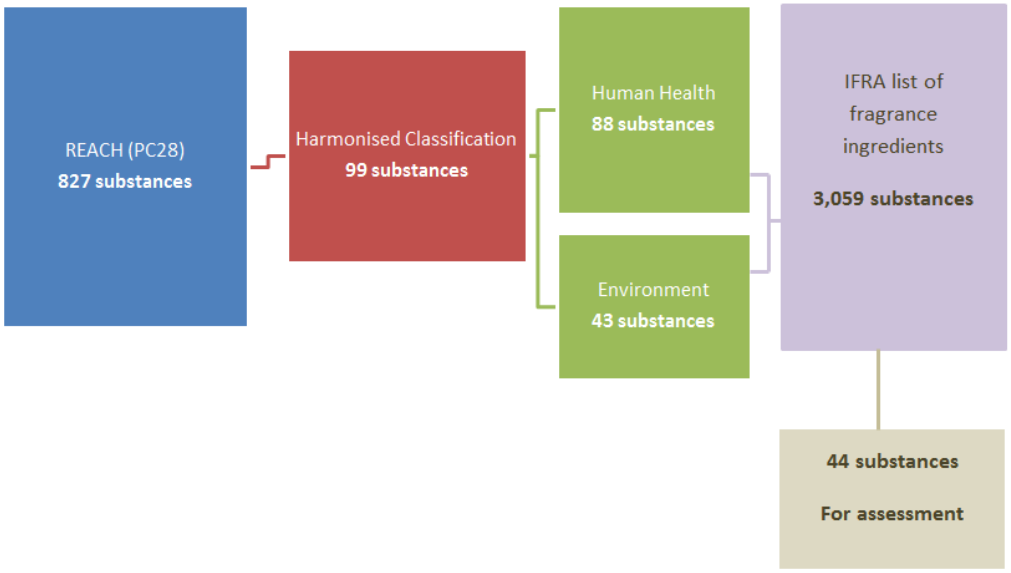


DIAGRAM SUMMARISING THE SELECTION OF THE 44 SUBSTANCES FOR ASSESSMENT

The group of 44 fragrance substances does *not* only include substances which we associate with a scent. The group also consists of substances which are used to keep the perfume liquid (solvent), preserve the perfume, and therefore also the scent, adjuvants; i.e. substances that modifies the effect of other substances and pigments which are applied in order to achieve a certain wanted colour and so on.
All substances, out of the 827 registered substances, with a harmonised classification and/or a notified classification, were further evaluated in order to determine if there are any uses on the Danish market by using the Nordic SPIN database which addresses the professional use of substances.

The majority of the examined 827 fragrance substances do not have a harmonised classification. Without harmonised classifications it is up to the suppliers to self-classify the substance, which may cause diffuse classifications and various downstream user preventive measures.
401 substances out of the 827 fragrances were appointed a notified classification addressing sensitisation and/or CMR properties and/or environment. 143 had notified classifications addressing skin sensitisation, 24 mutagenicity, 37 carcinogenicity, 42 reprotoxicity and 341 addressing the environment.

Besides registration under REACH and classification according to the CLP regulation, fragrance substances are regulated in both EU and Danish regulations. These include regulations addressing both workers by regulation of the use of chemicals in the working environment and consumers through directives addressing and setting limits for the content of substances in products such as toys, detergents and cosmetics. For the latter two there is also the requirement for information of 26 allergenic fragrances of special concern for consumers using cosmetics and detergent products. For these 26 fragrances their presence shall be indicated on the list of ingredients on the product if they are present in concentrations above the following limits: leave-on cosmetics > 0.001%, rinse-off cosmetics > 0.01%; detergents > 0.01%.
Four of the retrieved substances appear on the CoRAP list for substances prioritised for evaluation. None of the substances appears on the candidate list of SVHC.

Based on the SCCS opinion on fragrance substances from 2012 the EU Commission has proposed that "*three substances (HICC, atranol and chloroatranol) which were found to be unsafe should be banned from cosmetic products. Further, the Commission has proposed that additional allergens should be subject to the obligation of individual labelling on the package of a cosmetic product. In other words, they have to be mentioned in the list of ingredients, in addition to the words 'parfum' or 'aroma'*". The proposed changes to the Cosmetics Regulation in the form of an implementing act will be subject to a vote by the Member States in the standing Committee on Cosmetics in the near future.

The European Flower Ecolabel and the Nordic Swan Ecolabel generally address fragrances by their classification when evaluating products; excluding substances with a specific classification or setting concentration limits for the content of these substances within the product. The specific requirements are dependent on the product in question and the corresponding criteria document. Furthermore, some ecolabelling criteria include a maximum allowable amount of aquatic toxicity measured as critical dilution volume (CDV). Even small quantities of added fragrance can contribute considerably to an increased CDV. The reason is that a higher score is for instance obtained if the substance is not biodegradable (the case for several fragrance substances). But also the toxicity factor is important, and often a higher factor is applied for substances where there is a lack of data. Therefore fragranced products must improve on other parameters in order to achieve a good environmental profile if the product shall meet the CDV requirement.

Uses
Fragrances are used in a wide variety of products ranging from personal care products (hair care, personal hygiene, feminine care, baby care, fine fragrance and beauty products), household products (textile washing, dishwashing, surface cleaners, and polishes and waxes), and a variety of products like foods, toys, diapers and baby-wipes, fresh scent tablets for vacuum cleaner bags, scented candles, air fresheners, erasers, perfumes to pets, biocide products, paint, toilet paper and cutting oils.

Approximately 75% of the worldwide production of fragrance substances is used for personal care products and fine perfumes (eau de perfume, eau de toilette, eau de cologne), and the remaining approximately 25% is used for household products and consumer products like toys, air fresheners

etc.. The concentration of fragrance in a product is closely related to the product type but may vary from small concentrations of less than 0.01% to several percentages in e.g. eau de toilette.
Several studies of the use of fragrances in consumer products (mainly cosmetics and household products) have shown that D-limonene is by far the most used fragrance in consumer products, followed by linalool and butylphenyl methylpropionate. All three substances are evaluated as human allergens by SCCS. This use pattern is based on data of approximately 6-10 years of age. Thus the picture could be different today. However, newer data from e.g. surveys have not been found in the literature.
Information on use volumes and the tonnage of preparations in Denmark (year 2012) has been retrieved from the Nordic SPIN Database. From the data it can be seen that 278 out of 827 substances are registered as "used" in Denmark. However, data only cover professional uses. For 35 substances, data is reported as confidential in the database and therefore no information on the tonnage and the numbers of preparations is available. Information from the Danish product register was also assessed. Focus were on the product groups in which the substances are likely to be applied as fragrance substances (cleaning/washing agents, cosmetics and cutting fluids) and on substances which are associated with a scent (HHCB, Citral, l-limonene and d-limonene). The highest concentration within *cosmetic products* is reported for HHCB (CAS 1222-05-5) where concentrations up to 11% are registered. In *odour masking agents* (used for e.g. cat litter, sanitary products, paints or rubber to mask upleasent smell), which is the product group with the highest concentrations of fragrance substances, 50%, 100% and 90% are reported for HHCB (CAS 1222-05-5), Citral (CAS: 5392-40-5) and d-limonene (CAS: 5989-27-5), respectively. All three substances are evaluated as human allergens by SCCS.

Waste
According to the EU and Danish legislations on waste, waste generated during manufacturing and from industrial use has to be treated as hazardous waste if the waste contains substances in concentrations that would result in classification according to classification rules for chemical substances and preparations. Because perfume substances are applied in a wide variety of products, several types of waste may contain perfumes. Fragrance substances contained in liquid products will most likely end up in waste water and subsequent treatment in water treatment plants.

The subsequent fate of the substances will depend on their physico-chemical and fate properties. If the substance passes a waste water treatment plant before being discharged into the environment, readily biodegradable substances will be degraded to a large extend in the waste water treatment plants, and only a minor fraction will be emitted into the receiving environment. If the substance is not degraded, it might end up in receiving surface waters.
Some substances (Log Kow > 4.5) are adsorbed to sludge and may distribute to the terrestrial compartment if the sludge is subsequently applied to agricultural soil.
Solid waste containing fragrance substances will most likely end up in landfills or be incinerated.

Environmental effects
Regarding effects and exposure in the environment, it was decided only to address the 43 substances which were appointed a harmonised classification addressing the environment.
Studies on both acute and chronic toxicity to fish, crustaceans and algae were available. In general the toxicity of these substances is in the higher end, i.e. EC50 and NOEC values < 1-10 mg/L (as might also be expected since the substances have a harmonised classification).
Only a few toxicity data for sediment organisms and microorganisms were available. Data were available for the terrestrial compartment for most of the fragrance substances.

None of the fragrance substances evaluated in this report is to be considered as persistent (P), bioaccumulative (B) and Toxic (T). I.e. none of the substances are PBT substances nor very persistent (vP) or very bioaccumulative (vB).

As described before fragrance substances are applied in a wide variety of consumer products (cosmetics, laundry detergents, fabric softeners, all-purpose cleaners, car care products etc.), and therefore perfume substances are likely to be disposed of to the sewer system during use. This is therefore a likely source for the exposure of the aquatic compartment if substances are not degraded during waste water treatment. Containers applied for the above mentioned products, and which contain residues, or other product groups in which perfumes are applied such as different kinds of wipes, hygiene pads etc. might result in the release of perfume substances to soil when disposed of in landfills if not incinerated.

Some fragrance substances occur naturally in plants. Plants have long been used in perfumery as a source of essential oils and aroma compounds. Fragrances are extracted from bark (e.g. cinnamon), flowers (rose, jasmine, geranium etc.), fruits (orange, lemon, apples etc.), leaves (lavender, rosemary etc.), resin and terpenes. Others have animal origin. Examples are musk (retrieved from the glands of the musk deer) and civet (also called Civet Musk, which is obtained from the odorous sacs of the civets.

The distribution of fragrance substances among the different compartments (air, water, soil and sediment) is dependent on the physico-chemical properties of the substances. A data search was performed in order to find available information on substance concentrations in the environmental compartments. For most substances, monitoring data are not available. Environmental fate and monitoring data for fragrance substances were therefore exemplified through substances (HHCB and Limonene) where data have been available and do not represent all the substances identified.

The environmental risk is defined as the ratio of the predicted environmental concentration (PEC) to the predicted no effect concentration (PNEC). If the PEC exceeds the PNEC, a risk cannot be excluded (PEC/PNEC >1). Only a few monitoring data are available for fragrance substances, and therefore it is often not possible to evaluate whether there might be a risk towards the environmental compartment for these substances. Monitoring data or calculations of the predicted environmental concentrations are necessary in order to define if there is a possible risk. Monitoring data do not only reflect the release due to the use of fragrance substances in perfumes. In many cases other applications in non-perfume products contribute much more to the environmental concentrations. However the use in perfumes is expected to be significant for HHCB and Limonene which were assessed in more detail in this report.

The measured concentrations of HHCB in surface water (fresh- and marine water) were below the detection limit (0.001 µg/L). This is also lower than the $PNEC_{freshwater}$ and $PNEC_{marine}$ of 4.4 µg/L and 0.44 µg/L respectively. However the highest surface concentration (4.3 µg/L (90th percentile values)) reported in the HERA report is higher than the $PNEC_{marine}$.
The sediment concentration (724 µg/kg dw) which was reported in a report by DMU is lower than the $PNEC_{sediment}$ = 2.0 mg/kg dw. However reported concentrations in sediment obtained from the HERA report are above the $PNEC_{sediment}$. The available environmental concentration was also found to be lower than the PNEC-value which was reported for the sewage treatment plant.

Few monitoring data were available limonene. The reported concentrations in the aquatic environment were in the ng/L range which is below the $PNEC_{freshwater}$ of 5.4 µg/L and $PNEC_{marine}$ of 0.54 µg/L (REACH registration data). However, *single* data found on soil concentrations (920 µg/g in polluted areas) is above the calculated $PNEC_{soil}$ (0.262 mg/kg soil).

Human health effects
As already illustrated above, commercial perfumes may contain hundreds of individual fragrance chemicals. The main concern to humans regarding the use of fragrance substances is undoubtedly the development of skin sensitisation to fragrances in the general population. In addition to this,

fragrances in the air may act as irritants and cause different symptoms like headache and sneezing, and possible Multiple Chemical sensitivity; MCS.

Skin sensitisation to fragrances is a lifelong condition that may give rise to permanent or recurrent contact dermatitis and affect the quality of life. Around 1-4% of the general population and 16% of eczema patients in the European population are sensitised to fragrance substances. An increase of contact allergy in children is also observed during the past decade, and especially in girls above the age of 13 probably due to an increased use of cosmetic products in that age group and above compared to earlier. Direct contact to skin from cosmetics and household products seems to be the most important exposure when it comes to skin sensitisation to fragrances.

Exposure via inhalation from e.g. air fresheners or from toys seems of lesser importance. However, there is limited knowledge on the respiration sensitisation potential for most fragrance substances, like knowledge of their irritation potential through exposure by inhalation. Fragrance substances in the indoor air may act as irritants and may have an effect on the so-called MCS condition, were previously healthy individual experiences multiple, non-specific symptoms when exposed to chemical odours at very low concentrations. However, the causes and effects of MSC have not been fully investigated and the knowledge is thus limited.

The Scientific Committee on Consumer Safety (SCCS) has assessed 82 fragrance substances (including the 26 fragrances which must be declared on the label) as allergenic to humans. 12 single substances (all 12 being part of the group of the 26 regulated fragrances) and 8 natural extracts were found to be of special concern; hydroxyisohexyl 3-cyclohexene carboxaldehyde (HICC) in particular as the substance have been the cause of more than 1500 reported cases since 1999. Furthermore, approximately 100 other fragrance substances were found allergenic in animals or by modelling by SCCS.

Overall, only a few fragrance substances, out of 44 substances (38 with classifications addressing human health) which were selected in this project, have a harmonised classification for their skin sensitising potential. Only citral and limonene have both a harmonised classification for skin sensitisation and are mentioned as human allergens in the SCCS opinion. 7 fragrance substances - out of the 38 selected for this project – were identified as human allergens by SCCS, and are all self-classified for their skin sensitising potential by most notifiers except benzyl alcohol and benzyl benzoate, where only few notifiers have self-classified for their skin sensitisation potential. In total, 15 of the 38 substances (selected by the criteria above) are self-classified for their skin sensitisation potential.

Fragrance substances may have other toxicological effects such as acute toxicity by oral intake as well as indicated for some of the substances with harmonised classifications; however, these other human health hazards have not been examined further in this project except CMR properties of the substances, which were evaluated, based on harmonised classifications. Only one out of the 38 substances has a harmonised classification for its effects on reproduction (n-hexane).

Human exposure and health impact

The main concern regarding the use of fragrance substances is the development of perfume allergy in the general population. As described above around 1-4% of the general population and 16% of eczema patients in the European population are sensitised to fragrance substances. Fragrances are widely used in many product types even though cosmetic products are the main contributor to exposure to fragrances. Thus, both the consumer and also workers in specific occupations are exposed to fragrances on a daily basis and this may pose a health risk to the consumer and worker. Some of the most commonly used fragrance substances are limonene and linalool, which both, by SCCS (2012), are evaluated as human allergens of special concern.

In general data are inadequate for a quantitative estimation of the exposure to consumers from the wide and disperse use of fragranced products. This is also the case for children where there is a lack of information on the exposure to perfumes from uses of scented products (e.g. toys).

There seems to be a higher risk for developing skin allergy for specific occupations; especially occupations with a high degree of contact with cosmetic products during a working day or occupational contact with both water and cosmetics or cleaners. In these cases the workers' health regulation requires substitution considerations when working with hazardous substances and materials, including allergens. Where it is possible to remove or replace or reduce exposure to a minimum without significant technical differences, or expenses, the employer shall ensure this. In many processes, including cleaning, this will mean in practice to use non-scented products.

Declaration of perfume on consumer products is important in clinical practice for diagnostic purposes. It is also important for the patients in order to avoid future exposure to fragrance contact allergens which they may not tolerate. However, these measures may not be sufficient as a part of the sensitised population might not be diagnosed.

Due to reduction of concentrations in products or the replacement by other fragrances, prevalence of fragrance allergy for specific substances fluctuates in time. On one hand reductions in concentrations of fragrances in products can lead to decreases in sensitisation among the population towards the specific substances. On the other hand, the prevalence of sensitisation towards the alternative fragrances used in cosmetics and other consumer products may increase.

Based on data on elicitation levels in sensitised individuals, SCCS (2012) concluded that a level of exposure for fragrances of up to 0.01% may be tolerated by most consumers with contact allergy to fragrance allergens based on dose elicitation studies available. Such a threshold based on elicitation levels in sensitised individuals is believed to be sufficiently low to protect both sensitised individuals and most of the non-sensitised consumers from developing contact allergy. For some products such a concentration limit will not be feasible. For example eau de perfume may contain concentrations of several percent of a single fragrance, while for other types of products, it may be possible to keep the fragrance concentrations at a low level and still maintain the advantage of the fragrance. However, it is important to stress that a general threshold of 0.01%, although limiting the problem, does not preclude that the most sensitive segment of the population may react upon exposure to these levels. Hence, this threshold does not remove the necessity for providing information to the consumer concerning the presence of the fragrance substance in cosmetics and other products containing fragrance.

Alternatives

For consumers, the most effective alternative to fragrances would in many cases be to choose fragrance-free products instead. However, many consumers prefer to use scented products as perfumes may remove an unpleasant odour or they are experienced as something pleasant. Moreover, it is not possible for the consumer to choose the fragrance-free alternative for all types of products, which are normally added perfume. It would be possible for a consumer, however, to reduce the total load of exposure to fragrances by actively avoiding perfumes in some products (e.g. toys, deodorants, diapers).

Another possibility is to substitute certain fragrance substances, especially the ones of special concern. However, this may be a challenging option, as some scents, requested by general consumers (who do not suffer from allergy), may not be available anymore. Furthermore, to avoid allergies, possible alternatives could be to use other fragrances than the 82 known human allergens. However, there might be the possibility that, also for these "other fragrances", allergies would develop with time and therefore the best option is probably still to avoid products containing

perfume or to ensure a lower concentration of fragrance in the single products (e.g. the safe concentration limit of 0.01% proposed by SCCS).

In the working environment, scent-free or scent-reduction policy should be used in order to reduce known allergens in the working environment. In general, the working environmental legislation require that work is planned and organised in such a way that risks to the health and safety of the workers handling hazardous chemical agents (including allergens) are eliminated or reduced to a minimum. Any unnecessary exposure must be avoided.

Perspective - datagaps
This survey on fragrance substances has shown that a large group of substances is used to produce perfumes and for some of them a limited amount of data is available on their use and possible impact on health and/or environment. This applies both to consumer and professionel use. For many of the substances their use in cosmetics is well-known. However, the information on which specific fragrance substances used in other product types is limited. Thus, surveys of their use in other consumer products could add value to information on impact on human health. Additional, the impact of declaration of specific fragrances on consumer products should be investigated to elucidate the effects of the regulation. This could also illustrate whether this kind of provision would add value for other consumer products than cosmetics and detergents.

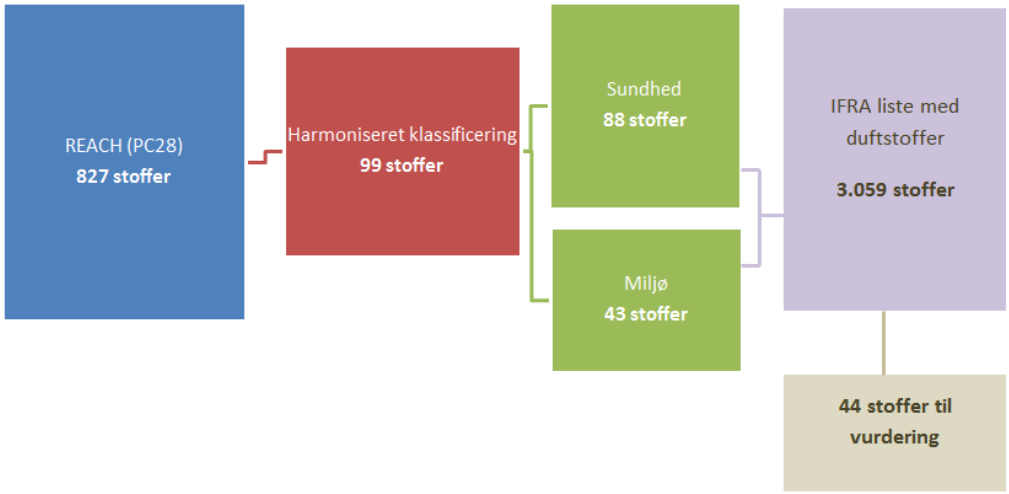
Sammenfatning og konklusion

Duftstoffer er stoffer med en karakteristisk og normalt behagelig duft. Ifølge den engelske ordbog er parfumer defineret som "stoffer, der udsender og udbreder en duft, især en flygtig væske destilleret fra blomster eller fremstillet syntetisk." Parfumer er sammensat af en blanding af flere duftstoffer, fx. blandinger af æteriske olier eller aromastoffer, fikseringsmidler og opløsningsmidler, dvs. også stoffer, som ikke udgør selve duften i parfumen. I virkeligheden kan en parfume bestå af fra ti til mere end 300 grundlæggende komponenter.
Gruppen af duftstoffer omfatter en lang række forskellige stoffer; den største gruppe er terpenoider (fx limonen, farnesol, retinol etc.). Faktisk er der så mange kendte duftstoffer (flere tusinde), at det ikke har været muligt at undersøge alle inden for rammerne af dette projekt. Således har det været nødvendigt, at reducere antallet af stoffer, der skulle indgå i dette projekt. Formålet med dette projekt har været at danne et overblik over stofgruppen, og også at give indsigt i både velkendte allergifremkaldende virkninger af nogle af disse stoffer samt andre potentielle skadelige effekter, og beskrive de vigtigste produktgrupper, hvor parfume anvendes. Overblikket kan dog kun være en foreløbig undersøgelse af denne store gruppe af stoffer idet tid og økonomi ikke tillod en grundig undersøgelse af alle stoffer.
Det blev i denne undersøgelse besluttet at fokusere på harmoniserede klassificerede stoffer registreret under REACH og inkluderet i listen over duftstoffer udviklet af IFRA. Ved at bruge denne metode er der en risiko for, at nogle af de mest anvendte parfumestoffer kan være blevet fravalgt fra undersøgelsen. Desuden viste undersøgelsen, at ikke alle stoffer, som er fundet allergene i mennesker er klassificerede som sådan, så den valgte tilgang også kan have fravalgt stoffer med potentielt sundhedsmæssige effekter. Dette er dog delvis behandlet i afsnittet om sundhedsefffekter, hvor listen over kendte humane allergener udviklet af VKF er medtaget.

En datasøgning blev udført, med henblik på at definere, hvilke stoffer der udgør gruppen "parfume". Også de klassifikationer der vedrører menneskers sundhed og miljøet er blevet behandlet og endeligt er anvendelserne af disse stoffer blev evalueret, både med hensyn til mængden af stof, der anvendes (i Danmark), og antallet af præparater på det danske marked, der indeholder stofferne.

Ifølge IFRA (International Fragrance Association), er der ca.3.000 stoffer, der anvendes i parfumeindustrien. Ifølge ECHA-databasen over registrerede stoffer, er der 827 stoffer, med en anvendt tonnage over 1 ton, som er registreret inden for produktkategorien "PC28", der udgør "duftstoffer/parfume". Det er dog kun ca. 40 % af disse registrerede stoffer som er opført på listen fra IFRA. En del af forklaringen på, at alle registrerede stoffer ikke er på IFRA liste og omvendt kunne være, at listen fra IFRA er dateret tilbage til 2011, og de registrerede data er fra 2014. Der kan være taget nye stoffer i brug i løbet af de sidste tre år. En anden forklaring kunne være, at nogle af de stoffer, der er registreret inden for produktkategorien PC28 kun anvendes i produktionen af parfumer (mellemprodukter), og derfor ikke er indeholdt i det endelige produkt. En anden forklaring, der kan forklare nogle af uoverensstemmelserne mellem de to lister kan være, at mange af stofferne på IRFAs liste ikke er registrerede, fordi de ikke bliver produceret eller importeret i en mængde, som udløser et krav om registrering (på nuværende tidspunkt 100 tons; efter 2018 1 tons). Ifølge IFRA anvendes 90 af de 100 stoffer der årligt anvendes i mængder højere end 175 tons, som duftstoffer i parfumeformuleringer og de resterende ti anvendes til andre funktioner såsom opløsningsmidler eller antioxidanter.

Klassificering og anden regulering
C & L-fortegnelsen blev gennemgået for at finde både de harmoniserede fareklassificeringer samt selv-klassificeringerne, i henhold til bilag VI i forordning (EF) nr 1272/2008 (CLP-forordningen), for de 827 parfumestoffer. Disse data er præsenteret i appendiks 1-
Resultaterne fra data præsenteret i appendiks 1 var, at:
• 401 af de 827 stoffer har en selvklassificering som omhandler CMR-egenskaber og / eller overfølsomhed og / eller miljø.
• ud af de 827 registrerede stoffer, har i alt 99 af stofferne en harmoniseret klassificering.
• 88 stoffer har en harmoniseret klassificering der adresserer menneskers sundhed
• 43 stoffer har en harmoniseret klassificering der adresserer miljøet.
• nogle stoffer har både en harmoniseret klassificering der adresserer menneskers sundhed og miljøet.
• med hensyn til klassifikationer, der adresserer sundhed er 38 af de 88 stoffer medtaget i IFRAs liste, der dækker 3.059 duftstoffer i brug.
• med hensyn til miljø klassificeringer er 20 af de 43 stoffer også inkluderet i IFRAs liste.
Alt i alt er 44 stoffer med en harmoniseret klassificering også medtaget i IFRAs liste og disse blev udpeget med henblik på en yderligere vurdering.



DIAGRAM, DER OPSUMMERER UDVÆLGELESEN AF DE 44 STOFFER TIL YDERLIGERE VURDERING

Gruppen af 44 parfumestoffer indeholder ikke kun stoffer, som vi forbinder med en duft. Gruppen består også af stoffer, der anvendes til at holde parfumen på væskeform (opløsningsmiddel), til at konservere parfumen, og dermed også duften, adjuvanser; dvs. stoffer, der modificerer virkningen af andre stoffer samt pigmenter, der anvendes til at opnå en bestemt farve og så videre.
Alle stoffer, ud af de 827 registrerede stoffer, med en harmoniseret klassificering og/eller en selvklassificering, blev yderligere evalueret for at afgøre, om der er nogen anvendelser på det danske marked ved at bruge den nordiske SPIN database, som indeholder informationer om professionel anvendelse af stoffer.

Hovedparten af de undersøgte 827 parfumestoffer har ikke en harmoniseret klassificering. Uden den harmoniserede klassificering er det op til leverandørerne at selvklassificere stoffet, dette kan forårsage diffuse klassificeringer og forskellige forebyggende foranstaltninger for downstream-brugere. 401 stoffer ud af de 827 duftstoffer har en selvklassificering der adresserer sensibilisering og/eller CMR-egenskaberne og/eller miljø. 143 har en selvklassificering der adresserer hudsensibilisering, 24 mutagenicitet, 37 carcinogenicitet, 42 reproduktionstoksicitet og 341 adresserer miljøet.

Udover en registrering i henhold til REACH og klassificering i henhold til CLP-forordningen, adresserer både EU og dansk lovgivning stoffer ud fra deres klassificeringer. Klassificeringer som også kan gælde for nogle få udvalgte stoffer, der er medtaget i denne rapport. Disse reguleringer omfatter både arbejdere, ved regulering af brugen af kemikalier i arbejdsmiljøet og forbrugere gennem direktiver, der vedrører og sætter grænser for indholdet af stoffer i produkter såsom legetøj, rengøringsmidler og kosmetik. For de to sidstnævnte er der også krav om oplysninger af 26 allergene parfumestoffer, der er i særlig fokus for forbrugere, der anvender kosmetik og rengøringsmidler. For disse 26 parfumestoffer skal deres tilstedeværelse anføres på listen over ingredienser på produktet, hvis de er til stede i koncentrationer over følgende grænser: leave-on kosmetiske> 0,001 %, rinse-off kosmetik> 0,01 %; detergenter > 0,01 %.

Fire af de vurderede stoffer er på CoRAP listen over stoffer der prioriteres til evaluering. Ingen af stofferne opført på kandidatlisten over særligt problematiske stoffer (SVHC).

Baseret på EU's Videnskabelige Komité for Forbrugersikkerheds (VKF) vurdering af parfumestoffer fra 2012 har EU-Kommissionen foreslået, at "*tre stoffer (HICC, atranol og chloroatranol), som blev anset for ikke at være sikre at anvende i kosmetiske produkter bør forbydes fra kosmetiske produkter. Yderligere har kommissionen foreslået, at yderligere allergener ud over de 26 bør være underlagt kravet om individuel mærkning på emballagen af et kosmetisk produkt. Med andre ord, de er nødt til at blive nævnt i ingredienslisten, foruden ordene »parfum« eller »aroma«.* ". De foreslåede ændringer til Kosmetikforordningen vil være genstand for en afstemning af medlemsstaterne i Den Stående Komité for Kosmetiske produkter i den nærmeste fremtid.

Det europæiske miljømærke "Blomsten" og det nordiske miljømærke "Svanen" behandler duftstoffer ud fra deres klassificering, når de evaluerer produkter; stoffer med en specifik klassificering udelukkes i disse produkter eller tildeles en koncentrationsgrænse for indholdet af stoffet i produktet. De specifikke krav er afhængige af det pågældende produkt og det tilsvarende krav til miljømærkningen. Desuden anvender begge mærker den kritiske fortyndings (dilution) volumen (CDV). Selv små mængder af en tilsat duft kan bidrage væsentligt til en øget CDV. Årsagen er, at en højere score eksempelvis opnås, hvis stoffet ikke er bionedbrydeligt (tilfældet for flere duftstoffer). Men også toksicitetsfaktoren er vigtig, og ofte vil en højere faktor blive anvendt for stoffer, hvor der er mangel på data. Derfor må parfumerede produkter forbedre deres CDV score på en anden måde, hvis en god miljøprofil skal opnås og CDV kravet opfyldes.

Anvendelser
Duftstoffer anvendes i en lang række produkter lige fra personlige plejemidler (hårpleje, personlig hygiejne, hygiejnebind, baby pleje, eau de parfume og skønhedsprodukter), husholdningsprodukter (vaskemidler til tekstiler, opvaske og rengøringsmidler samt pudsemidler og voks) og en lang række af produkter som levnedsmidler, legetøj, bleer og baby-klude, frisk-duft-tabletter til støvsugerposer, duftlys, luftfriskere, viskelædere, parfume til kæledyr, afskrækningsmidler mod myg, maling, toiletpapir og skæreolier.

Omkring 75 % af verdens produktion af duftstoffer anvendes til produkter til personlig pleje og parfumer (eau de parfume, eau de toilette, eau de cologne), og de resterende ca. 25 % anvendes til husholdningsprodukter og forbrugerprodukter så som legetøj, luftfriskere osv. Koncentrationen af duft i et produkt afhænger af varetypen, men kan variere fra små koncentrationer på mindre end 0,01 % til flere procenter i fx eau de parfume.

Adskillige undersøgelser af brugen af duftstoffer i forbrugerprodukter (hovedsagelig kosmetik og husholdningsprodukter) har vist, at D-limonen er langt det mest anvendte duftstof i forbrugerprodukter, efterfulgt af linalool og butylphenyl methylpropionat. De tre stoffer er alle vurderet som allergene i mennesker af VKF. Dette forbrugsmønster er baseret på data, der er ca. 6-

10 år gamle. Således kan billedet have ændret sig i dag. En litteraturgennemgang har dog ikke vist nyere data fra fx kortlægningsprojekter.
Oplysninger om anvendelsesmængder og tonnager for præparater på det danske marked er blevet hentet fra den Nordiske SPIN database (år 2012). Ud fra disse data kan det ses, at 278 ud af 827 stoffer er registreret som "anvendt" i Danmark. Data dækker imidlertid kun professionelle anvendelser. For 35 stoffer, er data rapporteret som fortrolige i databasen og der er derfor ingen oplysninger om tonnage og antallet af præparater til rådighed. Oplysninger fra det danske produkt-register blev også vurderet. Fokus var på varegrupper, hvor stofferne kan forventes at blive anvendt som duftstoffer (rengøringsmidler, vaskemidler, kosmetik og skærevæsker/olier) og på stoffer, der forbindes med en duft (HHCB, Citral, l-limonen og d-limonen). Den højeste koncentration i kosmetiske produkter er rapporteret for HHCB (CAS 1222-05-05), hvor koncentrationer op til 11 % er registreret. Produkter, hvis formål er at maskere ubehagelig lugt (i fx kattegrus, sanitære produkter, maling eller gummi) er produktgruppen med de højeste koncentrationer af duftstoffer, hvor der er rapporteret 50 %, 100 % og 90 % for henholdsvis HHCB (CAS 1222-05-05), Citral (CAS: 5392-40-5) og d limonen (CAS: 5989-27-5). De tre stoffer er alle vurderet som allergene i mennesker af VKF.

Affald
Ifølge EU og den danske lovgivning om affald, skal affald, der genereres under fremstilling og fra industriel anvendelse behandles som farligt affald, hvis affaldet indeholder stoffer i koncentrationer, der ville resultere i klassificering i henhold til reglerne for klassifikationen af kemiske stoffer og præparater. Fordi parfumestoffer anvendes i en lang række produkter, kan flere typer af affald indeholde parfume. Parfumestoffer, der er indeholdt i flydende produkter vil højst sandsynligt ende i spildevandet og efterfølgende blive ledt til behandling i et rensningsanlæg.

Den efterfølgende skæbne af stofferne vil afhænge af deres fysisk-kemiske egenskaber og deres nedbrydelighed. Hvis stoffet passerer et rensningsanlæg, før det udledes til miljøet, vil let nedbrydelige stoffer i vid udstrækning blive nedbrudt i renseanlægget, og kun en mindre fraktion vil blive ledt videre ud i miljøet. Hvis stoffet ikke nedbrydes, kan det blive udledt til overfladevand. Nogle stoffer (log Kow> 4.5) adsorberes til slam og kan distribueres til det terrestriske miljø, hvis slammet efterfølgende spredes på landbrugsjord.
Fast affald indeholdende parfumestoffer vil højst sandsynligt ende på lossepladser eller blive brændt.

Effekter på miljøet
Med hensyn til effekter på og eksponering af miljøet, blev det besluttet kun at se på de 43 stoffer, der har en harmoniseret klassificering i forhold til miljøet.
Undersøgelser af både den akutte og kroniske toksicitet overfor fisk, krebsdyr og alger var til rådighed. Generelt er toksiciteten af disse stoffer i den højere ende, dvs. EC50 og NOEC værdier <1-10 mg / L (som måske også forventes, da stofferne har en harmoniseret klassificering).
Kun få toksicitetsdata er tilgængelige for sedimentlevende organismer og mikroorganismer. Data var tilgængelige for det terrestriske miljø for de fleste af de udvalgte duftstoffer.

Ingen af de duftstoffer, der er blevet vurderet i denne rapport kan betragtes som persistente (P), bioakkumulerende (B) og giftige (T). Dvs. ingen af stofferne er PBT-stoffer eller meget persistente (VP) eller meget bioakkumulerende (vB).

Som tidligere beskrevet anvendes duftstoffer i en lang række forbrugerprodukter (kosmetik, vaskemidler, skyllemidler, universalrengøringsmidler, bilplejeprodukter mv), og det er derfor sandsynligt at parfumestoffer vil blive bortskaffet med spildevand under brug. Dette er derfor en sandsynlig kilde til eksponering af det akvatiske miljø, hvis stofferne ikke nedbrydes ved spildevandsbehandling. Beholdere anvendt til de ovenfor nævnte produkter, og som indeholder rester, eller andre produktgrupper, hvor parfumer anvendes, såsom forskellige typer af

engangsklude, hygiejne bind etc. kan føre til frigivelse af parfumestoffer til jorden, når produkterne bortskaffes ved deponering, hvis de ikke forbrændes.

Nogle duftstoffer forekommer naturligt i planter. Planter har længe været anvendt til fremstilling af parfumer og udgør en kilde til æteriske olier og aromastoffer. Dufte udvindes af bark (f.eks kanel), blomster (rose, jasmin, geranium etc.), frugter (appelsin, citron, æbler etc.), blade (lavendel, rosmarin etc.), harpiks og terpener. Andre har animalsk oprindelse. Eksempler er moskus (hentet fra kirtler i moskus hjorte) og civet (også kaldet Civet Musk, som stammer fra duftkirtler fra desmerkatte). Disse naturlige kilder vil også kunne bidrage til de miljømæssige koncentrationer af stofferne omend sandsynligvis kun i mindre grad.
Ifølge EUs og dansk lovgivning om affald skal affald, der genereres under fremstilling og fra industriel anvendelse, behandles som farligt affald, hvis affaldet indeholder stoffer i koncentrationer, der ville resultere i klassificering i henhold til klassificeringsreglerne for kemiske stoffer og præparater. Fordi parfumestoffer anvendes i en lang række produkter, kan flere typer affald indeholde parfume. Duftstoffer, der er indeholdt i flydende produkter, vil højst sandsynligt ende i spildevandet og efterfølgende til behandling i rensningsanlæg.

Stoffernes efterfølgende skæbne afhænger af deres fysisk-kemiske og skæbneegenskaber. Hvis stoffet passerer et rensningsanlæg, før det udledes i miljøet, vil let nedbrydelige stoffer blive nedbrudt i vid udstrækning i renseanlægget, og kun en mindre fraktion vil blive udledt i miljøet. Hvis stoffet ikke nedbrydes, kan det ende i det modtagende overfladevand.
Nogle stoffer (Log Kow > 4,5) adsorberes til slam og kan distribueres til det terrestriske miljø, hvis slammet efterfølgende spredes på landbrugsjord.
Fast affald indeholdende duftstoffer vil højst sandsynligt ende på lossepladser eller forbrændes.

Distribution af duftstoffer mellem de forskellige delmiljøer (luft, vand, jord og sediment) er afhængig af stoffernes fysisk-kemiske egenskaber. Der blev udført en datasøgning for at finde oplysninger om stofkoncentrationer i delmiljøerne. For de fleste stoffer er overvågningsdata ikke tilgængelige. Miljømæssig skæbne og overvågningsdata for duftstoffer blev derfor eksemplificeret gennem stoffer (HHCB og Limonene), hvor der er tilgængelige data, men de repræsenterer ikke alle de identificerede stoffer.

Den miljømæssige risiko defineres som forholdet mellem den forudsagte miljøkoncentration (PEC) og den forudsagte ingen-effekt-koncentration (PNEC). Hvis PEC overstiger PNEC, kan risiko ikke udelukkes (PEC/PNEC > 1). Kun få overvågningsdata er tilgængelige for duftstoffer, og det er derfor ofte ikke muligt at vurdere, om der kan være en risiko for delmiljøet for disse stoffer. Overvågningsdata eller beregninger af de forudsagte miljømæssige koncentrationer er nødvendige for at definere, om der er en mulig risiko. Overvågningsdata afspejler ikke kun udslip på grund af anvendelse af duftstoffer i parfumer. I mange tilfælde kan andre anvendelser, i ikke-parfumerede produkter give et mere udtalt bidrag til de miljømæssige koncentrationer. Men anvendelsen i parfumer forventes at være signifikant for HHCB og Limonene, som blev nærmere vurderet i denne rapport.

De målte koncentrationer af HHCB i overfladevand (fersk- og havvand) var under detektionsgrænsen (0,001 µg/L). Dette er også lavere end $PNEC_{freshwater}$ og $PNEC_{marine}$ på henholdsvis 4,4 µg/L og 0,44 µg/L. Men den højeste overfladekoncentration (4,3 µg/L (90. percentil værdier)) rapporteret i HERA rapporten er højere end $PNEC_{marine}$.
Sedimentkoncentrationen (724 µg/kg dw), som blev rapporteret i en rapport fra DMU, er lavere end $PNEC_{sediment}$ = 2,0 mg/kg dw. Men de rapporterede koncentrationer i sediment fra HERA rapporten er højere end $PNEC_{sediment}$. Den tilgængelige miljømæssige koncentration blev også fundet at være lavere end PNEC-værdien, der blev rapporteret for rensningsanlægget.

Få overvågningsdata var tilgængelige for limonen. De rapporterede koncentrationer i vandmiljøet var i området ng/L, hvilket er under $PNEC_{ferskvand}$ på 5,4 µg/L og $PNEC_{marine}$ på 0,54 µg/L (REACH registreringsdata). Men enkelte data fundet på jordkoncentrationer (920 µg/g i forurenede områder) er over den beregnede $PNEC_{soil}$ (0,262 mg/kg jord).

Sundhedseffekter
Som allerede vist ovenfor kan kommercielle parfumer indeholder hundredvis af individuelle duftstoffer. Den største risiko for mennesker i forbindelse med brugen af duftstoffer er udvikling af hudsensibilisering i den almindelige befolkning. Udover dette kan eksponering for parfumestoffer i luften forårsage irritation og hovedpine, og eventuel duft- og kemikalie overfølsomhed; også kendt som MCS (multiple Chemical Sensibility).

Parfumeallergi er en livslang tilstand, der kan give anledning til permanent eller tilbagevendende kontakteksem og påvirke livskvaliteten. Omkring 1-4 % af befolkningen og 16 % af eksempatienter i den europæiske befolkning er overfølsomme over for duftstoffer. En stigning i kontaktallergi hos børn er også observeret i det seneste årti, og især hos piger over 13 år sandsynligvis på grund af en øget brug af kosmetiske produkter i den aldersgruppe og derover i forhold til tidligere.
Direkte kontakt med huden fra kosmetiske produkter og husholdningsprodukter synes at være hovedeksponeringskilden, når det kommer til parfumeallergi. Eksponering via indånding fra fx luftfriskere eller fra legetøj synes af mindre betydning. Men viden om stoffernes respiratoriske sensibiliseringspotentiale er for de fleste parfumestoffer begrænset. Parfumestoffer i indeklimaet kan virke som irritanter og have en effekt på MCS tilstanden, hvor tidligere raske individer får flere ikke-specifikke symptomer, når de udsættes for kemiske lugte ved meget lave koncentrationer. Dog er grundene til MSC ikke blevet fuldt undersøgt, og kendskabet er derfor begrænset.

Den Videnskabelige Komité for Forbrugersikkerhed (VKF) har vurderet 82 duftstoffer (inklusive de 26 deklarationspligtige duftstoffer) til at være allergene for mennesker, hvor 12 enkeltstoffer (alle 12 er en del af gruppen af de 26 regulerede duftstoffer) og 8 naturlige ekstrakter blev fundet at være særligt betænkelige; med hydroxyisohexyl 3-cyclohexene carboxaldehyde (HICC) som den mest betænkelige da stoffet har været årsag til mere end 1500 rapporterede tilfælde a allergi siden 1999.. Desuden blev omkring 100 andre duftstoffer af VKF fundet at være allergene i dyr eller ved modellering.

Alt i alt har kun nogle få duftstoffer, ud af de udvalgte 44 stoffer (38 med en klassificering for sundhed), en harmoniseret klassificering for deres hudsensibiliserende potentiale. Kun citral og limonen har både en harmoniseret klassificering for allergi og er nævnt som humane allergener i VKFs vurdering. 7 parfumestoffer ud af de 38 stoffer udvalgt i dette projekt er af SCCS fundet at være humane allergener. Alle disse er selv-klassificeret for deres hudsensibiliserende potentiale af de fleste anmeldere, undtagen benzylalkohol og benzylbenzoat, hvor kun få anmelderne har selv-klassificeret for hudsensibiliserende potentiale.
Duftstoffer kan have andre toksikologiske virkninger, såsom akut toksicitet ved oral indtagelse, som angivet for nogle af stofferne med harmoniseret klassificering; men disse andre sundhedsrisici er ikke blevet undersøgt yderligere i dette projekt, bortset fra CMR egenskaber, der blev evalueret, baseret på de harmoniserede klassificeringer. Kun et stof ud af de 38 stoffer, har en harmoniseret klassificering for dets virkninger på reproduktion (n-hexan).

Human eksponering og risiko
Den største betænkelighed med hensyn til anvendelse af duftstoffer er udvikling af parfumeallergi i befolkningen generelt. Som beskrevet ovenfor er omkring 1-4 % af befolkningen og 16 % af eksempatienter i den europæiske befolkning overfølsomme over for duftstoffer. Duftstoffer er meget udbredt i mange produkttyper, selv om kosmetiske produkter udgør det største bidrag til eksponering for duftstoffer. Således er både forbrugere og også arbejdere i bestemte erhverv udsat for duftstoffer på daglig basis, og dette kan udgøre en sundhedsmæssig risiko for forbrugeren og

arbejderen. Nogle af de mest almindeligt anvendte duftstoffer er limonen og linalool, som begge vurderes at være særligt betænkelige allergener af VKF.
Generelt er data utilstrækkelige for en kvantitativ vurdering af eksponeringen af forbrugerne af den omfattende og udbredte anvendelse af parfumerede produkter. Dette er også tilfældet for børn, hvor der er mangel på oplysninger om eksponering for parfume ved brug af duftende produkter (fx legetøj).

Arbejdere i bestemte erhverv synes at have større risiko for hudallergi end andre; især erhverv med en høj grad af kontakt med kosmetiske produkter i løbet af en arbejdsdag eller erhverv i kontakt med både vand og kosmetik eller rengøringsmidler. Ved arbejde med farlige stoffer og materialer, herunder allergener, kræver lovgivningen substitutionsovervejelser. Hvor det er muligt at fjerne eller erstatte eller reducere eksponeringen til et minimum uden væsentlige tekniske forskelle eller udgifter, skal arbejdsgiveren sørge for dette. I mange processer, herunder rengøring, vil det i praksis betyde at der skal anvendes parfumefrie produkter.

Deklaration af parfume på forbrugerprodukter er vigtig i klinisk praksis til diagnostiske formål. Det er også vigtigt for patienterne for at undgå fremtidig udsættelse for duft kontaktallergener, som de ikke kan tåle. Dog er disse foranstaltninger ikke tilstrækkelige, da en del af den sensibiliserede befolkning muligvis ikke vil blive diagnosticeret.
På grund af reduktion af koncentrationerne af duftstoffer i produkter eller erstatning med andre dufte svinger forekomsten af duftallergi for bestemte stoffer. På den ene side kan reduktion i duftstofkoncentrationer i produkter føre til et fald blandt befolkningen i sensibilisering over for de specifikke stoffer. På den anden side kan forekomst af sensibilisering over for de alternative duftstoffer, der anvendes i kosmetik og andre forbrugerprodukter, stige.
Baseret på data om koncentrationsniveauer, der udløser allergi allerede sensibiliserede personer (elicitation) konkluderede VKF (2012), at et eksponeringsniveau for duftstoffer på op til 0,01 % kan tåles af de fleste forbrugere med kontaktallergi over for duftstoffer. Sådan en grænse menes at være tilstrækkelig lav til at beskytte både sensibiliserede personer og de fleste ikke-overfølsomme forbrugere mod at udvikle kontaktallergi. For nogle produkter vil en sådan koncentrationsgrænse ikke være muligt da der fx i eau de parfume kan forekomme koncentrationer på flere % af et enkelt duftstof, mens det for andre produkttyper vil det være muligt at holde duftstofkoncentrationerne nede på et lavt niveau og stadig bibeholde fordelen ved anvendelen af duft. Det er imidlertid vigtigt at understrege, at en generel grænse på 0,01 %, selvom den vil begrænse problemet, ikke udelukker, at den mest følsomme del af befolkningen kan reagere ved eksponering for disse niveauer.
Derfor fjerner denne grænse ikke behovet for at give oplysninger til forbrugeren om tilstedeværelse af duftstoffer i kosmetik og andre produkter, der indeholder duftstoffer.

Alternativer
For forbrugerne vil det mest effektive alternativ til duftstoffer i mange tilfælde være at vælge duft-frie produkter i stedet. Mange forbrugere foretrækker dog at bruge parfumerede produkter da parfume kan fjerne en ubehagelig lugt eller de opleves som noget behageligt. Desuden er det ikke muligt for forbrugeren at vælge det duft-frie alternativ til alle typer af produkter, som normalt tilsættes parfume. Det vil dog være muligt for en forbruger at reducere den samlede belastning af udsættelse for duftstoffer ved aktivt at undgå parfume i nogle produkter (f.eks legetøj, deodoranter, bleer).

En anden mulighed er at erstatte visse duftstoffer, især dem som er specielt bekymrende. Dette kan dog være teknisk udfordrende da nogle dufte, som almindelige forbrugere (som ikke lider af allergi) efterspørger så måske ikke længere er tilgængeligt. Endvidere, kunne mulige alternativer for at undgå allergi være at bruge andre duftstoffer end de 82 kendte humane allergener. Dog kan der være mulighed for, at også for disse "andre duftstoffer", ville udvikle allergi med tiden som forbruget stiger. Derfor den bedste løsning sandsynligvis stadig at undgå produkter, der indeholder parfume eller sikre en lavere koncentration af duft i de enkelte produkter (fx en sikker

koncentrationsgrænse på 0,01% som foreslået af SCCS).

I arbejdsmiljøet bør duft-fri eller duft-reducerede tiltag indføres for at reducere kendte allergener i arbejdsmiljøet, hvilket der også er krav om i arbejdsmiljølovgivningen. Lovgivningen kræver at arbejdet er organiseret på en sådan måde, at risiciene for sundhed og sikkerhed for arbejdere, der håndterer farlige kemiske agenser (herunder allergener) elimineres eller reduceres til et minimum. Unødig påvirkning skal undgås.

Perspektivering – næste trin
Denne undersøgelse af duftstoffer har vist, at en stor gruppe af stoffer anvendes til at fremstille parfume, og for nogle af dem er en begrænset mængde data tilgængelig for deres anvendelse og mulige indvirkning på sundhed og/eller miljø. Det gælder både for forbrugeranvendelsen og den erhvervsmæssige anvendelse. For mange af stofferne er deres anvendelse i kosmetiske produkter velkendt og velundersøgte. Dog er oplysninger om, hvilke specifikke duftstoffer, der anvendes i andre produkttyper begrænset. Således kunne nye kortlægninger af deres anvendelse i andre typer af forbrugerprodukter end kosmetiskse produkter tilføre værdi i forhold til information på deres indvirkning på menneskers sundhed. Yderligere, bør virkningen af deklarationspligten (for specifikke duftstoffer på nogle produkttyper) undersøges for at belyse virkningerne af deklarationen. Dette bl.a. med henblik på at belyse, om denne regulering vil tilføre værdi, hvis det indføres for andre forbrugerprodukter end kosmetik og vaske- og rengøringsmidler.

1. Introduction to the substance group

1.1 Definition of the substance group

Fragrance and flavour substances are compounds with a characteristic and usually pleasant odour. According to the English dictionary perfumes are defined as "*substances that emit and diffuse a fragrant odour, especially a volatile liquid distilled from flowers or prepared synthetically*".

According to IFRA; the International Fragrance Association, *Fragrances create important benefits that are ubiquitous, tangible, and valued. They solve important functional problems and they satisfy valued emotional needs. On a functional level, the complex properties of fragrances allow individuals to control or remove malodour: the bad smells that afflict the everyday lives of millions. Control of these smells, using fragrances embedded in household and personal care products, improves the physical quality of people's lives. As well as combating malodour, fragrances communicate complex ideas – creating mood, signalling cleanliness, freshness, or softness, alleviating stress, creating well-being, and triggering allure and attraction.*

Chemically, fragrances are a large unhomogeneously group of substances. The largest group of natural fragrances belongs to the group of plant derived terpenoids, which are defined as material made of isoprene units $(C_5H_8)n$ like monoterpenes ($C_{10}H_{16}$) (e.g. limonene and linalyl acetate), sesquiterpenes ($C_{15}H_{24}$) (e.g farnesol), dipentenes ($C_{20}H_{32}$) (e.g. retinol) and so on depending on the numbers of isoprene units. Terpenoids have the same chemical characteristics; especially of interest is: terpene alcohols, aldehydes and ketones. The terpenes and terpenoids occur naturally as constituents of essential plant oils and include a large number of fragrances and flavourings. Many of them are included in the industrial production of perfumes, cosmetics, food and beverages. However, relatively few terpenes occur naturally in such high concentrations that they by advantage can be extracted directly from natural sources. Thus, most of the commercially important parts of the terpenes are produced synthetically or semi-synthetically.

Perfumes are not only composed of a single fragrance substance but are composed as a mixture of several components, i.e. mixtures of essential oils or aroma compounds including preservatives, pigments, fixatives and solvents. In fact the SCCS[1] states that a perfume mix may consist of ten to more than 300 basic components selected from about 3,000 different known fragrances (SCCS, 2012; IFRA, September 2014). Table 1 indicates the functions of the substances evaluated in this project.

The function of perfumes is to give the human body, animals, food, objects, and living spaces a pleasant scent. Thus, fragrance substances are used in perfumes and other perfumed cosmetic products, but also in detergents, fabric softeners, and other household products where fragrance may be used to mask unpleasant odours from raw materials. Flavourings are used in foods,

[1] SCCS (Scientific Committee on Consumer Safety) is one of three independent non-food Scientific Committees providing the Commission with the scientific advice it needs when preparing policy and proposals relating to consumer safety, public health and the environment. The Committees also draw the Commission's attention to the new or emerging problems which may pose an actual or potential threat. The opinions of the Scientific Committees present the views of the independent scientists who are members of the committees. They do not necessarily reflect the views of the European Commission.

beverages, and dental products. Fragrance substances are also used in aromatherapy and may be present in herbal products, and used as topical medicaments for their antiseptic properties.

1.2 Limitation of the substance group

The group of fragrance substances includes a large number of different substances. In fact there are so many substances that they cannot all be examined within the framework of this project. Therefore, the first task within this project has been to find a reasonable way to limit the scope to those perfumes which are of most concern due to hazardous properties and/or widespread use etc. This has been done in three steps. The first step has been to search available literature and databases in order to define what substances and in which numbers, constitute the group "perfumes". Secondly, the classifications addressing human health and the environment have been listed, and thirdly the uses of these substances have been evaluated, both regarding the tonnage of substance applied (in Denmark) and the numbers of preparations on the Danish market which contain the single substances. The single tasks and the results obtained are described and presented below.

1.2.1 Task 1 - Literature search

The largest list of substances found during the data search was the list of substances presented on the IFRA webpage. IFRA, the International Fragrance Association, has published a list with 3,059 substances and mixtures of substances which have been reported used in the formulation of perfumes in 2011. The list of fragrance ingredients was generated from the IFRA 2008 Use Survey and represents approximately 90% of the world's production volume of fragrances. For some natural materials there might be multiple entries, possibly because sometimes one CAS number covers more than one extract from different parts of a plant (IFRA, 2011).

In 1999, the Scientific Committee on Cosmetic Products and Non-food products intended for Consumers (SCCNFP) published a list of 26 fragrances with a well-recognised potential to cause allergy in humans, and for which the Committee recommended that information about their presence in cosmetic products should be provided to consumers by declaration on the label (SCCNFP, 1999). The 26 allergenic fragrance substances were introduced into annex III of the Cosmetics Directive by the 7th amendment (2003/15/EC) on the basis of the SCCNFP opinion (see chapter 2).

In 2012 the Scientific Committee on Consumer Safety (SCCS) published an opinion on fragrance allergens in Cosmetic products (2012). This opinion is an update of the SCCNFP opinion and includes a systematic and critical review of the scientific literature to identify fragrance allergens, including natural extracts, relevant to consumers. Clinical, epidemiological and experimental studies were evaluated, as well as modelling studies performed, to create a list of established fragrance allergens, *likely* fragrance allergens and *possible* fragrance allergens. A total of *82* fragrances (54 individual substances and 28 natural extracts; including in total approximately *115* CAS numbers) were listed as *established* contact allergens in humans. Twelve of these 54 individual substances are of special concern as more than 100 and up to 1,000 cases of allergy in humans have been published for these substances. Furthermore, 6 natural extracts are also considered of special concern (for more information see Chapter 6.1.1).

Furthermore, the ECHA database on registered substances was consulted in order to identify substances registered within the product category "PC28" which covers "fragrances/perfume". According to ECHA an overall number of 844 substances are registered within this group (Data retrieved, July 2014). However, some CAS numbers appear more than once and the final number is therefore 827 substances.
Out of the 115 CAS numbers which are listed as "Established contact allergens in humans" in the SCCS opinion (2012), 34 CAS numbers are also among the substances registered under REACH.

Approximately 40% of the registered fragrances/perfumes are also included in IFRAs list with 3,059 substances and mixtures of substances which have been reported as used fragrance compounds in 2011.

After having discussed the different sources described above within the working group, it was decided to focus also on substances registered under REACH (task 2), i.e. the 827 substances registered as fragrances/perfumes (PC28). This decision was made based on the consideration that substances which are registered under REACH are in fact currently on the market.

1.2.2 Task 2 – Classification

The C&L inventory was searched in order to find both harmonised and notified classification according to Annex VI of Regulation (EC) No 1272/2008 (CLP Regulation) for the 827 perfume substances selected under Task 1. Based on a dialogue with the Danish Environmental Protection Agency (Danish EPA) it was decided to focus only on classifications addressing CMR and/or sensitising properties and the environment. The results are presented in Appendix 1:

Out of the 827 registered substances, in total, 99 of the substances have a harmonised classification; 88 substances have a harmonised classification addressing human health and 43 substances have a classification addressing the environment. In total 401 of the 827 substances have a notified classification which addresses CMR properties and/or sensitisation and/or environment (see Table 3 in Chapter 0 for the distribution of different notified classifications).
All substances with a harmonised classification and/or a notified classification were further evaluated in order to determine if there are any uses on the Danish market (Task 3).

20 of the 43 registered substances with a harmonised classification addressing the environment are also included in IFRA's list with 3,059 materials. Regarding human health, 38 of the 88 substances are also included in IFRA's list. Parts of the reason that all registered substances are not on the IFRA list could be that:

1. the list from IFRA is dated to 2011 and the registration data were retrieved in 2014. Perhaps, new fragrance substances have been taken into use during the last three years or
2. some substances on the list are just not produced or imported in an amount which triggers a requirement for registration, and therefore they do not appear on the list of registered substances. However, another explanation, which was also discussed by the Nordic Ecolabelling board (NMC, 2012) and which comes from experience from dealing with cosmetics cases is *"that*
3. it is not easy to define when something is a fragrance. Often the person dealing with the *cosmetic cosmeti*c substance will have to make a decision on whether *a substance* is a fragrance or an additive with a different characteristic*"*. This was also discussed by the Nordic Ecolabelling board and comes from experience from dealing with cosmetics (NMC, 2012).
4. Some of the substances on the list of registered substances may *be intermediates and not used in the finished products. The IFRA list is based on materials actually used, whereas REACH is based on production. This may explain the discrepancy* (IFRA personal communication, 2014).

1.2.3 Task 3 - Uses

In order to select substances which are on the Danish market, the SPIN database ("Substances in Preparations in the Nordic Countries") was consulted. The SPIN database is the result of a common Nordic initiative to gather non-confidential, summarised information from the Nordic product registers on the common use of chemical substances in different types of products and industrial areas.
From the database, information of use volumes and information on the distribution of perfume substances in preparations in Denmark was found. Data for the Danish market are only for

professional uses and not consumer use. Results for the latest entry into the database (i.e. data from 2012) are presented in Appendix 1:

1.2.4 Task 4 - Perfume substances selected for assessment

Based on tasks 1-3 above, it was decided to:

- continue with the substances which have a harmonised classification (in total 99 substances)
- focus only on the environmental effects and exposure of substances with a classification addressing the environment (43 substances out of the total 99)
- focus only on the human health effects and exposure of substances with a classification addressing human health and substances of special concern regarding allergies in humans (88 substances out of the total 99)
- highlight the effects of those substances which are also included on the IFRA list of 3,059 substances and mixtures of substances reported as used in perfumes in 2011 (44 substances out of the total 99)

Regarding environmental effects, the ecotoxicity of selected substances are addressed as well as the environmental fate of these substances in form of their biodegradation and bioaccumulation potential (i.e. PBT properties). In this way, it will be possible to compare substances.

Regarding human health effects, perfume substances are described as a group instead of addressing each single perfume substance one at a time, and also focusing on fragrance substances regarded of concern by SCCS. 7 of the selected 44 substances are by SCCS regarded as human allergens (SCCS, 2012)

Figure 1 illustrates the selection of the 44 substances for further assessment within this project (Task 1-4).

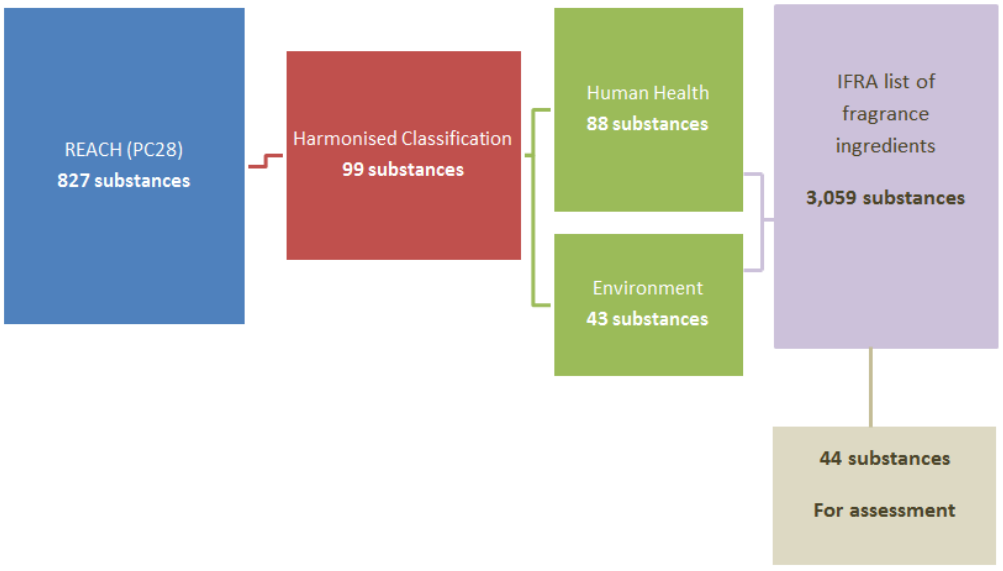


FIGURE 1
DIAGRAM ILLUSTRATING THE SELECTION OF THE 44 SUBSTANCES FOR FURTHER ASSESSMENT

In Table 1, it can be seen that this group of 44 fragrance substances does *not* only include substances which we associate with a scent. The group also consists of substances which are used to

keep the perfume liquid (solvents) and which are used to preserve the perfume (preservatives), and therefore also the scent, adjuvants; i.e. substances that modifies the effect of other substances and pigments, which are applied in order to achieve a certain desirable colour and so on. According to IFRA, 90 of the 100 fragrance substances used in annual volumes larger than 175 tons in perfume formulations (it was not informed if this is in EU or worldwide) are fragrances and the remaining ten are used for other functions such as solvents or antioxidants (personal communication with IFRA - referenced from SCCS, 2012).
It should also be noted that the substances specifically mentioned on the LOUS-list (LOUS, 2009) as examples of undesirable substances, i.e. Benzyl alcohol (CAS-nr. 100-51-6), Benzyl benzoate (CAS-nr. 120-51-4), Citral (CAS-nr. 5392-40-5) and d-Limonen (CAS-nr. 5989-27-5), are also included in the group of 44 substances selected for further evaluation.

1.3 Physico- chemical properties

The physico-chemical properties of the 44 fragrance substances selected for assessment are presented in Table 1.

TABLE 1
PHYSICO-CHEMICAL PROPERTIES OF FRAGRANCE SUBSTANCES WITH A HARMONISED CLASSIFICATION ADRESSING HUMAN HEALTH AND THE ENVIRONMENT AND INCLUDED ON THE IFRA LIST OF FRAGRANCE MATERIALS (BASED ON THE LIST OF 827 FRAGRANCE SUBSTANCES REGISTERED IN REACH). (REACH REGISTRATION DATA, 2014) MOLECULAR WEIGHT: EPI_SUITE CALCULATIONS

CAS No.	Substance name	Physical state	Molecular Weight (g/mol)	Vapour Pressure at 25 ° C (Pa)	Solubility in water at 25 ° C (mg/L)	Melting Point (°C)	Log Kow (25 °C)	Function	Reference
64-02-8	Tetrasodium ethylenediaminete-traacetate (Na_4EDTA)	Solid	$3.8*10^2$	$2*10^{-13}$	$5*10^5$ (20°C)	>300	NA	Complex binder	REACH Registration data
67-63-0	Propan-2-ol	Liquid	60	$6.0*10^3$	Miscible	-89	0.05	Solvent and scent	REACH Registration data
71-23-8	Propan-1-ol	Liquid	60	$2.8*10^3$	Miscible	-127.1	1.6	Solvent and scent	REACH Registration data
71-36-3	Butan-1-ol	Liquid	74	$1.0*10^3$	$66*10^3$ (20°C)	<-90	1.0	Solvent and scent	REACH Registration data
71-41-0	Pentan-1-ol	Liquid	88	$2.0*10^2$ (20°C)	$21*10^3$ (20°C)	-78.6	1.4 (20°C)	Solvent and scent	REACH Registration data
78-83-1	2-methylpropan-1-ol	Liquid	74	$1.6*10^2$ (20°C)	$70*10^3$ (20°C)	<-90	1.0	Solvent and scent	REACH Registration data
78-93-3	Butanone	Liquid	72	$1.0*10^4$ (20°C)	28 vol%	-86	0.3 (40°C)	Solvent and scent	REACH Registration data
97-88-1	Butyl methacrylate	Liquid	$1.4*10^2$	$2.1*10^2$ (20°C)	$3.6*10^2$	-50	3 (20°C)	Solvent and scent	REACH Registration data

CAS No.	Substance name	Physical state	Molecular Weight (g/mol)	Vapour Pressure at 25 ° C (Pa)	Solubility in water at 25 ° C (mg/L)	Melting Point (°C)	Log Kow (25 °C)	Function	Reference
100-51-6	Benzyl alcohol	Liquid	$1.1*10^2$	12	$41*10^3$	-15.4	1.1 (20°C)	Solvent and scent	REACH Registration data
100-52-7	Benzaldehyde	Liquid	$1.1*10^2$	$1.7*10^2$	$7.0*10^5$	-26	1.4	Solvent and scent	REACH Registration data
108-21-4	Isopropyl acetate	Liquid	$1.0*10^2$	$6.5*10^3$	$32*10^3$ (20°C)	-73.4	1.3 (20°C)	Solvent and scent	REACH Registration data
109-60-4	Propyl acetate	Liquid	$1.0*10^2$	$4.8*10^3$	$19*10^3$ (20°C)	-93	1.4	Solvent and scent	REACH Registration data
111-27-3	Hexan-1-ol	Liquid	$1.0*10^2$	$3.6*10^2$ (38°C)	$1,3*10^3$ (23 °C)	-45	1.8 (temperature not stated)	Solvent and scent	REACH Registration data
110-54-3	n-hexane	Liquid	86	$1.0*10^4$ (9.8°C)	9.8	-95.35	4.0 (20°C)	Solvent, carrier, propellant	REACH Registration data, LOUS (2014)
120-51-4	Benzyl benzoate	Solid	$2.1*10^2$	0.031	14 (20°C)	21	10	Solvent and scent	REACH Registration data
122-99-6	2-phenoxyethanol	Liquid	$1.4*10^2$	2.1	$2.9*10^4$ (21 °C)	11.8	1.2 (23°C)	Preservative	REACH Registration data
123-86-4	n-butyl acetate	Liquid	$1.2*10^2$	$1.5*10^2$ (20 °C)	$5,3*10^3$ (20 °C)	<-90	2.3	Solvent and scent	REACH Registration data

CAS No.	Substance name	Physical state	Molecular Weight (g/mol)	Vapour Pressure at 25 ° C (Pa)	Solubility in water at 25 ° C (mg/L)	Melting Point (°C)	Log Kow (25 °C)	Function	Reference
141-78-6	Ethyl acetate	Liquid	88	$1.3*10^4$	$8*10^4$	-83.6	0.68	Solvent and scent	REACH Registration data
687-47-8	Ethyl (S)-2-hydroxypropionate	Liquid	$1.2*10^2$	$2.2*10^2$ (20 °C)	Miscible	-9	0.31 (20 °C)	Solvent and scent	REACH Registration data
1222-05-5	1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylindeno[5,6-c]pyran (HHCB)	Viscous liquid	$2.6*10^2$	0.073	1.7	< -20	5.3	Scent	REACH Registration data
1310-73-2	Sodium hydroxide	Solid	40	0.001	$4.2*10^5$ (0°C)	323	NA	Base	REACH Registration data
1314-13-2	Zinc oxide	Solid	81	NA	2.9 (20°C)	>1,000	NA	Pigment	REACH Registration data
5131-66-8	1-butoxypropan-2-ol	Liquid	$1.3*10^2$	$1.4*10^2$	$5.2*10^4$ (20°C)	<-85	1.2 (20°C)	Solvent and scent	REACH Registration data
5392-40-5	Citral	Liquid	$1.5*10^2$	7.1	$4.2*10^2$	<-10	2.8 (25°C)	Scent	REACH Registration data
5989-27-5	(R)-p-mentha-1,8-diene (d-limonene)	Liquid	$1.4*10^2$	$2*10^2$	12	-73.7	4.4 (37 °C)	Scent	REACH Registration data
5989-54-8	(S)-p-mentha-1,8-diene (l-limonene)	Liquid	$1.4*10^2$	$2*10^2$	12	-73.7	4.4 (37 °C)	Scent	REACH Registration data

CAS No.	Substance name	Physical state	Molecular Weight (g/mol)	Vapour Pressure at 25 ° C (Pa)	Solubility in water at 25 ° C (mg/L)	Melting Point (°C)	Log Kow (25 °C)	Function	Reference
7681-57-4	Disodium disulphite	Solid	$1.9*10^{2}$	NA	$6.7*10^{5}$	>150	NA	Adjuvant	REACH Registration data
7695-91-2	3,4-dihydro-2,5,7,8-tetramethyl-2-(4,8,12-trimethyltridecyl)-2H-benzopyran-6-yl acetate	NA	$4.7*10^{2}$	$8.7*10^{-9}$	<0.8 (20°C)	-27.5	12	Scent	REACH Registration data
92585-24-5	2-methyl-4-phenylpentanol	Liquid	NA	0.30	$8*10^{2}$ (20°C)	<-20	3.0	Preservative	REACH Registration data
92484-48-5	sodium 3-(2H-benzotriazol-2-yl)-5-	Solid	NA	< 0.000000001	$9.8*10^{4}$ (20°C)	>170	-0.24	Scent	REACH Registration data
103694-68-4	3-(2,2-dimethyl-3-hydroxypropyl)toluene	Liquid	$1.8*10^{2}$	2.8 (20°C)	$2.7*10^{2}$	24	3.4	Scent	REACH Registration data
63500-71-0	A mixture of: cis-tetrahydro-2-isobutyl-4-methylpyran-4-ol; trans-tetrahydro-2-isobutyl-4-methylpyran-4-ol	Liquid	$1.7*10^{2}$	1 (20°C)	$2.4*10^{4}$ (20°C)	<-100	1.7 (23°C)	Scent	REACH Registration data
97384-48-0	2-benzyl-2-methyl-3-butenitrile	Liquid	$1.8*10^{2}$	$1.5*10^{3}$ (121.6°C)	$1.9*10^{2}$ (20°C)	-21.3	2.3 (38°C)	Solvent and scent	REACH Registration data
107898-54-4	(+/-) trans-3,3-dimethyl-5-(2,2,3-trimethyl-cyclopent-3-en-1-yl)pent-4-en-2-ol	Liquid	$2.2*10^{2}$	0.47 (20°C)	0.013 (23°C)	-18	4.3 (23°C)	Scent	REACH Registration data

CAS No.	Substance name	Physical state	Molecular Weight (g/mol)	Vapour Pressure at 25 ° C (Pa)	Solubility in water at 25 ° C (mg/L)	Melting Point (°C)	Log Kow (25 °C)	Function	Reference
125109-85-5	β-methyl-3-(1-methylethyl)benzenepropanal	Liquid	$1.9*10^2$	1 (20°C)	40 (20°C)	<-50	3.8 (20°C)	Scent	REACH Registration data
2511-00-4	ethyl 2-cyclohexylpropionate	Liquid	$1.8*10^2$	22	87 (20°C)	-36.5	4.0	Scent	REACH Registration data ChemIDplus
131766-73-9	A mixture of: trans-4-acetoxy-4-methyl-2-propyl-tetrahydro-2H-pyran; cis-4-acetoxy-4-methyl-2-propyl-tetrahydro-2H-pyran	Liquid	NA	43	$2.5*10^3$ (20°C)	NA	2.4 (23°C)	Scent	REACH Registration data
72903-27-6	Diethyl 1,4-cyclohexanedicarboxylate	Liquid	$2.3*10^2$	0.2	$1.3*10^3$ (20°C)	-11	2.5 (30°C)	Scent	REACH Registration data ChemIDplus
426218-78-2	A mixture of 4-(2,2,3-trimethylcyclopent-3-en-1-yl)-1-methyl-2-oxabicyclo[2.2.2]octane; 1-(2,2,3-trimethylcyclopent-3-en-1-yl)-5-methyl-6-oxabicyclo[3.2.1]octane; spiro[cyclohex-3-en-1-yl-[(4,5,6,6a-tetrahydro-3,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]furan];	Liquid	Unspecified	1.5	11 (20°C)	<-25	> 3.7 (21°C)	Scent	REACH Registration data ChemIDplus

CAS No.	Substance name	Physical state	Molecular Weight (g/mol)	Vapour Pressure at 25 ° C (Pa)	Solubility in water at 25 ° C (mg/L)	Melting Point (°C)	Log Kow (25 °C)	Function	Reference
	spiro[cyclohex-3-en-1-yl-[4,5,6,6a-tetrahydro-4,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]]furan]								
74338-72-0	2,4,4,7-tetramethyl-6-octen-3-one	Liquid	NA	22	59 (20°C)	<-52	4.5 (20°C)	Scent	REACH Registration data
75490-39-0	2,2,4-trimethyl-4-phenyl-butane-nitrile	Liquid	$1.9*10^2$	0.75	$1.1*10^2$ (20°C)	<-25	3.3 (20°C)	Scent	REACH Registration data ChemIDplus
3508-98-3	2-phenylhexanenitrile	Liquid	$1.7*10^2$	6.4	38 (20°C)	<-25	3.1 (21°C)	Scent	REACH Registration data ChemIDplus
10461-98-0	2-cyclohexylidene-2-phenylacetonitrile	Liquid	$2.0*10^2$	0.043 (20°C)	7.5 (20°C)	NA	4.0	Scent	REACH Registration data ChemIDplus
8006-64-2	Turpentine oil	Liquid	$1.5*10^2$	$2.6*10^3$	$3.5*10^2$ (20°C)	NA	NA	Scent	REACH Registration data

1.4 Summary and conclusions

Fragrance substances are compounds with a characteristic and usually pleasant odour. According to the English dictionary perfumes are defined as "*substances that emit and diffuse a fragrant odour, especially a volatile liquid distilled from flowers or prepared synthetically*". Perfumes are composed of a mixture of several fragrance substances, e.g. mixtures of essential oils or aroma compounds, fixatives and solvents i.e. also substances which do not constitute the scent of the perfume. In fact a perfume may be composed of ten to more than 300 basic components.
The group of fragrance substances includes a large number of different substances; the largest group being the terpenoids (e.g. limonene, farnesol, retinol etc.). In fact there are so many known fragrance substances (several thousands) that they could not all be examined within the framework of this project. Thus, the numbers of substances which were to be covered in this project had to be limited. The aim of this project has been to develop a thorough overview of the substance group which could still only be a preliminary survey of this large group of substances (time and economy did not allow otherwise) and also to provide insight into both the well-known allergenic effects of some of these substances as well as other potential hazardous effects, and to describe the main product groups in which perfumes are used.
A data search was performed in order to define which substances constitute the group "perfumes". Also the classifications addressing human health and the environment were examined and lastly the uses of these substances were evaluated, both regarding the tonnage of substance applied (in Denmark) and the numbers of preparations on the Danish market which contain the substances.

According to IFRA, the International Fragrance Association, approximately 3,000 substances are used within the perfume industry. According to the ECHA database on registered substances, 827 substancesare registered within the product category "PC28" which constitutes "fragrances/perfume". However, only approximately 40% of the registered substances are included in the list from IFRA. Part of the reason that all registered substances are not on the IFRA list could be that the list from IFRA is dated back to 2011 and the registration data are retrieved in 2014. Perhaps, new fragrance substances have been taken into use during the last three years. Another explanation is that a large amount of substances on the IRFA list are not registered because they are not produced or imported in an amount which triggers a requirement for registration. A third explanation could be that some of the substances registered within the product category PC28 is only used in the production phase of perfumes (intermediates) and therefore not contained in the final product.
According to IFRA 90 of 100 fragrance materials, used in annual volumes higher than 175 tons in perfume formulations, are applied as scents and the remaining ten are used for other functions such as solvents or antioxidants.

The C&L inventory was searched in order to find both harmonized and notified hazard classifications according to Annex VI of Regulation (EC) No 1272/2008 (CLP Regulation) for the 827 fragrance substances.
The findings were that:

- 401 of the 827 substances have a notified classification which addresses CMR properties and/or sensitisation and/or environment.
- out of the 827 registered substances, in total, 99 of the substances are appointed a harmonised classification.
- 88 substances have a harmonised classification addressing human health
- 43 substances have a harmonised classification addressing the environment.
- some substances are both subject to harmonised classification for human health and environment.
- regarding human health classifications 38 of the 88 substances are included in IFRAs list covering 3,059 fragrances in use.
- regarding environmental health classification 20 of the 43 substances are also included in IFRAs list.

Totally 44 substances with a harmonised classification were also included in the IFRA list and these were identified for further assessment. 7 of these substances are regarded as human allergens by SCCS.

The group of 44 fragrance substances does *not* only include substances which we associate with a scent. The group also consists of substances which are used to keep the perfume liquid (solvent), preserve the perfume, and therefore also the scent, adjuvants; i.e. substances that modifies the effect of other substances and pigments which are applied in order to achieve a certain wanted colour and so on.
All substances, out of the 827 registered substances, with a harmonised classification and/or a notified classification, were further evaluated in order to determine if there are any uses on the Danish market by using the Nordic SPIN database which addresses the professional use of substances.

2. Regulatory framework

This chapter gives an overview of how perfumes are addressed in existing and forthcoming EU and Danish legislation, international agreements, eco-label criteria etc. The overview reflects the findings from the data search.

Appendix 3: provides a brief overview of and connections between legislative instruments in EU and Denmark. The appendix also gives a brief introduction to chemicals legislation, as well as a brief introduction to international agreements and the aforementioned eco-label schemes.

2.1 Existing legislation

The table below (table 2) summarises both EU and Danish regulations addressing perfume substances. These include regulation addressing both workers by regulation of the use of chemicals in the working environment and consumers through directives and regulations addressing the content of substances in products such as detergents, toys and cosmetics.

TABLE 2
LEGISLATION ADRESSING FRAGRANCE SUBSTANCES

Legal instrument	Reference	Requirement as concerns perfumes and national implementation
General legislation		
REACH regulation REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)	EU	The REACH regulation requires that substances are registered. The deadline for substances already on the market varies according to the volumes. The deadline for substances produced in volumes above 100 ton/yr was in 2013 and the deadline for 1-100 tonnes is in 2018. Several fragrance substances have been registered under REACH.
CLP regulation (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008 on classification, labelling and packaging of substances and mixtures	EU	Several fragrance substances have a harmonised classification (Please refer to Appendix 1) –Furthermore several substances have a notified self-classification according to CLP.

Regulation addressing substances and products (consumers)		
REGULATION (EC) No 1223/2009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 November 2009 on cosmetic products	EU	The regulation addresses fragrance substances (by CAS number) in the following sections: Annex II lists substances prohibited in cosmetic products. The following fragrance substances (from Table 1) are listed in annex II: n-hexane (CAS: 110-54-3) Annex III contains a list of substances which cosmetic products must not contain or only contain with restrictions laid down in the annex. The following fragrance substances (from Table 1) are listed in annex III: Benzyl-alcohol (CAS: 100-51-6); Benzyl benzoate (CAS: 120-51-4); Sodium hydroxide (CAS: 1310-73-2); Citral (CAS: 5392-40-5); d-limonene (CAS: 5989-27-5)). Furthermore the regulation states: Given the hazardous properties of substances classified as carcinogenic, mutagenic or toxic for reproduction (CMR), category 1A, 1B and 2, pursuant to Regulation (EC) No 1272/2008 their use in cosmetic products should be prohibited unless certain conditions are met (art. 15). Generally, perfumes must always be declared, whatever the quantity, as “perfume”. In March 2005, a new legislation came into force. 26 fragrances that are proven to cause allergies in humans must be disclosed in the ingredient list with their INCI name, if they occur in a cosmetic product. The 26 fragrances are: Amyl cinnamal Benzyl alcohol Cinnamyl alcohol Citral Eugenol Hydroxycitronellal Isoeugenol Amylcinnamyl alcohol Benzyl salicylat Cinnamal Coumarin Geraniol Hydroxyisohexyl 3-cyclohexene carboxaldehyde (HICC) Anisyl alcohol Benzyl cinnamat Farnesol Butylphenyl methylpropional

		Linalool Benzyl benzoate Citronellol Hexyl cinnamal d-Limonene Methyl 2-octynoate Alpha isomethyl Ionone Evernia prunastri (oak moss extract) Evernia Furfuracea (tree moss extract) Allergens for which declaration on cosmetic products is mandatory must be declared by name if: • The concentration of one of the 26 substances > 0.001% in a stay-on cosmetic product e.g. lotion or deodorant. • The concentration of a substance > 0.01% in rinse-off cosmetic products e.g. shampoo.
REGULATION (EC) No 648/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 31 March 2004 on detergents	EU	The Detergents Regulation sets out requirements on the declaration of ingredients in washing and cleaning products. Perfumes must always be declared, whatever the quantity, as "perfume". In addition, the 26 fragrances that are on the list of potential allergens must be declared by name if concentrations are >0.01%.
DIRECTIVE 2009/48/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 June 2009 on the safety of toys	EU	Section 11 of Annex II list 55 allergenic fragrances which should not be contained in toys (However, the presence of traces of these fragrances shall be allowed provided that such presence is technically unavoidable under good manufacturing practice and does not exceed 100 mg/kg) and Section 11 of Annex II also list 11 fragrances which should be declared on toys if the concentration exceeds an amount above 100 mg/kg. For the selected substances (Table 1) the former applies for Benzyl alcohol (CAS 100-51-6) and Citral (CAS: 5392-40-5) and the latter applies for Benzyl benzoate (CAS: 120-51-4) and d-limonene (CAS: 5989-27-5) Furthermore substances that are classified as carcinogenic, mutagenic or toxic for reproduction (CMR) of category 1A, 1B or 2 under Regulation (EC) No 1272/2008 shall not be used in toys, in components of toys or in micro-structurally distinct parts of toys.
Regulation addressing working environment		
Council Directive 98/24/EC of 7 April 1998 on the protection of the health and safety of workers from the risks related to chemical agents at work and amended by Directive 2014/27/EU of 26	EU	The order addresses work with, including the production, use and handling of specific substances and materials which are included in appendix 1 of the order. The order lays down minimum requirements for the protection of workers from risks to their safety and

February 2014. Implemented in Denmark by Statutory Order No. 292 of 26. April 2001.		health arising, or likely to arise, from the effects of chemical agents that are present at the workplace or as a result of any work activity involving chemical agents. Implemented in Denmark by the Statutory Order No 292 of 26. April 2001.
Danish Executive Order on the Performance of Work No. 559 of 17 June 2004	DK	Section 16. Any unnecessary effect of substances and materials shall be avoided. Therefore, the effect of substances and materials during work shall be reduced to the lowest level reasonably practicable taking account of technical progress, and any limit values fixed shall be complied with.
Danish order no. 507 of May 17, 2011 on limit values for substances and materials.	DK	The order addresses any work with fabrics and materials, including production, use and handling, and any risk of exposure at the workplace to substances and materials setting substance specific occupational exposure limits. For the following substances used in perfumes a limit exposure value are established: Propan-2-ol (CAS: 67-63-0): 490 mg/m^3 Propan-1-ol (CAS: 71-23-8): 500 mg/m^3 Butan-1-ol (CAS: 71-36-3): 150 mg/m^3 2-methylpropan-1-ol (CAS: 78-83-1): 150 mg/m^3 Butanone (CAS: 78-93-3): 145 mg/m^3 Butyl methacrylate (CAS: 97-88-1): 145 mg/m^3 Propyl acetate (CAS: 109-60-4): 625 mg/m^3 n-hexane (CAS: 110-54-3): 72 mg/m^3 n-butyl acetate (CAS: 123-86-4): 710 mg/m^3 Ethyl acetate (CAS: 141-78-6): 540 mg/m^3
Danish order no. 908 of 27. September, 2005 on measures to prevent exposure to carcinogenic substances and materials	DK	This Order applies to all substances and materials that have a cancer classification. This applies both to the harmonized classifications and self-classifications. The substances listed in Annex 1A in the order is a subset of the substances covered by the general provisions of cancer notice. Besides these substances are all substances which meet the criteria for classification as hazardous within any physical and/or health hazard classes laid down in Regulation (EC) No 1272/2008 of the European Parliament and of the Council including IARC substances in Group 1 and 2A covered.

2.2 Classification and labelling

2.2.1.1 Harmonised classification in the EU

In Appendix 1, the harmonised and notified classifications for the fragrance substances registered under REACH are presented. From the table in Appendix 1 it can be seen that most substances out of the 827 registered substances do not have a harmonised classification. In total 99 of the 827 substances registered as used in the production of fragrances (12 %) are appointed a harmonised classification.

Table 3 presents the number of substances which are assigned a specific harmonised and/or notified classification (only CMR and allergy notified classifications were searched for human health). The data in the table shows that in particular the environmental classifications apply for the 827 fragrance substances especially when looking at the notified classifications of the substances. For human health especially the potential to pose allergenic skin reactions are the main classification used for the group of substances (143 substances (17 %) are appointed a notified classification as allergenic). However, this table does not show the amount of classified substances in the final product but it says something about the total use of classified substances all through the production chain as some of the substances registered for use in perfumes may be intermediates.

TABLE 3

NUMBERS OF SUBSTANCES WHICH ARE REGISTERED AS USED IN THE PRODUCTION OF PERFUMES THAT ARE ALSO ASSIGNED A HARMONISED AND/OR NOTIFIED CLASSIFICATION (TOTAL NUMBER OF SUBSTANCES = 827); -: NOT EXAMINED

Classification	Numbers of harmonised hazard classifications	Numbers of notified hazard classifications
H302; Harmful if swallowed	30	-
H304; May be fatal if swallowed and enters airways	5	-
H312; Harmful in contact with skin	10	-
H315; Causes skin irritation	19	-
H317; May cause an allergenic skin reaction	13	143
H318; Causes serious eye damage	9	-
H319; Causes serious eye irritation	21	
H330; Fatal if inhaled	2	-
H332; Harmful if inhaled	11	-
H335; May cause respiratory irritation	10	-
H336; May cause drowsiness or dizziness	14	-
H340; May cause genetic defects	3	6
H341; Suspected of causing genetic defects	2	18
H350; May cause cancer	14	20
H351; Suspected of causing cancer	2	17
H360; May damage fertility or the	1	9

Classification	Numbers of harmonised hazard classifications	Numbers of notified hazard classifications
unborn child		
H361; Suspected of damaging fertility, suspected of damaging the unborn child	4	33
H372; Causes damage to organs through prolonged or repeated exposure	3	-
H373; May cause damage to organs through prolonged or repeated exposure	1	-
H400; Very toxic to aquatic life	20	112
H410; Very toxic to aquatic life with long lasting effects	18	109
H411; Toxic to aquatic life with long lasting effects	13	176
H412; Harmful to aquatic life with long lasting effects	4	113
H413; May cause long lasting harmful effects to aquatic life	5	50

2.3 REACH

2.3.1 Registration

A total of 827 substances have been registered under REACH as used in fragrances (PC28). However, the data in public database on registered substances (www.echa.eu) only provides the total tonnage covering also other product categories. Thus, the tonnage data provided in REACH registration data does not give information of the use of each substance in perfumes since many of the substances are used for many other purposes e.g. as solvents for other purposes.

Other legislation/initiatives

The substances in Table 1 do not appear on the candidate list of Substances of Very High Concern (SVHC).

Some of the substances listed in Table 1 appear on the Community Rolling Action Plan (CoRAP) list for substance prioritised for evaluation. These include: n-hexane (CAS: 110-54-3); Citral (CAS: 5392-40-5); Disodium disulphite (CAS: 7681-57-4) and the mixture of cis-tetrahydro-2-isobutyl-4-methylpyran-4-ol; trans-tetrahydro-2-isobutyl-4-methylpyran-4-ol (CAS: 63500-71-0).

Based on the SCCS evaluation in 2012 the EU Commission stated in the beginning of 2014 that:

The most important findings of the SCCS were the following:

- Three allergens (HICC, atranol and chloroatranol) were considered not safe,
- The consumer should be made aware of the presence of additional allergens in the cosmetic product,
- 12 single chemicals and 8 natural extracts were identified as substances of special concern, based on the number of persons with positive patch test results. It was suggested that the 12 chemicals, also when present in natural extracts, should be subject to concentration limits in the cosmetic product.

These findings will be translated into changes to the Regulation on cosmetic products proposed by the Commission (EU Commission, 2014):

- The three substances which were found to be unsafe should be banned from cosmetic products,
  Additional allergens should be subject to the obligation of individual labelling on the package of a cosmetic product. In other words, they have to be mentioned in the list of ingredients, in addition to the words 'parfum' or 'aroma'.

Further scientific work is needed to define safe concentration limits of chemicals of special concern

The proposed changes to the Cosmetics Regulation in the form of an implementing act will be subject to a vote by the Member States in the standing Committee on Cosmetics. Once the measures are approved by the Member States, the European Parliament and the Council will have three months to exercise their right of scrutiny. If the proposal is not opposed the formal adoption of those changes is expected at the end of 2014/beginning 2015 (EU Commission, 2014).

Moreover, the labelling requirments of the Detergents Regulation states that any allergenic substances that are added to annex III of the Cosmetics Regulation (and thus require individual labelling) shall also require individual labelling on products for washing and cleaning products (detergents).

Eco-labels

The European Flower Eco-label and the Nordic Swan Eco-label generally address fragrances by their classification when evaluating products; excluding substances with a specific classification or

setting concentration limits for the content of these substances within the product. The specific requirements are dependent on the product in question, and the corresponding criteria document. Furthermore, some eco-label criteria state that the product shall not contain perfumes containing nitro-musk or polycyclic musk. Also, any substance added to the product as a fragrance must have been manufactured and/or handled in accordance with the code of practice of the International Fragrance Association.
Furthermore, the ecolabelling criteria often include demands related to the Critical Dilution Volume (CDV). The CDV calculation is applied in order to determine the environmental profile of a product. The formula applied in the calculations is presented below. Even small quantities of added fragrance can contribute considerably to an increased CDV. The reason is that a higher score is for instance obtained if the substance is not biodegradable (the case for several fragrance substances). But also the toxicity factor is important, and often a higher factor is applied for substances where there is a lack of data. Therefore fragranced products must often improve on other parameters in order to achieve a good environmental profile and to meet the CDV requirement (www.ecolabel.dk).
$CDV = \Sigma\ CDV(i) = \Sigma\ ((dosage(i) x\ DF(i))/TF\ (i)) \times 1000$

where
Dosage(i) = Dosage of substances *i*, expressed in g/wash, or in some cases as g/100 g product.
DF(i)= Degradation Factor for substance i.
TF(i)= Toxicity Factor for substance i.

2.4 Summary and conclusions

Besides registration under REACH and classification according to the CLP regulation, fragrance substances are regulated in both EU and Danish regulations. These include regulation addressing both workers by regulation of the use of chemicals in the working environment and consumers through directives addressing and setting limits for the content of substances in products such as toys and cosmetics. There is also a requirement for declaration of 26 allergenic fragrances of special concern on the packaging of cosmetic and detergent products. These 26 fragrances shall be indicated on the list of ingredients on the product if they are present in concentrations above the following limits: leave-on cosmetics > 0.001%, rinse-off cosmetics > 0.01%; detergents > 0.01%.

Four of the selected substances (table 1) appear on the CoRAP list for substance prioritised for evaluation. None of the substances are on the candidate list of SVHC.

Based on the SCCS opinion on fragrance substances from 2012 the EU Commission has proposed that three substances (HICC, atranol and chloroatranol) which were found to be unsafe should be banned from cosmetic products. Further, the Commission proposes that additional allergens should be subject to the obligation of individual labelling on the package of a cosmetic product. In other words, they have to be mentioned in the list of ingredients, in addition to the words 'parfum' or 'aroma'. The proposed changes to the Regulation on cosmetic products in the form of an implementing act will be subject to a vote by the Member States in the standing Committee on Cosmetics in the near future. If the individual labelling requirement is extended to cover more substances in cosmetics there will also be individual labelling requirements for these additional substances in detergents.

The European Flower Eco-label and the Nordic Swan Eco-label generally address fragrances by their classification when evaluating products; excluding substances with a specific classification or setting concentration limits for the content of these substances within the product. The specific requirements are dependent on the product in question and the corresponding criteria document. Furthermore, the eco-labelling applies the Critical Dilution Volume (CDV). Even small quantities of added fragrance can contribute considerably to an increased CDV. The reason is that a higher score is for instance obtained if the substance is not biodegradable (which is the case for several fragrance

substances). But also the toxicity factor is important, and often a higher factor is applied for substances where there is a lack of data. Therefore fragranced products must often improve on other parameters in order to achieve a good environmental profile if the product shall meet the CDV requirement.

3. Manufacturing and uses

3.1 Manufacturing

Fragrances are organic substances that to some extent have to be volatile in order to be sensed. The number of fragrant ingredients in a finished fragrance may range from just a few to several hundred. Around 80% of the synthetic fragrance ingredients derive from terpenoids, toluene, benzene, cresol or phenol. Fragrances tend to be diluted with ethanol.
Fragrances can also be extracted from certain plant families where they are present as either liquid oils or as complex sugar compounds (glycosides) and in small quantities (NMC, 2012).

3.2 Production and use

Fragrances are complex mixtures, prepared by blending many fragrance ingredients in varying concentrations. They are nearly always liquids, in which substances which are solids (Table 1) have to be dissolved. Fragrances are used in a wide variety of products. According to IFRA's homepage (September 2014) fragrance technologies are widely used in three principal user sectors:

- **Personal Care:** a wide range of personal care product categories make use of fragrances, including hair care (shampoos, conditioners, colorants, hair control), personal hygiene (shower gels, body washes, toilet soaps, deodorants, antiperspirants, body-sprays), male toiletries, feminine care, and baby care.

- **Household Care:** many product categories in this sector make use of fragrances. They include textile washing (laundry detergents, fabric care conditioners, stain removers), dishwashing (automatic dishwashing, hand-washing, rinse aids), surface cleaners (for kitchens, baths, windows, floors, and carpets), air fresheners, scented candles, and polishes and waxes.

- **Fine Fragrance and Beauty:** in this market sector, product categories that depend on fragrances include all types of perfumes (prestige, mid-market and, economy products), skin care, colour cosmetics, and beauty gift sets.

However, according to other sources fragrances or flavouring substances are also used in food (e.g. food additives in fish baits, soft drinks, biscuits e.g.), cigarettes and air fresheners (SWECO Environment AB, 2008). Other types of known applications which were identified by a google search include: toys, car-care products, paints, lacquers and varnishes, clothing, sanitary pads, diapers and baby-wipes, fresh scent tablets for vacuum cleaner bags, scented candles, erasers, perfumes for pets, toilet paper, biocidal products like disinfectants, wood preservatives and repellents and cutting oils. So overall there may be no limits to products and product types where fragrances are used.

European and US consumers are the largest groups of buyers of products that contain fragrances (IFRA, 2014). In 2010, their overall European expenditure on these products (measured at retail selling prices, excluding taxes) was over 85 billion EUR in the US it was 80 billion USD (IFRA, 2014). Almost every European and US household buys some or all of the products mentioned above on at least a monthly basis.

According to IRFA's homepage, fragrance blends for personal care products account for half of the industry's business while household care products and fine fragrances make up a quarter each (IFRA, September 2014).

The use of fragrance substances in products has been assessed in various studies. Some of these studies are described below. Some studies describe the single fragrance substances; others have a more generic approach and look at the group *fragrances* as a whole.
The data presented below, in Table 4, are from an analysis conducted by Nordic Eco-labelling in 2002. They report (2012) that to their knowledge of products today the concentrations in this table remain relevant, however Nordic Eco-labelled products often contain lower concentrations than this (NMC, 2012).

TABLE 4
THE CONCENTRATION OF PERFUME IN DIFFERENT PRODUCTS (NORDIC ECO-LABELLING, 2012)

PRODUCT TYPE	Fragrance content
Shampoo	0.3-0.8%
Dishwashing detergents	0.15-0.3%
Universal cleaning products	0.01-0.5%
Liquid laundry detergents	0.4-0.9%

The uses of fragrances in consumer products (a large variety of product types like cosmetics, household products, toys and scented products) were examined by Wijnhoven et al. in 2008. They consulted available published literature addressing surveys on fragrances in consumer products. They found, when all data was put together, the following ranking of the most frequently used fragrances in consumer products (see Table 5). However, the picture may have changed from 2008 to 2014 due to regulation (declaration on products) and new trends in the use of fragrances.

TABLE 5
MOST FREQUENTLY USED FRAGRANCES IN VARIOUS CONSUMER PRODUCTS (COSMETICS, HOUSEHOLD PRODUCTS, TOYS AND SCENTED PRODUCTS) TOTAL NO OF PRODUCTS = 516 (FROM WIJNHOVEN ET AL., 2008).

CAS No	Fragrance	% of products (n=516)
138-86-3	d- limonene	48.3
78-70-6	Linalool	35.8
80-54-6	Butylphenyl methylpropional	24.8
106-24-1	Geraniol	22.1
127-51-5	α-isomethylionon	21.7
101-86-0	Hexyl cinnamal	21.3
106-22-9 / 1117-61-9 / 7540-51-4	Citronellol	21.1
118-58-1	Benzyl salicylate	18.6

CAS No	Fragrance	% of products (n=516)
91-64-5	Coumarin	17.0
97-53-0	Eugenol	15.7
100-51-6	Benzyl alcohol	15.3
120-51-4	Benzyl benzoate	14.7
31906-04-4 / 51414-25-6	HICC	12.8
5392-40-5	Citral	11.6
107-75-5	Hydroxycitronellal	10.8
122-40-7	Amyl cinnamal	7.9
1331-81-3	Anisyl alcohol	7.0
104-54-1	Cinnamyl alcohol	6.4
4602-84-0	Farnesol	3.9
97-54-1	Isoeugenol	3.1

Table 5 clearly shows that d-limonene is by far the most commonly used fragrance in consumer products (48.3%), followed by Linalool (35.8%) and Butylphenyl methylpropionate (24.5%).

This is further confirmed by an analysis of 59 household products where the most common fragrance allergens were Limonene (78%), Linalool (61%) and Citronellol (47%) (Rastogi et al., 2001). In the UK, a review of 300 consumer products (perfumed cosmetic and household products) showed that most frequently labelled fragrances were linalool (190; 63%), limonene (189; 63%), Citronellol (145; 48%), Geraniol (126; 42%), Butyl phenyl methyl propional (126; 42%) and Hexyl Cinnamal (125; (42%) (Buckley, 2007).
Linalool (n = 46; 66%) was the most frequently found fragrance in 70 personal care products (soap, shampoo, shower gel). Linalool (n = 47; 80%) and limonene (n = 45; 76%) were the most frequent in 59 products for men (e.g. aftershave).
Limonene (n = 29; 51%) predominated in 57 household products (washing-up liquid, detergent). Limonene (n = 43; 98%) and Linalool (n = 42; 95%) were the most frequent fragrances in 44 perfumes for women. Alpha-isomethyl ionone (n = 28; 72%) was the most frequent in 39 cosmetics (foundation, lipstick, etc). Citronellol predominated (n = 15; 88%) in 17 deodorants and limonene (n = 9; 64%) was the commonest in 14 dental products (toothpaste and mouthwash). Thirty-four products (11%) contained none of the listed fragrances but were labelled as containing 'parfum' or 'aroma' (Buckley, 2007).
In a review of 301 cosmetic and detergent consumer products in Sweden, in half of the cosmetics and one-third of the detergents, one or more of the 26 fragrances requiring labelling were identified (Yazar et al., 2011).
In 2007, the Dutch Food and Consumer Product Safety Authority published a report in which 355 cosmetic products for babies and pre-schoolers and 400 products for children older than 3 years were investigated.Their composition of constituents including potential allergenic fragrances and preservatives was examined (VWA, 2007 – reported from Wijnhoven, 2008). According to the

label, allergenic fragrances were present in 88% and 78% of the products for babies and children older than 3 years, respectively. Twenty-three of the products for children older than 3 years were analysed. Limonene (concentration range found: 129 – 4,096 mg/L) and Linalool (concentration range found: 63 – 1,534 mg/L) were found to be the most frequently used fragrances in the products analysed (VWA, 2007 – reported from Wijnhoven, 2008).
Ter Burg et al (2014) assessed air fresheners by measuring the concentrations of 24 known fragrance allergens in 109 air fresheners. It was shown that the most frequently used fragrances in air fresheners were D-limonene and linalool.
According to SCCS (2012) and based on personal communication with IFRA, ninety of the 100 fragrance materials used in annual volumes > 175 tons in perfume formulations are applied as a scents and the remaining ten are used for other functions such as solvents or antioxidants. Among the 26 fragrances currently requiring individual labelling, 13 of these: *amyl cinnamal, benzyl benzoate, benzyl salicylate, butyl phenyl methyl propional, citral, citronellol, coumarin, eugenol, geraniol, hexyl cinnamal, hydroxyisohexyl 3-cyclohexene carboxyaldehyde (HICC), alpha-isomethyl ionone, and linalool,* are used in volumes greater than 175 tons pr. year.
Others are used in volumes less than 175 tons: *α- Amylcinnamyl alcohol, anisyl alcohol, benzyl alcohol, benzyl cinnamate, cinnamal, cinnamyl alcohol, farnesol, hydroxycitronellal, isoeugenol, d-limonene, methyl-2-octynoate, oak moss (Evernia prunastri), tree moss (Evernia furfuracea).*

As an example of the use of single fragrances, the use levels of **HHCB** (CAS: 1222-05-5) in cosmetics and household cleaning products are presented in the Table 6, table 7 and table 8 below. HHCB is the largest volume product of the fragrance substances known collectively as polycyclic musks (EU-RAR, 2008a). Other musk substances include: Musk Xylene (MX); Musk Ketone (MK); Tonalide (AHTN); Celestolide (ADBI); Traesolide (ATII); Phantolide (AHDI); Cashmeran (DPMI); Musk Ambrette (MA); Musk Moskene and musk tibetene. Musk Xylene is included on the Authorisation list (Annex XIV).

TABLE 6
USE LEVELS (97.5 PERCENTILE USE) OF HHCB IN COSMETIC PRODUCTS (EU-RAR, 2008A).

Product type	% HHCB in the product
Body lotion	0.12
Face cream	0.09
Eau de toilette	2.4
Fragrance cream	1.2
Antiperspirant /deodorant	0.30
Shampoo	0.15
Bath products	0.60
Shower gel	0.36
Toilet soap	0.45
Hair spray	0.15

TABLE 7
USE LEVELS (97.5 PERCENTILE USE) OF HHCB IN HOUSEHOLD CLEANING PRODUCTS (EU-RAR, 2008A).

Product type	% HHCB in the product
Laundry regular powder	0.05
Laundry liquid	0.12
Laundry compact (tabs)	0.05
Laundry compact (powder and other)	0.04
Laundry liquid concentrate	0.13
Fabric softener (conditioner)	0.06
Fabric softener concentrate	0.12
Laundry additive, powder bleach	0.03
Laundry additive, liquid bleach	0.03
Laundry additive, tablet	0.05
Hand dishwashing liquid	0.04
Hand dishwashing liquid concentrate	0.07
Machine dishwashing powder	0.02
Machine dishwashing Liquid	0.02
Machine dishwashing tablet	0.02
Surface cleaner liquid	0.09
Surface cleaner powder	0.04
Surface cleaner gel	0.11
Surface cleaner spray	0.02
Toilet cleaner powder	0.05
Toilet cleaner liquid	0.05
Toilet cleaner gel (concentrate)	0.06
Toilet cleaner tablet	0.05
Toilet rim block or gel	0.9

TABLE 8
REPORTED USE VOLUMES IN EUROPE

CAS No.	Name	Year	Volume (tonnes)	Reference
1222-05-5	HHCB	1992	2400	EU-RAR, 2008a
		1995	1482	
		1998	1473	
		2000	1427	
		2003	1441	
		2004	1307	

As seen in Table 6, 7 and 8, the use of HHCB is significant and covers product types ranging from different cosmetic products to toilet cleaner tablets and machine dishwashing powder.

Another example is the use levels of **propan-2-ol** (CAS: 67-63-0) in different household applications which is presented in Table 9 below and from which it can be seen that the concentrations within these products vary from less than 1% in laundry detergents to 15% in surface cleaners (Hera, 2005a).

TABLE 9
HOUSEHOLD APPLICATION AND FINISHED PRODUCT CONCENTRATION OF PROPAN-2-OL (HERA, 2005A)

PRODUCT TYPE	Fragrance content in finished product (%)
Regular laundry detergent	0.0-0.3
Compact laundry detergents	0.0 – 2 %
Fabric conditioners	0.4 -2.56 %
Laundry additives	0.0 -10.0 %
Hand dishwashing detergent	0.0 – 3.0 %
Surface cleaners	0.0 – 15.0 %

1-butoxypropan-2-ol (CAS: 5131-66-8) which is currently only used in hard surface cleaners at levels varying from 0 – 6.7%. In spray cleaners and surface wipes, 1-butoxypropan-2-ol is typically used at concentrations from 0.5 – 2.5% with a maximum of 4% (Hera, 2005b).

3.3 Import

3.3.1 The Nordic countries

The Nordic SPIN database ("Substances in Preparations in the Nordic Countries") is the result of a common Nordic initiative to gather non-confidential data. The database summarised information from the Nordic product registers on the common use of chemical substances in different types of products and industrial areas. Information on use volumes and the tonnage of preparations in Denmark (year 2012) has been retrieved and is presented in Appendix 1: (Nordic SPIN Database, 2014). These data are for *professional uses and only include consumer products to the extent that these are also used professionally. Only the Swedish product register includes consumer products*..

Also data represent the use in several types of products and *not* necessarily the use as a fragrance substance in perfume. From the data it can be seen that 278 out of 827 substances are registered as "used" in Denmark. For 35 substances data are reported as confidential and therefore no information on the tonnage or the number of preparations is available. In Annex 1 the total use in Denmark is presented for the fragrance substances appointed a harmonised or notified classification.

Information from the Danish product register (data received October 2014) on the use of the 44 fragrance substances in products on the Danish market was also made available. Again the use does not necessarily reflect the use as a fragrance substance but may cover several other uses. The table below (Table 10) presents the *non*-confidential information on typical concentrations within the products, total imported/produced amount (tonnes) as well as the amount of substance which is exported (tonnes). For clarity it was decided only to focus on the product groups in which the substances are likely to be applied as fragrance substances (cleaning/washing agents, cosmetics and cutting fluids) and to focus on substances which are associated with a scent (HHCB, citral, l-limonene and d-limonene). From the table it can be seen that the concentration within the product is dependent on the product type. The highest concentrations within *cosmetic products* are reported for HHCB (CAS 1222-05-5) where concentrations up to 11% are registered. In *odour agents* which is the product group with the highest concentrations of fragrance substances 50%, 100% and 90% are reported for HHCB (CAS 1222-05-5), Citral (CAS: 5392-40-5) and d-limonene (CAS: 5989-27-5) respectively.

TABLE 10
INFORMATION FROM THE DANISH PRODUCT REGISTER ON CONCENTRATION, IMPORTED/PRODUCED AND EXPORTED TONANGES (KG) OF SELECTED FRAGRANCE SUBSTANCES (DANISH PRODUCT REGISTER, OCTOBER 2014)

CAS No.	Substance name	Product group	Concentration (%)	Amount imported/ produced (kg)	Amount exported (kg)
1222-05-5	1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylindeno [5,6-c]pyran (HHCB)	Cleaning/washing agents	0-0.063	$2.1*10^{1}$-$2.5*10^{1}$	1.6-1.8
		Cosmetics	0.015-11	$2.5*10^{1}$	$1.2*10^{1}$
		Cutting fluids	#	#	#
		Odour agent	0.00001-50.0	$1.2*10^{2}$	$6.3*10^{-2}$
5392-40-5	Citral	Cleaning/washing agents	0.00001-0.067	$3.8*10^{1}$-$2.5*10^{2}$	1.9-5.6
		Cosmetics	0.0023-0.030	$1.2*10^{-1}$-4.7	0-3.0
		Cutting fluids	#	#	#
		Odour agent	0.0043-100.0	$5.5*10^{2}$	$1.7*10^{-3}$-$1.7*10^{-2}$
5989-27-5	(R)-p-mentha-1,8-diene (d-limonene)	Cleaning/washing agents	0-100	$8.2*10^{3}$-$8.7*10^{3}$	$1.6*10^{3}$
		Cosmetics	0.018-0.23	2.6-2.9	$3.1*10^{-2}$-$6.2*10^{-2}$
		Cutting fluids	0.32-0.9	$2.4*10^{1}$-$2.5*10^{1}$	$1.4*10^{-1}$-$1.7*10^{-1}$
		Odour agent	0.00006-90.0	$5.6*10^{2}$	0
5989-54-8	(S)-p-mentha-1,8-diene (l-limonene)	Cleaning/washing agents	#	#	#

CAS No.	Substance name	Product group	Concentration (%)	Amount imported/ produced (kg)	Amount exported (kg)
		Cosmetics	0.0015-0.3	3.0*10[1]	0
		Cutting fluids	¤	¤	¤
		Odour agent	¤	¤	¤

¤ No registered use within this product type.

Available but confidential

3.4 Summary and conclusions

Fragrances are used in a wide variety of products ranging from personal care products (hair care, personal hygiene, male toiletries, feminine care, baby care, fine fragrance and beauty products), household products (textile washing, dishwashing, surface cleaners, polishes and waxes), and a variety of products like foods, toys, diapers and baby-wipes, fresh scent tablets for vacuum cleaner bags, scented candles, air fresheners, erasers, perfumes for pets, toilet paper and cutting oils.

Approximately 75% of the worldwide production of fragrance substances is used for personal care products and fine perfumes, and the remaining approximately 25% is used for household products including consumer products like toys, air fresheners e.g. The concentration of fragrance in a product is closely related to the product type but may vary from small concentrations of less than 0.01% to several percentages in e.g. eau de perfume.

Several studies of the use of fragrances in consumer products (mainly cosmetics and household products) have shown that D-limonene is by far the most used fragrance in consumer products, followed by linalool and butylphenyl methylpropionate. All three substances are evaluated as human allergens by SCCS. This use pattern is based on data of approximately 6-10 years of age. Thus the picture could be different today. However, newer data from e.g. surveys have not been found in the literature.

Information on use volumes and the tonnage of preparations in Denmark (year 2012) has been retrieved from the Nordic SPIN Database. From the data it can be seen that 278 out of 827 substances are registered as “used” in Denmark. However, data only cover professional uses. For 35 substances, data is reported as confidential in the database and therefore no information on the tonnage and the numbers of preparations is available. Information from the Danish product register was also assessed. Focus were on the product groups in which the substances are likely to be applied as fragrance substances (cleaning/washing agents, cosmetics and cutting fluids) and on substances which are associated with a scent (HHCB, Citral, l-limonene and d-limonene). The highest concentration within *cosmetic products* is reported for HHCB (CAS 1222-05-5) where concentrations up to 11% are registered. In *odour agents,* which is the product group with the highest concentrations of fragrance substances, 50%, 100% and 90% are reported for HHCB (CAS 1222-05-5), Citral (CAS: 5392-40-5) and d-limonene (CAS: 5989-27-5), respectively. All three substances are evaluated as human allergens by SCCS.

4. Waste management

4.1 Waste treatment

Several types of waste are relevant to consider for perfumes, as perfume substances are applied in a wide variety of products. The most important waste stream is probably the sewage system. When applied in liquid products such as detergents and all-purpose cleaners or cosmetic products such as shampoo, conditioners and bath gels, perfume substances are disposed of down the drain and subsequently treated in waste water treatment plants. As described in more detail in Chapter 5, the subsequent environmental fate of the substances depends on their inherent physico-chemical and fate properties, where the biodegradability, hydrophobicity (measured as Log Kow) and volatility in water (Henrys Law Constant) are the most important properties. The likely distribution of substances in the environment is summarised in the table below, where the fate of a substance passing a waste water treatment plant is described. The substances assessed in this report represents more or less all the compartments in Table 12.

TABLE 11
DIAGRAM ILLUSTRATING THE MAIN FATE OF SUBSTANCES PASSING A WASTE WATER TREATMENT PLANT

Biodegradability	Volatile		Non-Volatile	
	Log Kow		Log Kow	
Biodegradability	< 4.5	>4.5	<4.5	>4.5
Readily biodegradability	Air + degraded	Sludge + degraded	Degraded	Degraded + sludge
Inherently biodegradability	Air	Sludge	Degraded + water	Sludge
Recalcitrant/not biodegradable	Air	Sludge	Water	Sludge

If the substance passes a waste water treatment plant before being discharged of into the environment, a readily biodegradable substance will be degraded to a large extend in the waste water treatment plants, and only a minor fraction will be emitted into the receiving environment. Volatile substances, which are not adsorbed to sludge to any significant degree, i.e. substances with a log Kow <4.5, are likely to end up in air if not degraded in the waste water treatment plant. However, non-volatile substances, which are also not adsorbed to sludge, are likely to end up in the water compartment. Both volatile and non-volatile substances which are not degraded and with a Log Kow > 4.5 will mainly distribute to sludge. The substances adsorbing to sludge might distribute to the terrestrial compartment if the sludge is subsequently applied to agricultural soil.
An example: Limonene which is readily biodegradable, has a Log Kow of 4.4 and a Henrys Law Constant of $3.2 \cdot 10^3$ Pa·m³/mole (HSDB, 2006, REACH registration data, 2014) i.e. above 100 Pa·m³/mol (Danish EPA, 2006), will be degraded in the environment. A minor fraction may distribute to the air compartment (due to the high Henrys Law Constant) and a minor fraction might also end up in sludge and further on in soil due to sludge application on agricultural soil. For more information on the physico-chemical and environmental fate properties please refer to Table 1 and Table 16.

Containers from the above mentioned product types or other types of solid waste arising from the application of perfumes in different kinds of products such as different kinds of wipes, hygiene pads and diapers will most likely end up in landfills, and therefore release to the terrestrial compartment is likely. Another possibility is incineration of solid waste.

4.2 Summary and conclusions

As perfume substances are applied in a wide variety of products, several types of waste may contain perfumes. Fragrance substances contained in liquid products will most likely end up in waste water and subsequent treatment in water treatment plants.

The subsequent fate of the substances will depend on their physico-chemical and fate properties. If the substance passes a waste water treatment plant before being discharged into the environment, readily biodegradable substances will be degraded to a large extend in the waste water treatment plants, and only a minor fraction will be emitted into the receiving environment. If the substance is not degraded, it might end up in receiving surface waters.
Some substances (Log Kow > 4.5) are adsorbed to sludge and may distribute to the terrestrial compartment if the sludge is subsequently applied to agricultural soil.

Solid waste containing fragrance substances will most likely be incinerated and small factions may end up in landfills.

5. Environmental effects and exposure

5.1 Environmental effects

This chapter only address the 43 substances which were appointed a harmonised classification addressing the environment (see also Appendix 1).

5.1.1 Toxicity to aquatic organisms

Data on the aquatic toxicity of fragrance substances which have harmonised classifications addressing the environment (in total 43 fragrance substances) are presented in Appendix 4, Table 4-1. The 20 substances also on the IFRA list are presented in Table 13 below. Key studies selected from the REACH registration dossier are presented together with the Predicted No Effect Concentrations (PNEC) for the substances. For substances, where a Risk Assessment report has been available, the calculated PNEC-values (if available) from these reports are included in Table 12.

From the table it can be seen that aquatic toxicity data are available for most substances, however for l-limonene only QSAR calculations have been available and were therefore included. Studies include both acute and chronic data on fish, crustaceans and algae. In general the toxicity of these substances is in the higher range; i.e. EC50 and NOEC values < 1-10 mg/L. This may reflect that the substances were initially selected on the basis that they had a harmonized classification.

TABLE 12
AQUATIC TOXICITY OF SELECTED SUBSTANCES (REGISTERED SUBSTANCES WITH A HARMONISED ENVIRONMENTAL CLASSIFICATION AND ON IFRA LIST) AND CALCULATED PNEC AQUATIC AND PNEC SEDIMENT. r= GROWTH RATE.

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
110-54-3	n-hexane	Fish: LC50 (96h) = 2.5 mg/L Daphnia: EC50 (48h) = 3.8 mg/L Artemia salina: EC50 (24h) = 1.5 Algae: EC50 (48-96h) = 10 mg/L (photosynthesis)	$PNEC_{freshwater}$ = 1.5 µg/L $PNEC_{marine}$ = 0.15 µg/L (indicative value obtained by dividing the EC50 (Artemia salina) value with an assessment factor of 1,000/10,000 respectively)	US EPA ECOTOX Database
120-51-4	Benzyl benzoate	Fish: LC50 (96h) = 2.3 mg/L Daphnia: EC50 (48h) = 3.1 mg/L Daphnia: NOEC (3 wk.) = 0.26 mg/L Algae: ErC50 (72h) 0.48 mg/L; Algae: NOECr (72h) =0.25 mg/L	$PNEC_{freshwater}$ =0.017 mg/L $PNEC_{marine}$ = 0.0017 mg/L $PNEC_{freshwater\ sed.}$= 11 mg/kg sediment dw. (partition coefficient) $PNEC_{marine\ sed.}$ = 1.1 mg/kg sediment dw. (partition coefficient)	REACH Registration data Key studies
1222-05-5	1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylindeno[5,6-c]pyran (HHCB)	Fish: NOEC (21d) = 0.068 mg/L Acartia tonsa EC50 (5d) =0.044 mg/L Daphnia:EC50 (48h) = 0.47 mg/L Daphnia: NOEC (21d) = 0.11 mg/L Algae: ECr50 (72h) > 0.85 mg/L Algae: NOECr (72h) = 0.2 mg/L Chironomid: EC50 (28d) = 54 mg/kg dw. Chironomid: NOEC (28d)= 7.1 mg/kg dw	$PNEC_{freshwater}$ = 4.4 µg/L* $PNEC_{marine}$ = 0.44 µg/L $PNEC_{freshwater\ sed.}$ = 2.0 mg/kg ww.* $PNEC_{marinesed.}$ = 0.39 mg/kg sediment dw.	REACH Registration data Key studies *EU Risk Asssessment report, 2008a
1314-13-2	Zinc oxide	Fish: LC50 (96h) = 1.79 mg/L Daphnia: EC50 (48h) = 1.7 mg/L	$PNEC_{freshwater}$ = 21 µg/L	REACH Registration data Key studies

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
		Algae: ErC50 (72h) =1.4·10¹ µg/L Algae: NOECr (72h) =24 µg/L	$PNEC_{marine}$ = 6.1 µg/L $PNEC_{freshwater\ sed.}$ = 118 mg/kg sediment dw. $PNEC_{marine\ sed.}$ = 57 mg/kg sediment dw.	(except fish, short term, supporting study)
5989-27-5	(R)-p-mentha-1,8-diene (d-limonene)	Fish: EC50 (96h) = 0.69 mg/L Daphnia: EC50 (48h) =0.36 mg/L	$PNEC_{freshwater}$ = 5.4 µg/L $PNEC_{marine}$ = 0.54 µg/L $PNEC_{freshwater\ sed.}$ = 1.3 mg/kg sediment dw. (partition coefficient) $PNEC_{marine\ sed.}$ = 0.13 mg/kg sediment dw. (partition coefficient)	REACH Registration data Key studies
5989-54-8	(S)-p-mentha-1,8-diene (l-limonene)	Fish (QSAR): EC50 (96h) = 0.85 mg/L Daphnia (QSAR): EC50 (48h) = 0.68 mg/L Algae (QSAR): EC50 (96h) =0.90 mg/L Algae (QSAR): NOECr = 0.51 mg/L	$PNEC_{freshwater}$ = 5.4 µg/L $PNEC_{marine}$ = 0.54 µg/L $PNEC_{freshwater\ sed.}$ = 1.3 mg/kg sediment dw. (partition coefficient) $PNEC_{marine\ sed.}$ = 0.13 mg/kg sediment dw. (partition coefficient)	REACH Registration data Key studies
7695-91-2	3,4-dihydro-2,5,7,8-tetramethyl-2-(4,8,12-trimethyltridecyl)-2H-benzopyran-6-yl acetate	Fish: LC50 (96h) > 11 mg/L Fish: NOEC (28d) > 100 mg/L Daphnia: EC50 (48h) > 21 mg/L Algae: ErC50 (72h) > 28 mg/L Algae: NOECr (72h) = 28 mg/L	$PNEC_{freshwater}$ = 0.27 mg/L $PNEC_{marine}$ = 0.027 mg/L $PNEC_{freshwater\ sed.}$ = 212,000 mg/kg sediment dw. (partition coefficient) $PNEC_{marine\ sed.}$ = 212,000 mg/kg sediment dw. (partition coefficient)	REACH Registration data Key studies

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
92585-24-5	2-methyl-4-phenylpentanol	Fish: LC50 (96h) = 13 mg/L Daphnia: EC50 (48h) = 8.7 mg/L Algae: ErC50 (72h) = 20 mg/L Algae: ErC10 (72h) = 11 mg/L	NA	REACH Registration data Key studies
103694-68-4	3-(2,2-dimethyl-3-hydroxypropyl)toluene	Daphnia sp.: EC50 (48h) = 19 mg/L Algae: ErC50 (72h) = 22 mg/L Algae: NOECr (72h) = 7.2 mg/L	NA	REACH Registration data Key studies
97384-48-0	2-benzyl-2-methyl-3-butenitrile	Daphnia: EC50 (24h) = 28 mg/L Algae: ErC50 (72h) = 24 mg/L Algae: NOECr (72h) = 5 mg/L	NA	REACH Registration data Key studies
107898-54-4	(+/-) trans-3,3-dimethyl-5-(2,2,3-trimethyl-cyclopent-3-en-1-yl)pent-4-en-2-ol	Daphnia: EC50 (48h) = 1 mg/L Algae: ErC50 (72h) = 1.4 mg/L Algae: NOECr (72h) = 0.45 mg/L	NA	REACH Registration data Key studies
125109-85-5	β-methyl-3-(1-methylethyl)benzenepropanal	Fish: LC50 (96h) = $1{\cdot}10^3$ mg/L Daphnia: EC50 (48h) = 5.5 mg/L Daphnia: NOEC (21d) = 0.71 mg/L Algae: ErC50 (72h) = 11 mg/L Algae: NOECr (72h) = 3.2 mg/L	$PNEC_{freshwater}$ = 7.1 µg/L $PNEC_{marine}$ = 0.71 µg/L $PNEC_{freshwater\ sed.}$ = 0.55 mg/kg sediment dw. (partition coefficient) $PNEC_{marine\ sed.}$ = 0.055 mg/kg sediment dw. (partition coefficient)	REACH Registration data Key studies
2511-00-4	ethyl 2-cyclohexylpropionate	Fish: LC50 (96h) = 8.6 mg/L Daphnia: EC50 (48h) = 1.1 mg/L Algae: ErC50 (72h) = 95 mg/L Algae: NOELr (72h) = 26 mg/L	NA	REACH Registration data Key studies
72903-27-6	Diethyl 1,4-cyclohexanedicarboxylate	Fish: LC50 (96h) = 3.2 mg/L Daphnia: EC50 (48h) = 45 mg/L	$PNEC_{freshwater}$ = 7.1 µg/L	REACH Registration data Key studies

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
		Algae: ErC50 (72h) = 86 mg/L Algae: NOECr (72h) = 25 mg/L	$PNEC_{marine}$ = 0.71 µg/L $PNEC_{freshwater\ sed.}$ = 0.17 mg/kg sediment dw. (partition coefficient) $PNEC_{marine\ sed.}$ = 0.017 mg/kg sediment dw. (partition coefficient)	
426218-78-2	A mixture of 4-(2,2,3-trimethylcyclopent-3-en-1-yl)-1-methyl-2-oxabicyclo[2.2.2]octane; 1-(2,2,3-trimethylcyclopent-3-en-1-yl)-5-methyl-6-oxabicyclo[3.2.1]octane; spiro[cyclohex-3-en-1-yl-[(4,5,6,6a-tetrahydro-3,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]furan]; spiro[cyclohex-3-en-1-yl-[4,5,6,6a-tetrahydro-4,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]]furan]	Fish: LC50 (96h) = 3.8 mg/L Daphnia: EC50 (48h) = 1.3 mg/L Algae: ErC50 (72h) = 13 mg/L Algae: NOECr (72h) = 2.6 mg/L	$PNEC_{freshwater}$ = 1.3 µg/L $PNEC_{marine}$ = 0.13 µg/L $PNEC_{freshwater\ sed.}$ = 0.29 mg/kg sediment dw. (partition coefficient) $PNEC_{marine\ sed.}$ = 0.029 mg/kg sediment dw. (partition coefficient)	REACH Registration data Key studies
74338-72-0	2,4,4,7-tetramethyl-6-octen-3-one	Fish: LC50 (96h) = 8.6 mg/L Daphnia: EC50 (48h) = 2.1 mg/L Algae: ErC50 (72h) = 13 mg/L Algae: NOECr (72h) = 1.7 mg/L	$PNEC_{freshwater}$ = 2.1 µg/L $PNEC_{marine}$ = 0.21 µg/L $PNEC_{freshwater\ sed.}$ = 34 µg/kg sediment dw. $PNEC_{marine\ sed.}$ = 3.4 µg/kg sediment dw.	REACH Registration data Key studies
75490-39-0	2,2,4-trimethyl-4-phenyl-butane-nitrile	Fish: LC50 (96h) = 4.6 mg/L Daphnia: EC50 (48h) = 12 mg/L Algae: ErC50 (72h) = 12 mg/L Algae: NOECb (72h) = 4.5 mg/L	NA	REACH Registration data Key studies

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
3508-98-3	2-phenylhexanenitrile	Fish: LC50 (96h) = 2.2 mg/L Daphnia: EC50 (48h) = 1.6 mg/L Algae: ErC50 (72h) > 2.6 mg/L Algae: NOECr (72h) = 0.26 mg/L	$PNEC_{freshwater}$ =1.6 µg/L $PNEC_{marine}$ = 0.16 µg/L $PNEC_{freshwater\ sed.}$ = 0.076 mg/kg sediment dw. (partition coefficient) $PNEC_{marine\ sed.}$ = 0.0076 mg/kg sediment dw. (partition coefficient)	REACH Registration data Key studies
10461-98-0	2-cyclohexylidene-2-phenylacetonitrile	Daphnia: EC50 (48h) = 2.3 mg/L Algae: ErC50 (72h) > 2 mg/L Algae: NOECr (72h) = 0.5 mg/L	NA	REACH Registration data Key studies
8006-64-2	Turpentine oil	Fish: LL50 (96h) = 29 mg/L Daphnia: EL50 (48h) = 6.4 mg/L Algae: ELr50 (72h) = 17 mg/L Algae: NOELr (72h) = 10 mg/L	NA	REACH Registration data Key studies

5.1.2 Toxicity to microorganisms

Data on toxicity of fragrance substances towards microorganisms are presented in this section. Data for substances which have a harmonised classification addressing the environment are presented in Appendix 4, Table 4-2. The 20 substances also in the IFRA list are presented in Tabel 14. Key studies were selected from the REACH registration dossier. For several substances, toxicity data were not available and/or $PNEC_{stp}$ not calculated indicated by 'NA' in the table. For substances were data were available the calculated $PNEC_{STP}$ ranged between 32 µg/L (CAS: 72903-27-6) and 100 mg/L (CAS: 7695-91-2).

TABLE 13
TOXICITY TO MICROORGANISMS OF SELECTED SUBSTANCES (REGISTERED SUBSTANCES WITH A HARMONISED ENVIRONMENTAL CLASSIFICATION AND ON IFRA LIST) AND CALCULATED PNEC STP (SEWAGE TREATMENT PLANT).

CAS No.	Substance name	Result on toxicity (microorganism)	Resulting $PNEC_{STP}$	Reference
110-54-3	n-hexane	NOEC (48h) = 11 mg/L (QSAR)	NA	REACH Registration data Key studies
120-51-4	Benzyl benzoate	EC50 (3h) > $1{\cdot}10^4$ mg/L	NA	REACH Registration data Key studies
1222-05-5	1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylindeno[5,6-c]pyran (HHCB)	EC0 (5d) = 10 mg/L	1 mg/L > 2 mg/L (based on $PNEC_{water}$)#	REACH Registration data Key studies #EU Risk Assessment Report, 2008
1314-13-2	Zinc oxide	NOEC (4h) = 0.1 mg/L	100 µg/L	REACH Registration data Key studies
5989-27-5	(R)-p-mentha-1,8-diene (d-limonene)	NA	1.8 mg/L	REACH Registration data
5989-54-8	(S)-p-mentha-1,8-diene (l-limonene)	NA	1.8 mg/L	REACH Registration data
7695-91-2	3,4-dihydro-2,5,7,8-tetramethyl-2-(4,8,12-trimethyltridecyl)-2H-benzopyran-6-yl acetate	EC10 > $1*10^4$ mg/L	100 mg/L	REACH Registration data Key studies
92585-24-5	2-methyl-4-phenylpentanol	NA	NA	
103694-68-4	3-(2,2-dimethyl-3-hydroxypropyl)toluene	NA	NA	
97384-48-0	2-benzyl-2-methyl-3-butenitrile	NA	NA	
107898-54-4	(+/-) trans-3,3-dimethyl-5-(2,2,3-trimethyl-cyclopent-3-en-1-yl)pent-	NA	NA	

CAS No.	Substance name	Result on toxicity (microorganism)	Resulting $PNEC_{STP}$	Reference
	4-en-2-ol			
125109-85-5	β-methyl-3-(1-methylethyl)benzenepropanal	NA	NA	
2511-00-4	ethyl 2-cyclohexylpropionate	NA	NA	
72903-27-6	Diethyl 1,4-cyclohexanedicarboxylate	NOEC (3h) = $3.2*10^1$ mg/L	32 µg/L	REACH Registration data Key studies
426218-78-2	A mixture of 4-(2,2,3-trimethylcyclopent-3-en-1-yl)-1-methyl-2-oxabicyclo[2.2.2]octane; 1-(2,2,3-trimethylcyclopent-3-en-1-yl)-5-methyl-6-oxabicyclo[3.2.1]octane; spiro[cyclohex-3-en-1-yl-[(4,5,6,6a-tetrahydro-3,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]furan]; spiro[cyclohex-3-en-1-yl-[4,5,6,6a-tetrahydro-4,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]]furan]	NOEC (30 min) = 18 mg/L	1.8 mg/L	REACH Registration data Key studies
74338-72-0	2,4,4,7-tetramethyl-6-octen-3-one	NA	NA	
75490-39-0	2,2,4-trimethyl-4-phenyl-butane-nitrile	NOEC (3h) = $1*10^2$ mg/L	NA	REACH Registration data Key studies
3508-98-3	2-phenylhexanenitrile	NOEC (3h) ≥ $1*10^2$ mg/L	10 mg/L	REACH Registration data Key studies
10461-98-0	2-cyclohexylidene-2-phenylacetonitrile	NA	NA	
8006-64-2	Turpentine oil	EC10 (3h) = 66 mg/L	6.6 mg/L	REACH Registration data Key studies

NA: Not Available

5.1.3 Toxicity to terrestrial organisms

Data on the toxicity of fragrance substances towards soil organisms are presented in Appendix 4 Table 4-3. Substances also in the IFRA list are presented in table 15. Key studies were selected from the REACH registration dossier. Generally there are not a lot of data for terrestrial toxicity. For some substances data on aquatic toxicity has been applied in the calculation of a PNEC for the terrestrial compartment ("equilibrium partitioning method" applying the partition coefficient).

TABLE 14
TERRESTRIAL TOXICITY OF SELECTED SUBSTANCES (REGISTERED SUBSTANCES WITH A HARMONISED ENVIRONMENTAL CLASSIFICATION AND ON IFRA LIST) AND CALCULATED PNEC SOIL

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
110-54-3	n-hexane	NA	NA	
120-51-4	Benzyl benzoate	NA	NA	
1222-05-5	1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylindeno[5,6-c]pyran (HHCB)	Earthworm: NOEC (8wk) = 45 mg/kg soil dw Collembola: NOEC (4wk) = 45 mg/kg soil dw	0.31 mg/kg soil dw.	REACH Registration data Key study EU Risk Assessment Report, 2008
1314-13-2	Zinc oxide	Lolium perenne: IC50 (12d) = 64 mg/L	36 mg/kg soil dw.	REACH Registration data
5989-27-5	(R)-p-mentha-1,8-diene (d-limonene)	NA	0.26 mg/kg soil dw. (partition coefficient)	REACH Registration data
5989-54-8	(S)-p-mentha-1,8-diene (l-limonene)	NA	0.26 mg/kg soil dw. (partition coefficient)	REACH Registration data
7695-91-2	3,4-dihydro-2,5,7,8-tetramethyl-2-(4,8,12-trimethyltridecyl)-2H-benzopyran-6-yl acetate	NA	$7.5 \cdot 10^4$ mg/kg soil dw.	REACH Registration data
92585-24-5	2-methyl-4-phenylpentanol	NA	NA	
103694-68-4	3-(2,2-dimethyl-3-hydroxypropyl)toluene	NA	NA	
97384-48-0	2-benzyl-2-methyl-3-butenitrile	NA	NA	
107898-54-4	(+/-) trans-3,3-dimethyl-5-(2,2,3-trimethyl-cyclopent-3-en-1-yl)pent-4-en-2-ol	NA	NA	
125109-85-5	β-methyl-3-(1-methylethyl)benzenepropanal	NA	0.11 mg/kg soil dw.	REACH Registration data

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
2511-00-4	ethyl 2-cyclohexylpropionate	NA	NA	
72903-27-6	Diethyl 1,4-cyclohexanedicarboxylate	NA	0.029 mg/kg soil dw.	REACH Registration data
426218-78-2	A mixture of 4-(2,2,3-trimethylcyclopent-3-en-1-yl)-1-methyl-2-oxabicyclo[2.2.2]octane; 1-(2,2,3-trimethylcyclopent-3-en-1-yl)-5-methyl-6-oxabicyclo[3.2.1]octane; spiro[cyclohex-3-en-1-yl-[(4,5,6,6a-tetrahydro-3,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]furan]; spiro[cyclohex-3-en-1-yl-[4,5,6,6a-tetrahydro-4,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]]furan]	NA	0.057 mg/kg soil dw.	REACH Registration data
74338-72-0	2,4,4,7-tetramethyl-6-octen-3-one	NA	11 µg/kg soil dw.	REACH Registration data
75490-39-0	2,2,4-trimethyl-4-phenyl-butane-nitrile	NA	NA	
3508-98-3	2-phenylhexanenitrile	NA	0.014 mg/kg soil dw.	REACH Registration data
10461-98-0	2-cyclohexylidene-2-phenylacetonitrile	NA	NA	
8006-64-2	Turpentine oil	NA	0.45 mg/kg soil dw.	REACH Registration data

NA: Not available

5.1.4 Classification

Please refer to Appendix 1: for the environmental classification of fragrance substances.

5.2 Environmental fate

Biodegradability, Log Kow and the Henrys Law Constant (H) are the essential substance properties determining the distribution in the environment. Henrys Law Constant is roughly proportional to the ratio between vapour pressure and water solubility, i.e. substances with a low water solubility, and possibly a medium to high vapour pressure tend to have a high Henrys Law Constant, whereas very water soluble substances such as acetone and ethanol have a relatively low Henrys Law Constant even though they both have a high vapour pressure.

If the substance passes a waste water treatment plant before being discharged into the environment, readily biodegradable substances will to a large extend be degraded in the waste water treatment plants, so only a minor fraction will be emitted into the receiving environment. A substance with a high Henrys Law Constant (H >100 Pa·m^3/mol) and a low Log Kow will then evaporate into the air, and a substance with a Log Kow > 4.5 tends to adsorb to the sludge.

For a substance released into the environment, substances with a low Henrys Law Constant and a Log Kow < 4.5 are likely to distribute primarily into the aquatic compartment. Substances with a Log Kow > 4.5 will concentrate in the water sediment if it is released into water. Substances concentrated in the sewage sludge will distribute to the terrestrial compartment if the sludge is applied on agricultural soil. Substances with have a high Henrys Law Constant are expected to partition to the air compartment after release.

Results on the biodegradation of substances identified in Chapter 1 are presented in Appendix 4, Table 4-4. From the table it can be seen that several of the substances are not readily biodegradable under aerobic conditions. However, this endpoint is not applicable for inorganic substances such as metal and their salts which are also represented among the substances assessed. Table 16 presents the result on biodegradation for the substances with a harmonised classification addressing the environment and also in the IFRA list. Furthermore, Table 16 presents the Log Kow values for the substances.

Data on Henry Law Constants, which describes the volatility of a substance in water, is not available for most of the assessed substances. For HHCB (CAS: 1222-05-5), Limonene and 3,4-dihydro-2,5,7,8-tetramethyl-2-(4,8,12-trimethyltridecyl)-2H-benzopyran-6-yl acetate (CAS: 7695-91-2) reported values are 36.9 Pa·m^3/mole; 3.2·10^3 Pa·m^3/mole and 41.6 Pa·m^3/mole respectively (HSDB, 2006, REACH Registration Data, 2014).

TABLE 15
INFORMATION ON BIODEGRADATION AT AEROBIC CONDITIONS AND LOG KOW VALUES OF SELECTED SUBSTANCES (REGISTERED SUBSTANCES WITH A HARMONISED ENVIRONMENTAL CLASSIFICATION AND ON IFRA LIST)

CAS No.	Substance name	Biodegradation	Log Kow at 25 °C	Reference
110-54-3	n-hexane	Readily biodegradable (QSAR)	4 (20°C)	REACH Registration data, (HSDB, 2013)
120-51-4	Benzyl benzoate	Readily biodegradable	9.97	REACH Registration data
1222-05-5	1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylindeno[5,6-c]pyran (HHCB)	Not readily biodegradable	5.3	REACH Registration data Key study
1314-13-2	Zinc oxide	Not applicable inorganic chemical-	NA	

CAS No.	Substance name	Biodegradation	Log Kow at 25 °C	Reference
		Zinc is an element and therefore persistent in the environment		
5989-27-5	(R)-p-mentha-1,8-diene (d-limonene)	Readily biodegradable	4.4 (37 °C)	REACH Registration data
5989-54-8	(S)-p-mentha-1,8-diene (l-limonene)	Readily biodegradable	4.4 (37 °C)	REACH Registration data
7695-91-2	3,4-dihydro-2,5,7,8-tetramethyl-2-(4,8,12-trimethyltridecyl)-2H-benzopyran-6-yl acetate	Not readily biodegradable	12.2	REACH Registration data
92585-24-5	2-methyl-4-phenylpentanol	Not readily biodegradable	3.0	REACH Registration data Key study
103694-68-4	3-(2,2-dimethyl-3-hydroxypropyl)toluene	Not readily biodegradable	3.4	REACH Registration data Key study
97384-48-0	2-benzyl-2-methyl-3-butenitrile	Not readily biodegradable	2.3 (38°C)	REACH Registration data Key study
107898-54-4	(+/-) trans-3,3-dimethyl-5-(2,2,3-trimethyl-cyclopent-3-en-1-yl)pent-4-en-2-ol	Not readily biodegradable	4.3 (23°C)	REACH Registration data Key study
125109-85-5	β-methyl-3-(1-methylethyl)benzenepropanal	Inherently biodegradable	3.8 (20°C)	REACH Registration data Key study
2511-00-4	ethyl 2-cyclohexylpropionate	Not readily biodegradable	4.0	REACH Registration data Key study
72903-27-6	Diethyl 1,4-cyclohexanedicarboxylate	Readily biodegradable	2.5 (30°C)	REACH Registration data
426218-78-2	A mixture of 4-(2,2,3-trimethylcyclopent-3-en-1-yl)-1-methyl-2-oxabicyclo[2.2.2]octane ; 1-(2,2,3-	Not readily biodegradable	> 3.7 (21°C)	REACH Registration data Key study

CAS No.	Substance name	Biodegradation	Log Kow at 25 °C	Reference
	trimethylcyclopent-3-en-1-yl)-5-methyl-6-oxabicyclo[3.2.1]octane ; spiro[cyclohex-3-en-1-yl-[(4,5,6,6a-tetrahydro-3,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]furan]; spiro[cyclohex-3-en-1-yl-[4,5,6,6a-tetrahydro-4,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]]furan]			
74338-72-0	2,4,4,7-tetramethyl-6-octen-3-one	NA	4.5 (20°C)	REACH Registration data Key study
75490-39-0	2,2,4-trimethyl-4-phenyl-butane-nitrile	Not readily biodegradable	3.3 (20°C)	REACH Registration data Key study
3508-98-3	2-phenylhexanenitrile	Not readily biodegradable	3.1 (21°C)	REACH Registration data Key study
10461-98-0	2-cyclohexylidene-2-phenylacetonitrile	Not readily biodegradable	4	REACH Registration data Key study
8006-64-2	Turpentine oil	Readily biodegradable, but failing 10-day window	NA	REACH Registration data Key study

NA: Not Available

5.2.1 PBT

An assessment of PBT properties of the 20 substances was made based on the information presented in the REACH registration data where available. None of the substances which were assessed for PBT properties in the registration data fulfil the criteria for P and B and T and therefore they cannot be regarded as PBT substances. Also none of the substances which were not assessed in the REACH registration data are expected to be PBT substances based on the information reported in Table 1 (physico-chemical properties), Table 12 (Aquatic toxicity) and Table 15 (aerobe biodegradation).

TABLE 16
SUMMARY ON PBT PROPERTIES OF 20 SELECTED (REGISTERED SUBSTANCES WITH A HARMONISED ENVIRONMENTAL CLASSIFICATION AND ON IFRA LIST) FRAGRANCE SUBSTANCES. INFORMATION IS BASED ON THE RESULTS PRESENTED IN TABLES 1, 13 AND 16.

CAS No.	Substance name	PBT assessment	Reference
110-54-3	n-hexane	Not PBT	NA
120-51-4	Benzyl benzoate	Not PBT	REACH Registration data
1222-05-5	1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylindeno[5,6-c]pyran (HHCB)	Not PBT	REACH Registration data EU Risk Assessment Report, 2008
1314-13-2	Zinc oxide	Not applicable, Inorganic substance	
5989-27-5	(R)-p-mentha-1,8-diene (d-limonene)	Not PBT	REACH Registration data
5989-54-8	(S)-p-mentha-1,8-diene (l-limonene)	Not PBT	REACH Registration data
7695-91-2	3,4-dihydro-2,5,7,8-tetramethyl-2-(4,8,12-trimethyltridecyl)-2H-benzopyran-6-yl acetate	Not PBT	REACH Registration data
92585-24-5	2-methyl-4-phenylpentanol	NA	NA
103694-68-4	3-(2,2-dimethyl-3-hydroxypropyl)toluene	NA	NA
97384-48-0	2-benzyl-2-methyl-3-butenitrile	NA	NA
107898-54-4	(+/-) trans-3,3-dimethyl-5-(2,2,3-trimethyl-cyclopent-3-en-1-yl)pent-4-en-2-ol	NA	NA
125109-85-5	β-methyl-3-(1-methylethyl)benzenepropanal	NA	NA
2511-00-4	ethyl 2-cyclohexylpropionate	NA	NA
72903-27-6	Diethyl 1,4-cyclohexanedicarboxylate	Not PBT	REACH Registration data
426218-78-2	A mixture of 4-(2,2,3-trimethylcyclopent-3-en-1-yl)-1-methyl-2-oxabicyclo[2.2.2]octane; 1-(2,2,3-trimethylcyclopent-3-en-1-yl)-5-methyl-6-oxabicyclo[3.2.1]octane; spiro[cyclohex-3-en-1-yl-[(4,5,6,6a-tetrahydro-3,6',6',6'a-	Not PBT	REACH Registration data

CAS No.	Substance name	PBT assessment	Reference
	tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]furan]; spiro[cyclohex-3-en-1-yl-[4,5,6,6a-tetrahydro-4,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]]furan]		
74338-72-0	2,4,4,7-tetramethyl-6-octen-3-one	Not PBT	REACH Registration data
75490-39-0	2,2,4-trimethyl-4-phenyl-butane-nitrile	NA	NA
3508-98-3	2-phenylhexanenitrile	Not PBT	REACH Registration data
10461-98-0	2-cyclohexylidene-2-phenylacetonitrile	NA	NA
8006-64-2	Turpentine oil	Not PBT	REACH Registration data

NA: Not Available

5.3 Environmental exposure

5.3.1 Sources of release

Fragrance substances are applied in a wide variety of consumer products (cosmetics, laundry detergents, fabric softeners, all-purpose cleaners, car care products etc.) and therefore fragrance substances are likely to be disposed of to the sewer system during use. This is therefore a likely source for the exposure of the aquatic compartment if substances are not broken down during waste water treatment.

Containers applied for the above mentioned products, which contain residues, or other product groups in which perfumes are applied such as different kinds of wipes, hygiene pads, diapers etc. might result in the release of perfume substances to soil when disposed on landfills if not incinerated.

Furthermore, some fragrance substances occur naturally in plants. Plants have long been used in perfumery as a source of essential oils and aroma compounds. Fragrances are extracted from bark (e.g. cinnamon), flowers (rose, jasmine, geranium etc.), fruits (orange, lemon, apples etc.), leaves (lavender, rosemary etc.), resin and terpenes. Other fragrances have animal origin. Examples are musks (retrieved from the glands of the musk deer) and civet (also called civet musk, which is obtained from the odorous sacs of the civets).

5.3.2 Predicted Environmental Concentration

The distribution of fragrance substances in the different environmental compartments (air, water, soil and sediment) depends on the physico-chemical and fate properties of the single substances. These properties were already addressed in section 1.3 (Table 1: physico-chemical properties) 4.2 (Table 11: main fate of substances) and 5.2 (Table 15: aerobe biodegradation) of this report and will not be addressed further here.

5.3.3 Environmental fate and monitoring data

A data search was performed in order to find available information on substance concentrations in the environmental compartments. Publicly available databases and literature was searched applying the CAS numbers of the substances combined with search phrases (monitoring/ (environmental) concentration/risk assessment). Databases included the NORMAN database on environmental monitoring data.

In this section environmental fate and monitoring data for fragrance substances are exemplified through substances (HHCB and Limonene) where data have been available. Therefore, data do not represent all the substances identified in Chapter 1 and described in section 5.2.
Furthermore, the presented data cannot be used to predict the fate of other substances, as measured data depends on both the use patterns and the environmental behaviour properties of the single substances. Also monitoring data reported in the sections below do *not* necessarily represent the release arising only from perfumes, even though the use in perfumes is expected to be significant for HHCB and Limonene.

5.3.3.1 HHCB

If released into **water,** HHCB is expected to adsorb to suspended solids and sediment (Log Kow = 5.3). HHCB is not readily biodegradable and biodegradation is not an important environmental fate process in water. Volatilization from water surfaces is however expected to be an important fate process based upon this compound's estimated Henry's Law constant of 13.17 Pa·m^3/mole (it should be noted that this value is below the H = 100 Pa·m^3/mol which is reported as a "limit" for considering a substance as volatile by the Danish EPA (Danish EPA, 2006)). Estimated volatilization half-lives for a model river and model lake are 18 hours and 10 days, respectively. However, volatilization from water surfaces is expected to be attenuated by adsorption to suspended solids and sediment in the water column. The estimated volatilization half-life from a model pond is 31 months if adsorption is considered (HSDB, 2007).

DMU has conducted a study on polycyclic musk substances, including HHCB, in point sources and the aquatic environment in Denmark. These results showed that the concentration of HHCB in surface water (fresh- and marine water) was below the detection limit (0.001 µg/L) (DMU, Draft report 2009).
The HERA report on HHCB (2004) presents concentrations in surface waters in European countries which are between 0.0008 -4.3 µg/L (90th percentile values). The EU RAR (2008a) reports concentrations in surface water in European countries between 0.01-2.73 µg/L (90th percentile values). A $PEC_{local, water}$ = 0.49 µg/L was applied in the risk assessment (Southern EU-15 Scenario) in the EU RAR (2008a).

In the study by DMU, **sediment** samples were also analysed. The limit of detection for sediment samples was 0.5 µg/kg dw. Results showed that HHCB was present at a concentration between 1.3 and 724 µg/kg dw. (DMU Draft report, 2009). Concentrations of HHCB in suspended matter and sediment are presented in the HERA report. Data show that the measured concentrations depend on time and location of sampling. The 90th-percentile value for suspended solids is 0.5 mg HHCB/kg. The observed levels in the contaminated brooks in Hessen show a decreasing maximum concentration from circa 13 mg/kg to 1 mg/kg (1996 to 2000). The 90th-percentile for the sediment in areas with low or medium effluent input was 0.35 mg HHCB/kg. The maximum levels observed in contaminated brooks in Hessen in 1996 were by an order of magnitude higher, but the level decreased to the same level in 2000 (HERA, 2004). Furthermore, the EU RAR (2008a) reports data on the concentration in sediment. Also here the concentration is dependent on the degree of contamination. For instance, in the Berlin area, concentrations were below the limit of detection at sites with a low effluent input. At sites with a moderate and high input of effluent, concentrations were 0.38 mg/kg dw and 1.9 mg/kg dw respectively (90th percentile values).
A $PEC_{local, sediment}$ = 1.21 mg/kg dw. was applied in the risk assessment (Southern EU-15 Scenario) in the EU RAR. For comparison the reported $PNEC_{freshwater\ sed.}$ was 2.0 mg/kg ww. in the EU RAR (Table 13) (2008a).

The concentration of HHCB was measured by DMU in the in- and outlet of **sewage** treatment plants. Results showed that of the polycyclic musk compounds present in the inlet about 10-20 % was found in the outlet water. The major part of the compound present in the inlet water was adsorbed to sewage sludge (DMU, Draft report 2009). Analysis of sewage sludge from three plants

in Denmark revealed HHCB in concentrations above the detection limit (5 µg/kg dw.) in one of three samples. Results from the report are presented in Table 17 below.
In the HERA report on HHCB concentrations in European sewage treatment plants are reported. Mean concentration are in the range 1.5-6.9 µg/L and 0.78-9 µg/L in the influent- and effluent respectively. It should be mentioned that not all countries report a concentration for both inlet and outlet. However data, from countries who do report both values, indicate a removal during waste water treatment. Concentrations in sludge from sewage treatment plants vary with time and location (concentration primary sludge: 5.4-27 mg/kg dw. and activated sludge: 4.4-63 mg/kg dw.) (HERA, 2004).
Concentrations measured in sludge were reported from the Netherlands, Germany, Switzerland, UK, the Nordic countries Denmark, Sweden, Norway, Finland, Iceland and from southern countries Greece, Spain and Italy presented in the in the EU-RAR (2008a). The type of sludge was not further specified. Highest concentrations were found in Denmark and Sweden (median 14.1 and 13.9 mg/kg dw), intermediate in Norway and Finland (median 7.7 and 5.4 mg/kg dw), whereas the levels were low in Iceland (0.5 mg/kg dw) EU-RAR (2008a).

TABLE 17
MEASURED CONCENTRATIONS OF HHCB IN THE IN- AND OUTLET OF SEWAGE TREATMENT PLANTS AND IN SLUDGE (DMU, 2009)

CAS No.	Substance name	Concentration inlet [µg/L]	Concentration outlet [µg/L]	Concentration sludge [µg/kg dw.]	Country	Reference
1222-05-5	1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylindeno[5,6-c]pyran (HHCB)	13.1	2.25 (17.2%)	400.2	Denmark	DMU, Draft report 2009

If released to **soil**, HHCB is - based upon the Koc value (38,600 L/kg) - expected to be immobile. Volatilization from moist soil surfaces is expected to be an important fate process based upon an estimated Henry's Law constant. However, adsorption to soil is expected to attenuate volatilization. A biodegradation half-life in soil of 4 months indicates that biodegradation is not an important environmental fate process in soil (HSDB, 2007).
An average sludge application rate on a field in Georgetown (US) was 0.6 to 1.1 kg sludge per m[2]. The HHCB concentration in sludge was in the order of 86 mg/kg dw. With a ploughing depth of 15 cm the expected initial concentration was calculated to be 0.22 mg/kg dw. The concentration measured immediately after application was 0.07 mg/kg dw, which is close to the $PEC_{local, soil}$ = 0.06 mg/kg dw, which was applied in the risk assessment of the EU RAR (2008a), and it dropped to below the quantification limits after 30 days (<0.05 mg/kg dw) (EU RAR, 2008a). The concentrations in 6 sludge amended fields in Germany measured in 2002 were below 1 µg PCM[2]/kg dw except on one field (2.1 µg PCM/kg) (EU RAR, 2008a).

If released to **air,** HHCB will exist in both the vapor and particulate phases in the atmosphere. Vapor-phase HHCB will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction is estimated to be 10 hours. Particulate-phase HHCB will be removed from the atmosphere by wet or dry deposition. HHCB is not expected to be

[2] PCM: polycyclic musks

susceptible to direct photolysis by sunlight. No monitoring data in the air are available (HSDB, 2007).

5.3.3.2 Limonene

If released to **water**, limonene is expected to adsorb to suspended solids and sediment in the water (Log Kow =4.4) .Volatilization from water surfaces is expected to occur rapidly based upon the estimated Henry's Law constant ($3.2 \cdot 10^3$ Pa·m^3/mole). Estimated volatilization half-lives for a model river and model lake are 1 hour and 5 days, respectively. Limonene is not expected to undergo hydrolysis since it lacks functional groups that hydrolyses under environmental conditions (HSDB, 2006).
Mean limonene concentrations in two polluted Spanish rivers were 590 ng/L and 1,600 ng/L. Samples of water collected from the Gulf of Mexico contained limonene at a concentration of 2-40 ng/L. Limonene has also been detected at Terra Nova Bay, Antarctica; water and pack ice samples contained limonene at concentrations up to 20 ng/L and 15 ng/L, respectively (WHO, 1998). The concentration of limonene (unspecified isomer) in seawater samples from Resurrection Bay, AK (US) was 84 ng/L in June 1985 and 0.47 ng/L in June 1986 (HSDB, 2006).

Limonene concentrations from 1 to 130 µg/L in **groundwater** were measured in a polluted area at a former site for the production of charcoal and pine tar products in Florida (WHO, 1998). Limonene (unspecified isomer) was detected in contaminated groundwater in The Netherlands at a maximum concentration of 10 µg/L (HSDB, 2006).

If released to **soil**, limonene is expected to have low mobility. Volatilization from moist soil surfaces as well as dry soil surfaces is expected to occur (HSDB, 2006). Limonene concentrations up to 920 µg/g in soil were measured in a polluted area at a former site for the production of charcoal and pine tar products in Florida (WHO, 1998).

If released to **air**, limonene will exist solely in the vapor-phase in the ambient atmosphere. Vapor-phase limonene is degraded rapidly in the atmosphere by reaction with photochemically-produced hydroxyl radicals, nitrate radicals and ozone. The half-lives for these reactions are very short, ranging from several minutes to about 2.6 hours (HSDB, 2006). Typical concentrations of limonene in air from rural areas range from 0.1 to 0.2 ppb (0.6-1.1 µg/m^3) and typical concentrations of limonene in urban/suburban air are likely to range from 0.1 to 2 ppb (0.6-11.1 µg/m^3) (WHO, 1998). The concentration of limonene (unspecified isomer) in the air above Moscow Mountain, ID, (US) 1976-1977, ranged from <10 to 50 ppt. (HSDB, 2006).

5.4 Environmental impact

The risk towards the environmental is defined as the ratio of the predicted environmental concentration (PEC) to the predicted no effect concentration (PNEC). In general a ratio above 1 indicates that a risk towards the environment cannot be excluded where as a ratio below 1 indicates that no risk is expected.
Based on the very limited amount and most often the lack of monitoring data describing the environmental concentrations of fragrance substances, it is often not possible to identify a risk towards the environmental compartment. The reason for the lack of data might, at least for some of the substances, be the rationale that perfume and therefore fragrance substances are only applied in products in a very limited amount and therefore their environmental concentration is not monitored. Especially for substances where a low PNEC value has been calculated such as e.g. n-hexane, benzyl benzoate, HHCB etc. (which all have PNEC values in the µg/L range) monitoring data are of interest in order to identify a possible risk towards the environment (i.e. PEC > PNEC).

Monitoring data do not only reflect the release due to the use as fragrance substances in perfumes. Other applications, in non-perfume products, may have a more pronounced contribution to the environmental concentrations.
However the use in perfumes is expected to be significant for substances such as Limonene and HHCB.

HHCB
The results presented in the DMU, Draft report (2009) showed that the concentration of HHCB in surface water (fresh- and marine water) were below the detection limit (0.001 µg/L). This is also lower than the $PNEC_{freshwater}$ and $PNEC_{marine}$ of 4.4 µg/L and 0.44 µg/L respectively (REACH registration data). However the highest surface concentration (4.3 µg/L (90th percentile values)) reported in the HERA report (2004) is higher than the $PNEC_{marine}$.

The sediment concentration (724 µg/kg dw) which was reported in the DMU report is lower than the $PNEC_{freshwater\ sed.}$ = 2.0 mg/kg dw.. However this value is above the $PNEC_{marine\ sed.}$ = 0.39 mg/kg sediment dw (REACH registration data). Also some of the reported concentrations in sediment obtained from the HERA report (HERA, 2004) are above the $PNEC_{marine\ sed.}$.

The reported inlet concentration of 13.1 µg/L (DMU Draft Report, 2009) and the mean concentrations reported for the inlets to European STP (1.5-6.9 µg/L) (HERA, 2004) are lower than the $PNEC_{microorganism}$ of 1 mg/L (REACH Registration data).

The reported HHCB concentration of 0.07 mg/kg dw reported for the field in Georgetown (US) is below the $PNEC_{soil}$ of 0.31 mg/kg soil dw. (REACH Registration data).

The conclusions on environmental risk obtained in the HERA report (2004) are:

- *Sufficient data are available to assess the environmental risks.*
- *The assessment can be based on measured concentrations in the northern region of the EU, representing average and below average use scenarios.*
- *Generally a decrease in measured concentrations is observed when data from years around 1996 are compared to recent results from the same areas.*
- *Risk ratios are below 1. In specific areas characterised by high effluent input, risk ratios for sediment organisms may be above 1. This is the case for historic data in Berlin (1996/97) and Hessen (1996). There is a need for more recent and more detailed data on concentration levels in Berlin. The uncertainty of the PNEC may be reduced by carrying out toxicity studies with sediment organisms.*
- *For the 'worst case' use scenario no measured concentrations are available. There is a need for information on concentration levels in the southern European region.*

The conclusions on environmental risk obtained in the EU RAR (2008a) are:

- *Conclusion (ii) There is at present no need for further information and/or testing and no need for risk reduction measures beyond those which are being applied already.*

  Conclusion (ii) applies to all compartments and all scenarios.

Limonene
Few monitoring data are available limonene. The reported concentrations in the aquatic environment were in the ng/L range which is below the $PNEC_{freshwater}$ of 5.4 µg/L and $PNEC_{marine}$ of 0.54 µg/L (REACH registration data). However, *single* data found on soil concentrations (920 µg/g in polluted areas) is above the calculated $PNEC_{soil}$ (0.262 mg/kg soil) (HSDB, 2006).

Overall, monitoring data or calculations of the predicted environmental concentrations are necessary in order to define if there is a possible risk. However monitoring data might not *only* reflect the release due to the use of fragrance substances in perfumes. Other applications may also contribute to the environmental concentrations. However the use in perfumes is expected to be significant for Limonene.

5.5 Summary and conclusions

It was decided only to address the 43 substances which were appointed a harmonised classification addressing the environment.

Studies on both acute and chronic toxicity to fish, crustaceans and algae were available. In general the toxicity of these substances is in the higher end, i.e. EC50 and NOEC values < 1-10 mg/L. This may reflect that the substances were initially selected on the basis that they had a harmonized classification.

Only a few toxicity data for sediment organisms were available - however data for microorganisms and the terrestrial compartment is also available for most of the fragrance substances.

None of the fragrance substances evaluated in this report can be considered as both persistent (P), bioaccumulative (B) and Toxic (T), i.e. none of the substances are considered PBT substances nor very persistent (vP) and very bioaccumulative (vB).

Fragrance substances are applied in a wide variety of consumer products (cosmetics, laundry detergents, fabric softeners, all-purpose cleaners, car care products etc.) and therefore fragrance substances are likely to be disposed of to the sewer system during use. This is therefore a likely source for the exposure of the aquatic compartment if substances are not broken down during waste water treatment.
Containers applied for the above mentioned products, which contain residues, or other product groups in which perfumes are applied such as different kinds of wipes, hygiene pads etc. might result in the release of perfume substances to soil when disposed on landfills if they are not incinerated. Furthermore, some fragrance substances occur naturally in plants. Plants have long been used in perfumery as a source of essential oils and aroma compounds. Fragrances are extracted from bark (e.g. cinnamon), flowers (rose, jasmine, geranium etc.), fruits (orange, lemon, apples etc.), leaves (lavender, rosemary etc.), resin and terpenes. Others have animal origin. Examples are musks (retrieved from the glands of the musk deer) and civet (also called Civet Musk, which is obtained from the odorous sacs of the civets).

The distribution of fragrance substances among the different compartments (air, water, soil and sediment) is depending on the physico-chemical properties of the single substances. A data search was performed in order to find available information on substance concentrations in the environmental compartments. For most substances monitoring data are not available. Environmental fate and monitoring data for fragrance substances were therefore exemplified through substances (HHCB and Limonene) where data have been available. Therefore data do not represent all the substances identified.

The risk characterisation ratio towards the environment is defined as the ratio of the predicted environmental concentration (PEC) to the predicted no effect concentration (PNEC). If the PEC exceeds the PNEC a risk cannot be excluded (PEC/PNEC >1). Only a few monitoring data are available for fragrance substances and therefore it is often not possible to define a risk towards the environmental compartment for these substances. Monitoring data or calculations of the predicted environmental concentrations are therefore necessary in order to define if there is a possible risk. However monitoring data might not *only* reflect the release due to the use of fragrance substances

in perfumes. In many cases, other applications have a much more pronounced contribution to the environmental concentrations. However, the use in perfumes is expected to be significant for HHCB and Limonene.

The concentrations of HHCB in surface water (fresh- and marine water) were below the detection limit (0.001 µg/L). This is also lower than the $PNEC_{freshwater}$ and $PNEC_{marine}$ of 4.4 µg/L and 0.44 µg/L respectively. However the highest surface concentration (4.3 µg/L (90th percentile values)) reported in the HERA report is higher than the $PNEC_{marine}$..

The sediment concentration (724 µg/kg dw) which was reported in the DMU report is lower than the $PNEC_{freshwater\ sed.}$ = 2.0 mg/kg dw.. However this value is above the $PNEC_{marine\ sed.}$ = 0.39 mg/kg sediment dw (REACH registration data). Also some of the reported concentrations in sediment obtained from the HERA report are above the $PNEC_{marine\ sed.}$.

The available environmental concentration was also found to be lower than the PNEC-value which was reported for the sewage treatment plant.

Few monitoring data were available limonene. The reported concentrations in the aquatic environment were in the ng/L range which is below the $PNEC_{freshwater}$ of 5.4 µg/L and $PNEC_{marine}$ of 0.54 µg/L (REACH registration data). However, *single* data found on soil concentrations (920 µg/g in polluted areas) is above the calculated PNEC (0.262 mg/kg soil).

6. Human health effects and exposure

6.1 Human health hazard

Overall fragrances are a dissimilar group of substances, and information on their toxicological effects is not available for all substances. Allergy is the most important human health effects and it was decided in cooperation with the Danish EPA, to consider the allergy potential from a general point of view. Furthermore, CMR effects were considered for selected substances if considered relevant.

Out of 827 substances registered in the use category "PC28 Fragrance / Perfume" under REACH, 88 substances were appointed a harmonised classification regarding human health (see also Appendix 1:). Out of the 88 substances, 38 were also listed on IFRAs list covering 3,059 materials which have been reported as used in perfumes.

Out of the 38 substances 7 substances are also listed in the SCCS opinion of 82 known fragrance allergens (SCCS, 2012): These are: 1) Benzyl alcohol, 2) Benzaldehyde, 3) benzyl benzoate, 4) Citral, 5) d-limonene, 6) l-limonene and 7) Turpentine oil.

Six out of the 38 substances have a harmonised classification addressing allergy (Table 19). These are:

1) Butyl methacrylate,
2) Citral,
3) d-limonene,
4) l-limonene,
5) 2-Methyl-4-phenylpentanol,
6) a mixture of: trans-4-acetoxy-4-methyl-2-propyl-tetrahydro-2H-pyran; cis-4-acetoxy-4-methyl-2-propyl-tetrahydro-2H-pyran.

However, the six substances with a harmonised classification addressing allergy are not all identical with the substances mentioned as human allergens in SCCS, 2012. Only citral and limonene is both appointed a classification for allergy and mentioned as a human allergen in the SCCS opinion. However, the 7 fragrance substances out of the 38 found as human allergens by SCCS are all self-classified for their skin sensitising potential by most notifiers except benzyl alcohol and benzyl benzoate, where only few notifiers have self-classified for their skin sensitisation potential (see Table 18). In total, 15 of the 38 substances are self-classified for their skin sensitisation potential.

Below in Table 18 the harmonised and notified classifications for the 38 substances are shown. This table shows that the main problem related to human health for these selected substances used to produce perfume are their potential to cause skin sensitisation. Several of the substances are also classified for the irritation potential.

TABLE 18

THE HARMONISED CLASSIFICATION OF 39 FRAGRANCE SUBSTANCES REGISTERED UNDER REACH IN THE USE CATEGORY "PC28 FRAGRANCE / PERFUME" AND IN THE IFRA LIST COVERING USED FRAGRANCES. [A] INCLUDED IN THE SCCS EVALUATION OF KNOWN HUMAN ALLERGENS AND [B] INCLUDED IN THE SCCS EVALUATION AS FRAGRANCE SUBSTANCES LACKING HUMAN DATA AND USED IN HIGH VOLUMES ACCORDING TO INDUSTRY INFORMATION.

CAS No.	Substance name	Harmonised classification	Notified classifications (number of notifiers)
64-02-8	Tetrasodium ethylenediaminete-traacetate (NA4EDTA)	Acute Tox. 4; H302 (Harmful if swallowed) Eye Dam. 1; H318 (Causes serious eye damage)	H351 (Suspected of causing cancer) (1 of 2,653)
67-63-0	Propan-2-ol	Eye Irrit. 2; H319 (Causes serious eye irritation) STOT SE 3; H336 (May cause drowsiness or dizziness)	NA
71-23-8	Propan-1-ol	Eye Dam. 1; H318 (Causes serious eye damage) STOT SE 3; H336 (May cause drowsiness or dizziness)	NA
71-36-3	Butan-1-ol	Acute Tox. 4;H302 (Harmful if swallowed) Skin Irrit. 2; H315 Causes skin irritation) Eye Dam. 1; H318 (Causes serious eye damage) STOT SE 3; H335 (May cause respiratory irritation) STOT SE 3; H336 (May cause drowsiness or dizziness)	NA
71-41-0	Pentan-1-ol	Skin Irrit. 2; H315 (causes skin irritation) Acute Tox. 4; H332 (harmful if inhaled) STOT SE 3; H335 (May cause respiratory irritation)	NA
78-83-1	2-methylpropan-1-ol	Skin Irrit. 2; H315 (Causes skin irritation) Eye Dam. 1; H318 (Causes serious eye damage) STOT SE 3; H335 (May cause respiratory irritation)	NA

CAS No.	Substance name	Harmonised classification	Notified classifications (number of notifiers)
		STOT SE 3; H336 (May cause drowsiness or dizziness)	
78-93-3	Butanone	Eye Dam. 1; H319 (Causes serious eye irritation) STOT SE 3; H336 (May cause drowsiness or dizziness)	NA
97-88-1	Butyl methacrylate	Skin Irrit. 2; H315 (Causes skin irritation) Skin Sens. 1; H317 (May cause an allergic skin reaction) Eye Irrit. 2; H319 (Causes serious eye irritation) STOT SE 3; H336 (May cause drowsiness or dizziness)	H317 (May cause an allergic skin reaction) (1,136 of 1,136)
100-51-6[A]	Benzyl alcohol	Acute Tox. 4; H302 (Harmful if swallowed) Acute Tox. 4; H332 (Harmful if inhaled)	H317 (May cause an allergic skin reaction) (1 of 822)
100-52-7[A]	Benzaldehyde	Acute Tox. 4; H302 (Harmful if swallowed)	H317 (May cause an allergic skin reaction) (446 of 598)
108-21-4	Isopropyl acetate	Eye Irrit. 2; H319 (Causes serious eye irritation) STOT SE 3; H336 (May cause drowsiness or dizziness)	H317 (May cause an allergic skin reaction) (1 of 2,184)
109-60-4	Propyl acetate	Eye Irrit. 2; H319 (Causes serious eye irritation) STOT SE 3; H336 (May cause drowsiness or dizziness)	NA
111-27-3	Hexan-1-ol	Acute Tox. 4; H302 (Harmful if swallowed)	NA
110-54-3	n-hexane	Asp. Tox. 1; H304 (May be fatal if swallowed and enters airways) Skin Irrit. 2; H315 (Causes skin irritation) STOT SE 3; H336 (Ma cause drowsiness or dizziness)	H361(f) (Suspected of damaging fertility or the unborn child) (2,662 of 2,662)

CAS No.	Substance name	Harmonised classification	Notified classifications (number of notifiers)
		Repr. 2; H361f (Suspected of damaging fertility or the unborn child) STOT RE 2; H373 (May cause damage to organs through prolonged or repeated exposure)	
120-51-4[A]	Benzyl benzoate	Acute Tox. 4; H302 (Harmful if swallowed)	H317 (May cause an allergic skin reaction) (2 of 1,995)
122-99-6	2-phenoxyethanol	Acute Tox. 4; H302 (Harmful if swallowed) Eye Irrit 2; H319 (Causes serious eye irritation)	H341 (Suspected of causing genetic defects) (1 of 2,724) H351 (Suspected of causing cancer) (1 of 2,724)
123-86-4	n-butyl acetate	STOT SE 3; H336 (May cause drowsiness or dizziness)	NA
141-78-6	Ethyl acetate	Eye Irrit 2; H319 (Causes serious eye irritation) STOT SE 3; H336 (May cause drowsiness or dizziness)	H317 (May cause an allergic skin reaction) (1 of 3,663)
687-47-8	Ethyl (S)-2-hydroxypropionate	Eye Dam. 1; H318 (Causes serious eye damage) STOT SE 3; H335 (May cause respiratory irritation)	NA
1310-73-2	Sodium hydroxide	Skin Corr. 1A; H314 (Causes severe skin burns and eye damage)	NA
5131-66-8	1-butoxypropan-2-ol	Skin Irrit 2; H315 (Causes skin irritation) Eye Irrit 2; H319 (Causes serious eye irritation)	H317 (May cause an allergic skin reaction) (1 of 2,180) H341 (Suspected of causing genetic defects) (1 of 2,180) H351 (Suspected of causing cancer) (1 of 2,180) H360 (May damage fertility or the unborn child) (1 of 2,180)

CAS No.	Substance name	Harmonised classification	Notified classifications (number of notifiers)
5392-40-5[A]	Citral	Skin Irrit 2; H315 (Causes skin irritation) Skin Sens. 1; H317 (May cause an allergic skin reaction)	H317 (May cause an allergic skin reaction) (2,083 of 2,084)
5989-27-5[A]	(R)-p-mentha-1,8-diene (d-limonene)	Skin Irrit 2; H315 (Causes skin irritation) Skin Sens. 1; H317 (May cause an allergic skin reaction)	H317 (May cause an allergic skin reaction) (1,976 of 1,976)
5989-54-8[A]	(S)-p-mentha-1,8-diene (l-limonene)	Skin Irrit 2; H315 (Causes skin irritation) Skin Sens. 1; H317 (May cause an allergic skin reaction)	H317 (May cause an allergic skin reaction) (1,070 of 1,070)
7681-57-4	Disodium disulphite	Acute Tox. 4; H302 (Harmful if swallowed) Eye Dam. 1; H318 (Causes serious eye damage)	H317 (May cause an allergic skin reaction) (2 of 2,170)
92585-24-5	2-methyl-4-phenylpentanol	Skin Sens. 1; H317 (May cause an allergic skin reaction)	H317 (May cause an allergic skin reaction) (197 of 198)
92484-48-5	sodium 3-(2H-benzotriazol-2-yl)-5-	Eye Dam. 1; H318 (Causes serious eye damage)	NA
63500-71-0[B]	A mixture of: cis-tetrahydro-2-isobutyl-4-methylpyran-4-ol; trans-tetrahydro-2-isobutyl-4-methylpyran-4-ol	Eye Irrit. 2; H319 (Causes serious eye irritation)	NA
97384-48-0	2-benzyl-2-methyl-3-butenitrile	Acute Tox. 4; H302 (Harmful if swallowed)	NA
107898-54-4	(+/-) trans-3,3-dimethyl-5-(2,2,3-trimethyl-cyclopent-3-en-1-yl)pent-4-en-2-ol	Skin Irrit. 2; H315 (Causes skin irritation)	NA
131766-73-9	A mixture of: trans-4-acetoxy-4-methyl-2-propyl-tetrahydro-2H-pyran; cis-4-acetoxy-4-methyl-2-propyl-tetrahydro-2H-pyran	Skin Sens. 1; H317 (May cause an allergic skin reaction)	H317 (May cause an allergic skin reaction) (923 of 923)

CAS No.	Substance name	Harmonised classification	Notified classifications (number of notifiers)
426218-78-2	A mixture of 4-(2,2,3-trimethylcyclopent-3-en-1-yl)-1-methyl-2-oxabicyclo[2.2.2]octane; 1-(2,2,3-trimethylcyclopent-3-en-1-yl)-5-methyl-6-oxabicyclo[3.2.1]octane; spiro[cyclohex-3-en-1-yl-[(4,5,6,6a-tetrahydro-3,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]furan]; spiro[cyclohex-3-en-1-yl-[4,5,6,6a-tetrahydro-4,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]]furan]	Skin Irrit 2; H315 (Causes skin irritation) Eye Irrit ;2 H319 (Causes serious eye irritation)	NA
74338-72-0	2,4,4,7-tetramethyl-6-octen-3-one	Skin Irrit. 2; H315 (Causes skin irritation)	H317 (May cause an allergic skin reaction) (1 of 1,259)
75490-39-0	2,2,4-trimethyl-4-phenyl-butane-nitrile	Acute Tox. 4; H302 (Harmful if swallowed)	NA
3508-98-3	2-phenylhexanenitrile	Acute Tox. 4; H302 (Harmful if swallowed)	NA
10461-98-0[B]	2-cyclohexylidene-2-phenylacetonitrile	Acute Tox. 4; H302 (Harmful if swallowed)	NA
8006-64-2[A]	Turpentine oil	Acute Tox. 4; H302 (Harmful if swallowed) Asp. Tox. 1; H304 (May be fatal if swallowed and enters airways) Acute Tox. 4; H312 (Harmful in contact with skin) Skin Irrit. 2; H315 (Causes skin irritation) Acute Tox. 4; H317 (Harmful if swallowed) Eye Irrit 2; H319 (Causes serious eye irritation) Acute Tox. 4; H332 (Harmful if inhaled)	H317 (May cause an allergic skin reaction) (1,576 of 1,576)

The published literature indicates that the main known risk using fragrances is the risk of allergy. Out of the approximately 3000 fragrances on the marked, 82 are known to be allergenic to humans, and approximately further 100 substances suspected to be allergenic to humans (based on animal studies and QSAR) (SCCS, 2012). Regardless of the fact that 82 fragrances substance are known to be human allergens, these substances have been widely used in the composition of perfumes for many different products (Videncenter for allergi; September 2014), and some of them seen as the most used in product like cosmetics and household products (see chapter 3).
Overall, 1-4% of the general population in EU has allergies toward fragrance substances (SCCS, 2012). Fragrance allergy is a lifelong condition that may give rise to permanent or recurrent contact dermatitis and may affect quality of life (Heisterberg, 2013).

6.1.1 Skin sensitization

Allergy includes two phases:

- Induction of specialized immunological T cell memory in an individual by repeated exposure to an allergen (i.e. the immune system learns to react).
- Elicitation, i.e. production of an immune system (T cell) mediated allergenic response subsequent to exposure of a sensitised individual to the allergen (visible skin reaction). Usually, lower doses are necessary for elicitation than are required for induction.

Simplified it could be described as shown in Table 19

TABLE 19
DIFFERENCE BETWEEN INDUCTION AND ELICITATION OF CONTACT DERMATITIS (WIJNHOVEN ET AL, 2008)

	Induction	Elicitation
Exposure dose	High(er)	Low(er)
Frequency of exposure	Several	Single
Effect	No symptoms	Allergenic reaction on skin

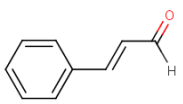
Skin sensitization is not an 'all or none' phenomenon: there is a sequence of immunobiological events that need to be activated to produce first an induction of sensitization and secondly to elicit a clinical reaction. In consequence, induction and elicitation of contact allergy are threshold phenomena and allergenic contact dermatitis therefore is to a considerable extent a preventable disease.
Contact allergy to fragrance substances may develop following skin contact with sufficient amounts of these substances often through the use of consumer products like cosmetics, cleaning agents or other products containing perfume. Around 16% of eczema patients in the European population are sensitised to fragrance substances, and 1-4% of the general population in Europe (SCCS, 2012). The overall trend of fragrance allergy has been stable during the last 10 years, as some causes of fragrance allergy have decreased and other increased. People with allergies to fragrance substances may be allergenic to several different fragrances. It is not always possible to determine exactly what specific fragrances that are the cause of a fragrance allergy.
Contact allergy among children was previously considered to be rare, but data from the past decade have shown that it is common among children and that the prevalence may be increasing.
Allergenic contact dermatitis acquired in childhood has important consequences for the individual, as it may, like in adults, affect the quality of life. It may interfere with play, sports activities, and school, and affect decisions regarding future occupation. In a retrospective analysis of patch test data from the Danish National Database of Contact Allergy covering 2594 children during the period 2003-2011 it was found that allergenic contact dermatitis in children is a significant clinical problem (Simonsen et al, 2014). The most common sensitizers were metals, fragrances, and hair dyes. The most common causes of fragrance allergy were deodorants, shampoo and liquid soap.

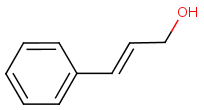
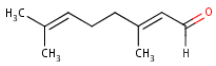
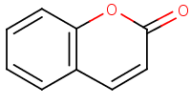
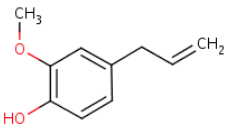
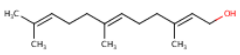
Perfume allergy was seen in all age groups from 5 years of age. The frequency of positive patch test reactions and allergenic contact dermatitis was significantly higher among girls. However, this difference was most pronounced after 13 years of age probably because of a more common use of cosmetic products in females (Simonsen et al, 2014).

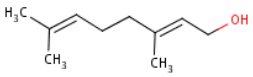
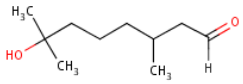
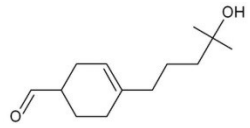
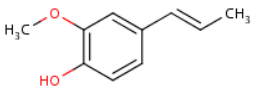
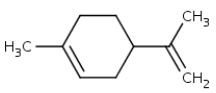
In 1999 SCCNFP did an evaluation of a number of fragrances. They identified 24 fragrances of special concern regarding allergy in humans. The list of 24 fragrances was in a later stadium completed with oak moss and tree moss (see the list of 26 fragrances in Table 2). They concluded that information of the presence of these substances in cosmetic products should be provided to the consumer. These labelling requirements were on a later state also included in the regulations for detergents.

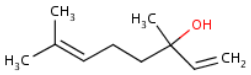
In 2012 SCCS did a new evaluation of fragrances used in cosmetic products, this time including a much bigger amount of substances. About 200 substances (individual substances and natural extracts) were included in the evaluation. SCCS (2012) based their evaluation on scientific literature published since the SCCNFP opinion in 1999. Clinical, epidemiological and experimental studies were evaluated and critical reviewed. The evaluation confirmed that the fragrance allergens identified by SCCNFP in 1999 are still relevant fragrance allergens for consumers from their exposure to cosmetic products (SCCS, 2012).
Based on clinical data, in total 82 substances were identified as contact allergens in humans covering 54 single chemicals and 28 natural extracts. Out of these 82 substances 12 individual fragrance substances were considered to be of special concern based on their allergenic potential as more than 100 reported cases of allergy in humans for each are known. These 12 substances are all included in the regulated 26 fragrances. The 12 substances, their classification (harmonised and notified), and chemical structure are presented in Table 20. Even though harmonised classifications for their skin sensitisation potential for most part of the substances are lacking, notified classification for their skin sensitisation potential is appointed to almost every single one of them for a majority of the notifiers. Regarding their chemical structures the table shows that the majority of the substances (66%) belong to the group of terpenes, a group which is known as a large contributor to fragrance substances (see chapter 1)

TABLE 20
INDIVIDUAL FRAGRANCE SUBSTANCES OF SPECIAL CONCERN REGARDING THEIR ALLERGENIC POTENTION IN HUMANS ACCORDING TO SCCS (2012). HARMONISED CLASSIFICATIONS AND THEIR SCENT

Cas No.	Name	Harmonised classification addressing allergy	Notified classifications	Scent and chemical structure
104-55-2	Cinnamal	None	Acute tox 4 - H312, Skin Irrit 2 - H315, Skin Sens 1 - H317, Eye irrit 2 - H319	Pungent, spicy note (cinnamon) 
104-54-1	Cinnamyl alcohol	None	Skin Sens 1 - H317	Pleasant, floral odour hyacinth

Cas No.	Name	Harmonised classification addressing allergy	Notified classifications	Scent and chemical structure
				
5392-40-5	Citral	Skin Sens. 1; H317 (May cause an allergic skin reaction)	Skin Irrit 2 - H315, Skin Sens 1 - H317	Strong lemon odour (aldehyde of terpene) 
91-64-5	Coumarin	None	Acute tox 4 - H312, Skin Sens 1 - H317	Pleasant odour resembling that of vanilla beans 
97-53-0	Eugenol	None	Skin Sens 1 - H317, Eye irrit 2 - H319	Warm, spicy, floral odour of cloves (phenol of terpene) 
4602-84-0	Farnesol	None	Skin Irrit 2 - H315, Skin Sens 1 - H317	Delicate mild flower odour (alcohol of terpene) 

Cas No.	Name	Harmonised classification addressing allergy	Notified classifications	Scent and chemical structure
106-24-1	Geraniol	None	Skin Irrit 2 - H315, Skin Sens 1 - H317	Sweet rose odour (alcohol of terpene) 
107-75-5	Hydroxycitro-nellal	None	Skin Sens 1 - H317, Eye irrit 2 - H319	Sweet floral odour (aldehyde of terpene) 
31906-04-4 / 51414-25-6	Hydroxyisohexyl 3-cyclohexene carboxaldehyde (HICC)	None	Skin Sens 1 - H317	Sweet light floral odour 
97-54-1	Isoeugenol	None	Acute tox 4 - H302 Acute tox 4 - H312, Skin Irrit 2 - H315, Skin Sens 1 - H317, Eye irrit 2 - H319	Spice-clove odour (phenol of terpene) 
138-86-3	Limonene (oxidised)	Skin Sens. 1; H317 (May cause an allergic skin reaction)	Asp tox 1 – H304, Skin Irrit 2 - H315, Skin Sens 1 - H317,	Pleasant lemon-like odour (terpene) 

Cas No.	Name	Harmonised classification addressing allergy	Notified classifications	Scent and chemical structure
78-70-6	Linalool (oxidised)	None	Skin Irrit 2 - H315, Eye irrit 2 - H319	Flora, spicy, wood odour (alcohol of terpene) 

In particular one substance was highlighted; Hydroxyisohexyl 3-cyclohexene carboxaldehyde (HICC) having been the cause of more than 1500 reported cases since 1999. Despite the industries attempt to restrict the use concentration of this substance in cosmetic products to 0.02% since 2009, allergy to this fragrance substance continues to be very frequently observed (2.5%). No change in the prevalence of positive patch test reactions over the last 9 years was found by Heisterberg *et al* (2012). Nardelli also found HICC as being one of the most frequent allergens in a large cross sectional study on patch test result of 13,332 patients from January 1990 to December 2011 (Nardelli et al, 2013). Based on the high numbers of allergy reported for HICC, SCCS (2012b) concluded, that HICC should not be used in consumer products in order to prevent further cases of contact allergy to HICC and to limit the consequences to those who already have become sensitised. As described in chapter 2 there is now, based on the SCCS (2012b) opinion initiatives to ban the use of HICC in cosmetic products.

Furthermore SCCS (2012) found 8 natural extracts to pose a high risk of sensitisation to the consumer (Table 22). As seen in table 22 none of them have a harmonised classification for their sensitisation potential. However, self-classifications for their sensitisation potential are appointed to every single one of them except turpentine (oil) for a majority of the notifiers.

TABLE 21
NATURAL EXTRACTS OF SPECIAL CONCERN REGARDING THEIR ALLERGENIC POTENTIAL ACCORDING TO SCCS (2012)

Cas No.	Name	Harmonised classification addressing allergy	Notified classification
83863-30-3; 8006-81-3	Cananga odorata and Ylang-ylang oil	None	Asp tox 1 - H304, Skin Irrit 2 - H315, Skin Sens 1 - H317, Eye irrit 2 - H319
8000-34-8	Eugenia caryophyllus leaf / flower oil	None	Asp tox 1 - H304, Skin Sens 1 - H317, Eye irrit 2 - H319
90028-67-4	Evernia furfuracea extract*	None	Skin Sens 1 - H317

Cas No.	Name	Harmonised classification addressing allergy	Notified classification
90028-68-5	Evernia prunastri extract*	None	Skin Sens 1 - H317
84776-64-7; 90045-94-6; 8022-96-6	Jasminum grandiflorum / officinale	None	Acute tox 4 - H302, Skin Irrit 2 - H315, Skin Sens 1 - H317
8007-00-9	Myroxylon pereirae	None	Acute tox 4 - H302, Skin Sens 1 - H317
84787-70-2; 8006-87-9	Santalum album	None	Skin Irrit 2 - H315, Skin Sens 1 - H317, Eye Irrit 2 – H319
8006-64-2; 9005-90-7; 8052-14-0	Turpentine (oil)	Acute Tox. 4; H302 (Harmful if swallowed) Asp. Tox. 1; H304 (May be fatal if swallowed and enters airways) Acute Tox. 4; H312 (Harmful in contact with skin) Skin Irrit. 2; H315 (Causes skin irritation) Acute Tox. 4; H317 (Harmful if swallowed) Eye Irrit 2; H319 (Causes serious eye irritation)	Acute tox 4 - H302, Asp tox 1 - H304, Acute tox 4 - H312, Skin Irrit 2 - H315, Skin Sens 1 - H317, Eye irrit 2 - H319, Acute tox 4 - H332,

Moreover experiments in animals and QSAR analysis indicates that approximately 100 additional fragrance substances are expected to be contact allergens in humans, although human evidence is currently lacking (SCCS, 2012).

Dose-response relationships exist between exposure to contact allergens and the proportion of consumers who will become sensitised to an allergen (i.e. induction), as well as the proportion who will suffer from allergenic contact dermatitis (elicitation). For a number of recognised contact allergens in man, dose-elicitation studies on sensitised individuals are available. These studies indicate that it is in principle possible to derive exposure levels that the majority of sensitised individuals will tolerate (SCCS, 2012). The thresholds based on elicitation levels in sensitised individuals should be sufficiently low to protect both the majority of sensitised individuals as well as most of the non-sensitised consumers from developing contact allergy and limit the risk of induction.
The dose elicitation studies available indicate that a general level of exposure of up to 0.8 μg/cm² (0.01%, which is the concentration limit requiring a declaration of some fragrances in rinse-off cosmetics) may be tolerated by most consumers with contact allergy to fragrance allergens (SCCS, 2012). Such a threshold based on elicitation levels in sensitised individuals will be sufficiently low to

protect both sensitised individuals from allergenic reactions as well as most of the non-sensitised consumers from developing contact allergy. The SCCS is of the opinion that for substances identified as posing a high risk to the consumer and for which no individual thresholds could be derived, the general threshold of 0.01% would limit the problem of fragrance allergy in the consumer significantly.
It was not possible to provide a safe threshold for natural extracts of concern, as no specific investigations exist and the model providing the general threshold (0.01%) has been based on individual chemicals only. However the SCCS considers that the maximum use concentration also applies to the above identified fragrance allergens when present in the natural extract. This will also reduce the risk of sensitisation and elicitation from natural extracts.

6.1.2 Respiration sensitisation

Several fragrances are as described above known skin sensitizers, but it is unknown whether inhalation exposure to these chemicals can induce respiratory sensitization.
Ter Burg *et al* (2014) investigated the effects on the immune system by testing a selection of five fragrance allergens in the respiratory local lymph node assay (LLNA). The probability and extent of exposure were assessed by measuring concentrations of 24 known fragrance allergens in 109 air fresheners. It was shown that the most frequently used fragrances in air fresheners were D-limonene and linalool. In the respiratory LLNA, these fragrances gave negative results.
Of the other tested chemicals, only isoeugenol induced a statistically significant increase in cell proliferation. Consumer exposure was assessed in more detail for D-limonene, linalool, and isoeugenol by using exposure modelling tools. It was shown that the most frequently used fragrances in air fresheners, D-limonene, and linalool gave rise to a higher consumer exposure compared with isoeugenol. To evaluate whether the consumer exposure to these fragrances is low or high, these levels were compared with measured air concentrations of diisocyanates, known human respiratory sensitizers. This comparison showed that consumer exposure from air fresheners to D-limonene, linalool, and isoeugenol is considerably lower than occupational exposure to diisocyanates. By combining this knowledge on sensitizing potency with the much lower exposure compared to diisocyanates it seems highly unlikely that isoeugenol can induce respiratory sensitization in consumers using air fresheners.

6.1.3 CMR properties

The CMR properties for the 827 registered substances within REACH were explored by their harmonise classifications. Substances with a harmonised classification for their CMR potential, but not included in the 38 substances (table 19) selected by the criteria in this project are shown in Appendix 5.
Substances appointed a harmonised classification for CMR effects (out of the 38 selected substances) are mentioned below.

6.1.3.1 Toxicity to reproduction

One of the fragrance substances in Table 18 (n-hexane) has a harmonised classification as repr 2; H361 (suspected of damaging fertility or the unborn child). n-Hexane is, as written in chapter 2.1, not allowed as an ingredient in cosmetic products, and the use of the substance as a fragrance seems minimal (for further information on this substance see the newly performed LOUS report on the substance – Mikkelsen *et al*, 2014).

6.1.3.2 Mutagenicity

None of the 38 substances have a harmonised classification addressing mutagenicity.

6.1.3.3 Carcinogenicity

None of the 38 substances have a harmonised classification addressing carcinogenicity.

6.1.4 Multiple Chemical sensitivity, MCS

Multiple Chemical Sensitivity (MCS) is a relatively new health disorder where some people suddenly can no longer tolerate the odour of chemicals at doses far below those known to cause harmful effects. MCS is a condition were previously healthy individual experiences multiple, non-specific symptoms when exposed to chemical odours at very low concentrations (Danish EPA, 2005). A limitation of the risk for exposure to chemicals, both at high and low concentrations, seems to be the primary objective for preventing new cases of MCS. Avoidance of the initial exposure seems especially important. In the report from the Danish EPA, the authors conclude that the consumers would benefit from access to knowledge on what kind of chemicals they are exposed to. Consumers can contribute to prevent the break out of MCS-symptoms by avoiding indoor exposure to high concentration of volatile chemicals and by avoiding use of strongly smelling products, including use of perfume and scented products (Danish EPA, 2005).

6.2 Human exposure

6.2.1 Direct exposure

6.2.1.1 Consumers

Most consumers will, on a daily basis, be exposed to fragrances from a large variety of sources as fragrances are contained in many different product types (SCCS, 2012, Park *et al*, 2006). Exposure to fragrance substances is most commonly by direct skin contact, however, exposure via inhalation and oral intake may also occur. Exposure to fragrance substances may occur from e.g.

- Personal care products (perfumes, cosmetics, feminine care and baby care)
- Textile washing (laundry detergents, fabric care conditioners, stain removers)
- Dishwashing (automatic dishwashing, hand-washing, rinse aids)
- Surface cleaners (for kitchens, baths, windows, floors, and carpets)
- Toys
- Food
- Air fresheners
- Fragrant candles + wax
- Ethereal oils
- Fragrant sachets Bags of textile
- Sprays
- Potpourri Mix of (dried) flowers, fruits or other material
- Toilet bowl rim hangers container with grid, enclosing a fragrant solid, gel or liquid specifically designed to suspend from the toilet bowl rim.
- Ironing-perfumes (a liquid perfume to be added to the water container in a steam iron)
- Vacuum perfumes (a ball of material to be placed in the vacuum cleaner. The scent is released when the appliance is switched on)
- Biocides (repellents and wood preservatives)
- Parfume for pets
- Toilet paper

Thus, in fact there is no limit to the products and product types where fragrances are used.

6.2.1.2 Personal care products (e.g. cosmetics, feminine care)

The exposure to personal care products is extensive, and it is difficult to avoid exposure to fragrances. Cosmetic products and clothing containing fragrance are the most important skin-contact product groups as a potential large area of skin is in contact with the perfumed product.

In 2007, the Danish EPA investigated the presence of selected fragrances (and preservatives) in 97 deodorants on the Danish market (Rastogi et al., 2007a). In almost 70% of the deodorants investigated, one or more of the 26 allergenic fragrances that are regulated for labelling, were

present according to the ingredients list on the product. Approximately 25% of the deodorants contained 5-17 (a median of 8 per product) of the 26 target fragrances, meaning that there is a considerable allergen load in deodorants on the Danish market. In another study by Rastogi (2007b) they investigated the current exposures to 4 important fragrance allergens (isoeugenol, hydroxy-iso-hexyl 3-cyclohexene carboxaldehyde (HICC, Lyral), atranol and chloro-atranol) in hydroalcoholic cosmetic products. 25 popular perfume products of Danish as well as international brands were purchased from the Danish retail market. Isoeugenol was found in 56%, HICC in 72%, atranol in 59%, and chloro-atranol in 36% of the investigated eau de toilette/eau de perfume products. The concentrations of isoeugenol were, in all products, below a concentration of 0.02%. HICC reached a concentration of maximum 0.2%, which is 10-fold higher than the maximum tolerable concentration considered safe by SCCNFP in 2003. Later, in 2012 SCCS re-evaluated HICC and concluded that HICC should be banned in cosmetics based on the number of cases of HICC allergy documented over the last decade, which were exceptionally high and that continued exposure to HICC by the consumer is not considered safe even at concentrations as low as 0.02%. The median concentrations of atranol and chloro-atranol in the investigated products were similar to those found in similar products in 2003 (Wijnhoven, 2008). A significant decrease in the frequency of presence of chloro-atranol in the products was observed. The author concluded that there is still a wide-spread exposure to potent fragrance allergens in perfumes. The EU Commission has proposed a ban of HICC, atranol and chloro-atranol in cosmetics as described in chapter 2.

6.2.1.3 Household products

Laundry detergents are commonly used consumer products that contain fragrances. Surveys on marketed detergents and cleaning products on the market have been carried out in both Denmark and in The Netherlands (Rastogi, 2002, Bouma and Van Peursem, 2006). It was found that in both countries allergenic fragrances were present in the majority of the detergents. Fourty-three different, non-cosmetic consumer products were investigated for the presence of fragrances by the Danish EPA (Rastogi, 2002). Mainly dish wash, laundry detergents, and hard and soft surface cleaners were studied (33 products), and 97% of these cleaning products (n=32) contained up to 9 of the target fragrance substances (the 26 fragrances that are regulated for labelling in the EU). Other products investigated in this study were panties, nappies and toilet paper as well as erasers and a doll. Most frequently found fragrances were limonene (67% of all products investigated), butylphenyl methylpropional (56%), hexylcinnamic aldehyde, linalool and γ-methylionone (40% each), benzyl alcohol and coumarin (30% each), benzyl benzoate and citronellol (26% each), benzyl salicylate and geraniol (21% each), eugenol (19%) and citral (16%) (Rastogi, 2002).

6.2.1.4 Toys

Addition of potential allergenic fragrances to a wide variety of children's articles that earlier were only available in unscented versions, is increasing (Wijnhoven, 2008). The aim of scent addition is to differentiate them from similar non-scented products in order to make them more attractive. Toys like dolls, teddy bears, school articles (speed markers, erasers and pencils) or puzzles are scented to highlight the product and to stimulate consumers for buying, or to displace unpleasant odours. By playing with toys containing potential allergenic fragrances, children are potentially exposed via skin absorption, inhalation or by ingestion of the substances. To date, there is a lack of information on the exposure of children to perfumes emitting from scented toys during usage (Masuck et al, 2009). Danish research in 2006 revealed that in 7 out of 10 toys examined, allergenic fragrances (18 of the 26 regulated fragrances) were found (Glensvig and Ports, 2006). In another investigation performed by Masuck *et al* (2010) they found that benzyl benzoate were present in children's toys at levels higher than 100 µg/g, which would require appropriate declaration on the package (but was missing).

In the toys directive on the safety of toys (Directive 2009/48/EC, 2009) a number of fragrances have either been banned from toys or require declaration on the package (see also chapter 2). Contact to the Danish industry association for the toy industry (in September 2014) gave the

impression that the content of perfume in toys sold on the Danish market is declining as consumers in Denmark are very focused on avoiding perfume in toys for their children. Both Top Toy and BR in Denmark have a fragrance policy in which the companies state, that they don't sell toys in their stores containing the 26 known fragrance allergens, and only sell toys containing fragrance, if the correct function of the toy depends on the added fragrance (personal communication, 2014).

6.2.1.5 Air fresheners' e.g.

Air fresheners are consumer products specifically intended for spreading a pleasant smell and the consumer is hereby mainly exposed via inhalation and in lesser extend by dermal contact with the fragrance substances.
An increasing number of these products are currently available on the market in different applications and their use is growing. A large proportion of the population is using air fresheners in the home and in the car. These products can be categorized in the following groups: room perfumes in holders, fragrant candles and wax, ethereal oils, fragrant sachets, sprays, potpourri, fragrant cardboards, toilet bowl rim hangers, incense, ironing perfumes and vacuum perfumes (Park et al., 2006). In addition to fragrance chemicals, these products often contain other chemicals such as solvents and propellants in sprays.
In 2003, the Danish EPA mapped chemical substances in air fresheners and other fragrance liberating products (Pors and Fuhlendorff, 2003). They found that in 100% of the air fresheners tested, at least one of the 26 fragrances identified as allergens (for dermal exposure) by the SCCNFP was detected. Presence of a single fragrance varied from trace levels (0.00035%) to a large content (6.2%).
Ter Burg et al (2014) assessed air fresheners by measuring the concentrations of 24 known fragrance allergens in 109 air fresheners. It was shown that the most frequently used fragrances in air fresheners were D-limonene and linalool.

6.2.2 Occupational exposure

Occupational exposures to fragrance substances at the production sites may occur by the inhalation and dermal route. For citral, as an example, the estimated human exposure of a worker who operates the drum filler and does sampling without protective equipment was estimated in a Japanese production site. Air samples around the drum were measured to 0.31-0.56 mg/m^3. Based on the maximum concentration of 0.56 mg/m^3, the inhalation of a worker who operates the drum filler for 4 hours and does sampling for 12 minutes a day without protective equipment is 0.04 mg/kg/day. Dermal exposure during sampling was estimated to be 0.1-1 mg/cm^2/day. Thus, the dermal exposure for 12 minutes sampling work was estimated to 0.3 mg/kg/day, assuming both hands were exposed. The combined exposure would be 0.34 mg/kg/day. However, protective measures i.e. safety glasses and gloves are expected during these processes. Therefore, the actual exposure to workers is probably lower than the estimated value (OECD SIDS, 2001b).

Other occupational exposures besides at the production site of the fragrances may also be relevant. A German survey from 2001 (Uter *et al*) found that in a number of occupations the development of skin sensitisation to fragrances are at high risk. The proportion of patients with fragrance skin sensitisation varied greatly between different occupational groups from 2.5% to 17.4%, the highest occupational risk of fragrance skin sensitisationwas associated with work as a masseur or physiotherapist, metal furnace operator, potter or glass maker etc., or geriatric nurse (Uter *et al*, 2001). Moreover, hairdressers, beauty therapists and aroma therapists are examples of occupations where there is occupational exposure to fragrance-containing cosmetic and other products. Cleaners are exposed dermally to fragrance-containing household products (e.g. detergents). Cooks and bakers are exposed to flavouring chemicals and spices. Healthcare workers are also at risk of acquiring fragrance contact allergy (SCCS, 2012).

Buckley *et al* (2001) found (in total 24,046 patients were tested during a 15 year period) that health care workers and metalworkers had statistically significant higher rates of skin sensitisation to

eugenol than did workers in other occupations while food handlers had significant higher rates of skin sensitisation to cinnamal and cinnamic alcohol. They also found a strong correlation between age and allergy suggesting that with increasing age an increasing cumulative exposure to potentially sensitizing fragrances over time is likely to be the cause of an age-related increase in fragrance allergy.

Finally, occupational exposure - as well as consumer exposure - also occurs in many retail shops where perfumes are actively pumped into the air of the store to create a scented environment.

6.2.3 Indirect exposure

Indirectly people may be exposed to perfumes (e.g. at public places) from:

- Airborne exposure
- From another individual wearing perfumes

Inhalation should be considered as an important exposure pathway, especially in indoor environments even though the knowledge of the effects after exposure via inhalation to fragrances is not fully known.
An indirect exposure to fragrance of the consumer (and worker) takes place largely in supermarkets and shopping malls when perfume is sprayed out in the public room to attract buyers.

6.3 Human health impact

6.3.1 Workers

Generally, skin sensitisation to perfume in the working environment does not seem to get that much attention. In Denmark, 160 cases of sufferings (occupational diseases) in the working environment were reported for the period 2004-2013. In these cases fragrance was one of three influences. Out of the 160 reported sufferings, 119 involved skin diseases (making it the largest group). For comparison, in the period 2005-2012 the total reported sufferings from skin diseases were 14,904. Wet work, soaps and detergents (and not perfume) were the most commonly reported cause in connection with a skin disease (personal communication with the Danish working environment authority).
Based on the available literature describing occupational risks for contact with fragrance substances it may be concluded that preventive action should be implemented in occupations with a high risk of fragrance allergy. In general, the working environmental legislation require that work is planned and organized in such a way that risks to the health and safety of the workers handling hazardous chemical agents (including allergens) are eliminated or reduced to a minimum. Any unnecessary exposure must be avoided. Preventive measures must be assessed in each individual case (e.g. process ventilation and spray booths). The individual evaluation of the exposure may trigger the requirement to use gloves and/or respiratory protection when working with products containing fragrance.
Specific occupations seem at higher risks than others; especially occupations with a high degree of direct contact with cosmetic products during a working day or occupations with contact with both water and cosmetics or cleaners. In these cases the regulation requires substitution considerations when working with hazardous substances and materials, including allergens. Where it is possible to remove or replace or reduce exposure to a minimum without significant technical differences, or expenses, the employer shall ensure this. In many processes, including cleaning, this will mean in practice to use non-scented products.

6.3.2 Consumers

Around 1-4% of the general population and 16% of eczema patients in the European population are sensitised to fragrance substances. In Demark an investigation (Glostrup undersøgelsen) was conducted in 1990, 1998 and 2006 (Videncenter for Allergi, consulted 2014). All people included in

the investigation answered a questionnaire and were tested for allergenic reactions. 543 people were included in 1990, 312 in 1998 and 3460 in 2006. The investigation showed the following:
Skin sensitisation to fragrance mix I (mixture of 8 individual fragrances that is used to screen for fragrance allergy) were in 1990 1.1% (men and women), in 2006 1.4% (men) and 1.8% women (data for 1998 not available).
Heisterberg et al (2014) found that quality of life is affected by having a fragrance allergy. Women and in particular young women, with a recent diagnosis of fragrance allergy were most affected. Especially young women may find it as a social problem not being able to use for example fine perfume (eau de perfume, eau de toilette, eau de cologne) or scented deodorants.
It is known that suffering from MCS will also lead to decreased quality of life (Ternesten-Hassèus et al, 2007).
The available data indicates that direct contact to skin from consumer products, and especially cosmetics and household products, seems to be the most important exposure for human health risks; and mainly skin sensitisation. Exposure via inhalation from e.g. air fresheners or from toys seems of lesser importance. However, knowledge on the respiration sensitisation potential for most fragrance substances is limited, like knowledge of their irritation potential via exposure by inhalation is limited. Fragrance substances in the indoor air may act as irritants and may have an effects on the so-called MCS condition. However, the causes and effects of MSC has not been fully investigated and the knowledge of the impact of fragrances on the condition thus limited.
Surveys of consumer products (mainly cosmetics and household products) have shown that some of the most used fragrance substances are limonene and linalool, which are both, evaluated as human allergens of special concern by SCCS (2012). The wide use of fragrance in many products is of importance. The dose per unit area and the frequency of exposure are the most important factors in both induction and elicitation of skin sensitisation, and not the source of exposure.

Preventive measures
A strategy for prevention of allergy may include primary, secondary and tertiary prevention. In primary prevention the focus is on minimizing the risk of induction of sensitization among workers and consumers by risk assessing the sensitization potential for the fragrance ingredients, and in an ideal world to do the assessment before they are introduced on the market. However, the large group of fragrance substances is already used in consumer products, for the some part, without being assessed thoroughly for their allergenic potential. At the work place primary prevention could also include minimizing the contact between allergens and the skin. Once eczema has developed, facilitation of skin penetration of allergens is expected, resulting in an increased risk of sensitization and elicitation. For this reason, primary prevention could also entail education on how to minimize the risk of eczema at the work place among employees in risk occupations. This has proven to be effective.
Secondary and tertiary prevention aims at reducing the risk of elicitation and the morbidity among those with eczema. Product labelling is one way of handling this issue. However, a part of the sensitised population might not be diagnosed. Thus, this way of preventing allergenic contact dermatitis may not be fully efficient. Among the established chemical fragrance allergens, 12 were identified as posing a high risk of sensitisation to the consumer, i.e. more than 100 reported cases (SCCS, 2012). For these substances, limitation of exposure would help to protect sensitised consumers. This may be done by introducing an allowable limit concentration of fragrances in scented products. SCCS (2012) concluded that a general level of exposure of fragrances of up to 0.8 μg/cm² (0.01%) may be tolerated by most consumers with contact allergy to fragrance allergens based on dose elicitation studies available. Such a threshold is believed to be sufficiently low to protect both sensitised individuals from a reaction as well as most of the non-sensitised consumers from developing contact allergy. However, the use of fragrances in most products today is not restricted to concentration limit values as legislation for most products types concerns declaration on the label (cosmetics and cleaning products) only. Declaration of perfume on consumer products is important in clinical practice for diagnostic purpose. However, due to reduction of concentrations in products or the replacement by other fragrances, prevalence of fragrance allergy fluctuates over

time. It should be noted that time trends for fragrances are compound-specific, making patch test results of fragrance mixtures very difficult to interpret. This indicates on one hand that reductions in concentrations of fragrances in products can lead to decreases in population sensitivity to those specific substances. At the same time, sensitivity to alternative fragrances used in consumer products may increase (Buckley *et al.*, 2000).
A concentration limit of 0.01% for fragrances may for some products not be feasible. For example eau de perfume may contain concentrations of several percent of a single fragrance, while for other types of products, it may be possible to keep the fragrance concentrations at a low level and still maintain the advantage of the fragrance. However, it is important to stress that a general threshold of 0.01%, although limiting the problem, does not preclude that the most sensitive segment of the population may react upon exposure to these levels. Hence, this threshold does not remove the necessity for providing information to the consumer concerning the presence of the fragrance substance in cosmetics

6.4 Summary and conclusions

Commercial perfumes may contain hundreds of individual fragrance chemicals. The main concern to humans regarding the use of fragrance substances are the development of skin sensitisation to fragrances in the general population.)In addition, the use of perfumes in the society may cause some kind of irritation and Multiple Chemical sensitivity; MSC in sensitive persons.
Skin sensitisation to fragrances is a lifelong condition that may give rise to permanent or recurrent contact dermatitis and may affect quality of life. Around 1-4% of the general population and 16% of eczema patients in the European population are sensitised to fragrance substances. An increase of skin sensitisation in children is also observed during the past decade, and especially in girls above the age of 13 probably due to an increased use of cosmetic products in that age group and above compared to earlier.
Direct contact to skin from cosmetics and household products seems to be the most important exposure when it comes to skin sensitisation to fragrances. Exposure via inhalation from e.g. air fresheners or from toys seems of lesser importance. However, knowledge on their respiration sensitisation potential for most fragrance substances is limited like knowledge of their irritation potential through exposure by inhalation is limited. Fragrance substances in the indoor air may act as irritants and may have an effect on the so-called MCS condition, were previously healthy individual experiences multiple, non-specific symptoms when exposed to chemical odours at very low concentrations. However, the causes and effects of MSC has not been fully investigated and the knowledge thus limited.

The Scientific Committee on Consumer Safety (SCCS) has evaluated 82 fragrance substances (including the 26 fragrances which must be declared on the label) as allergenic to humans with 12 single substances (all 12 being part of the group of the 26 regulated fragrances) and 8 natural extracts identified as of special concern. Furthermore, approximately 100 other fragrance substances were found allergenic in animals or by modelling by SCCS. In particular one substance was highlighted by SCCS; hydroxyisohexyl 3-cyclohexene carboxaldehyde (HICC) having been the cause of more than 1500 reported cases since 1999.

Overall, only a few fragrance substances, out of 44 substances (38 with classifications addressing human health) which were selected in this project, have a harmonised classification for their skin sensitising potential. Only citral and limonene have both a harmonised classification for skin sensitisation and mentioned as human allergens in the SCCS opinion. 7 fragrance substances out of the 38 selected for this project were identified as human allergens by SCCS, and are all self-classified for their skin sensitising potential by most notifiers except benzyl alcohol and benzyl benzoate, where only few notifiers have self-classified for their skin sensitisation potential. In total, 15 of the 38 substances are self-classified for their skin sensitisation potential.

Fragrance substances may have other toxicological effects as indicated for some of the substances with harmonised classification; however, these other human health hazards have not been examined further in this project except the CMR properties of the substances, which were evaluated, based on harmonised classifications. Only one out of the 38 substances has a harmonised classification for its effects on reproduction (n-hexane).

Fragrances are widely used in many product types even though cosmetic products are the main contributor to exposure to fragrances. Thus, both the consumer and workers in specific occupations is exposed to fragrances on a daily basis and this may pose a risk. Some of the most used fragrance substances are limonene and linalool, which both, by SCCS (2012), is evaluated as human allergens of special concern.
In general, data are very poor for a quantitative estimation of the exposure to consumers from the wide and disperse use of fragranced products. This is also the case for children as there is a lack of information on the exposure to perfumes from uses of scented products (e.g. toys).

Specific occupations seem at higher risks for skin allergy than others; especially occupations with a high degree of contact with cosmetic products during a working day or occupational in contact with both water and cosmetics or cleaners. In these cases the workers' health regulation requires substitution considerations when working with hazardous substances and materials, including allergens. Where it is possible to remove or replace or reduce exposure to a minimum without significant technical differences, or expenses, the employer shall ensure this. In many processes, including cleaning, this will mean in practice to use non-scented products.

Declaration of perfume on consumer products is important in clinical practice for diagnostic purpose. It is also important for the patients in order to avoid future exposure to fragrance contact allergens which they may not tolerate. However, these measures may not be sufficient as a part of the sensitised population might not be diagnosed.

Due to reduction of concentrations in products or the replacement by other fragrances, prevalence of fragrance allergy for specific substances fluctuates in time. On one hand reductions in concentrations of fragrances in products can lead to decreases in sensitisation among the population towards the specific substances. On the other hand, the prevalence of sensitisation towards the alternative fragrances used in cosmetics and other consumer products may increase.

Based on data on elicitation levels in sensitised individuals, SCCS (2012) concluded that a level of exposure for fragrances of up to 0.8 μg/cm² (0.01%) may be tolerated by most consumers with contact allergy to fragrance allergens based on dose elicitation studies available. Such a threshold based on elicitation levels in sensitised individuals is believed to be sufficiently low to protect both sensitised individuals and most of the non-sensitised consumers from developing contact allergy. For some products such a concentration limit will not be feasible for example eau de perfume may contain concentrations of several percent of a single fragrance, while for other types of products, it may be possible to keep the fragrance concentrations at a low level and still maintain the advantage of the fragrance. However, it is important to stress that a general threshold of 0.01%, although limiting the problem, does not preclude that the most sensitive segment of the population may react upon exposure to these levels. Hence, this threshold does not remove the necessity for providing information to the consumer concerning the presence of the fragrance substance in cosmetics and other products containing fragrance.

7. Information on alternatives

Many consumers find it beneficial to use scented products as it may remove an unpleasant odour or is experienced as something pleasant. This makes the shift to alternatives difficult as the most effective alternative to fragrances is to avoid them and choose fragrance-free products instead.

However, to fully exclude fragrance from consumer products is probably not very realistic as they are used widely in many different product types, and equally important, as stated above many people like to use perfumed products. Some consumers require a certain product to have a pleasant odour i.e. contain perfume, before they will buy it, even though there is a focus on allergy related to perfumes in Denmark. Realistically, fragrances are here to stay. One possibility might, however, be to reduce the content of perfumes within the products and thus the consumer exposure. It would be possible to reduce the total load of fragrances for a person by choosing some products with perfume (e.g.eu de toilette) and others without (e.g. toys, deodorants) instead of choosing perfume in all products.
A shift to a total use of fragrance-free products is probably not possible for all product types and all uses. Thus, it may to some extend be possible to shift from the use of fragrances of special concern to fragrances with less concern regarding effects on health and environment. Possible alternatives, to avoid allergies, could be to use other fragrances than the 82 know human allergens and in particularly the 12 individual substances and 8 natural extracts of special concern. However, this may be a challenging option as a certain scent may not be available then. Furthermore, due to the replacement by other fragrances, prevalence of fragrance allergy fluctuates over time. It should be noted that time trends for fragrances are compound-specific, making patch test results of fragrance mixtures very difficult to interpret. This indicates on one hand that reductions in concentrations of fragrances in products can lead to decreases in population sensitivity to those specific substances. At the same time, sensitivity to alternative fragrances used in cosmetics and other consumer products may increase (Buckley et al., 2000).
Declaration of perfume for some product types (cosmetics and detergents) means that the consumer has a larger freedom to choose whether they want a fragranced or fragranced-free product. A possibility could be to introduce this declaration requirement to more product types and thereby giving the consumer an overall choice to selectively avoid perfume or avoid specific fragrances. The declaration of single substances (the 26 fragrances) was introduced for allergy patients to be able to identify and avoid future exposure to fragrance contact allergens which they may not tolerate. Of course the general public can also benefit from this information in order to reduce their exposure to fragrance substances. The possible future requirement for declaration of further fragrance substances besides the 26 may change the use pattern because it simply becomes difficult for the producers to declare all the fragrance substances.

In the working environment, scent-free or scent-reduction policy should be introduced in order to reduce known allergens in the working environment. In general, the working environmental legislation (see chapter 2) require that work is planned and organized in such a way that risks to the health and safety of the workers handling hazardous chemical agents (including allergens) are eliminated or reduced to a minimum. Any unnecessary exposure must be avoided.

References

Bouma, K., and Van Peursem, A. J. J. (2006). Marktonderzoek naleving detergenten verordening voor textielwasmiddelen. Dutch Food en Consumer Products Safety Authority (VWA) Report ND06K173.

Buckley DA Rycroft RJG White IR McFadden JP (2001) Fragrance as an occupational allergen Occup. Med Vol 52 No 1 pp 13-16

Buckley D A. (2007) Fragrance ingredient labelling in products on sale in the U.K. Br J Dermatol 2007: 157: 295-300.

Canadian Centre for Occupational Health and Safety, available from: http://www.ccohs.ca/oshanswers/hsprograms/scent_free.html (September 2014)

ChemIDplus; part of ToxNet (Toxicological Data Network); U.S. National Library of Medicin. Available from: http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp

C&L inventory: Data searched by CAS number http://echa.europa.eu/information-on-chemicals/cl-inventory

Danish EPA (2005): Multiple Chemical Sensitivity, MSC Available at: http://www2.mst.dk/common/Udgivramme/Frame.asp?pg=http://www2.mst.dk/Udgiv/publications/2005/87-7614-548-4/html/helepubl_eng.htm

Danish EPA (2006): Vejledning fra Miljøstyrelsen nr. 2, 2006. Tilslutning af industrispildevand til offentlige spildevandsanlæg.

DMU Draft Report 2009: Bossi, R; Mogensen, B. B og Johansen, E.: Musk stoffer i punktkilder og i det akvatiske miljø. Arbejdsrapport fra DMU nr. 55. NOVANA Screeningsundersøgelse.

ECHA guidance document R. 11. (2012) PBT assessment. version 1.1 November 2012.

ECHA (2014) homepage: http://echa.europa.eu/

European Flower Ecolabel www.ecolabel.dk

EPI-Suite (EPIWEB 4.1): US Environmental Protection Agency's Office of Pollution Prevention and Toxics and Syracuse Research Corporation (SRC).

Questions and Answers: Commission launches consultation on fragrance allergens; Brussel 13. February 2014. Available at: http://europa.eu/rapid/press-release_MEMO-14-108_en.htm

EU Commission (2014) Public consultation on fragrance allergens in the framework of Regulation (EC) No. 1223/2009 of the European Parliament and of the Council on cosmetic products. Available at: http://ec.europa.eu/dgs/health_consumer/dgs_consultations/ca/consultation_cosmetic-products_fragrance-allergens_201402_en.htm

EU-RAR (2004): European Union Risk Assessment Report tetrasodium ethylenediaminetetraacetate (NA_4EDTA) (CAS: 64-02-8) (2004).

EU-RAR (2008a): European Union Risk Assessment Report (2008), 1,3,4,6,7,8-HEXAHYDRO-4,6,6,7,8,8-HEXAMETHYLCYCLOPENTA-γ-2-BENZOPYRAN(1,3,4,6,7,8-HEXAHYDRO-4,6,6,7,8,8-HEXAMETHYLIN-DENO[5,6-C]PYRAN - HHCB) CAS No: 1222-05-5 .

EU-RAR (2008b): European Union Risk Assessment Report (2008), zinc oxide (CAS: 1314-13-2)

Glensvig, D., and Ports, J. (2006). Mapping of perfume in toys and children's articles. A survey and health assessment of cosmetic products for children. Report Danish Ministry of the Environment, Environmental Protection Agency (EPA). Survey of Chemicals in Consumer Products, No 68.

Heisterberg MV (2013) Fragrance allergy – diagnosis, causes and quality of life; PhD thesis. National Allergy Research Centre, Gentofte hospital, University of Copenhagen, Denmark

Heisterberg MV Mennè T, Johansen JD (2014) Fragrnace allergy and quality of life – a case – control study. Contact dermatitis 70, 81-89

HERA (2004): Human & Environmental Risk Assessment on ingredients of Household Cleaning Products Polycyclic musks AHTN (CAS 1506-02-1) and HHCB (CAS 1222-05-05) Environmental Section Version 2.0 November, 2004.

HERA (2005a): Human & Environmental Risk Assessment on ingredients of European household cleaning products. Isopropanol (CAS 67-63-0), Edition 1.0 May 2005.

HERA (Draft, 2005b) Human and Environmental Risk Assessment on ingredients of Household Cleaning Products. Propylene Glycol n-Butyl Ether (CAS Number 5131-66-8 , 29387-86-8) Edition 1.0, May 2005.

HSDB (Hazardous Substance Data Bank): Search by CAS number. http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB

IFRA (International fragrance association) (2014): http://www.ifraorg.org/

IPCS (1998): international programme on chemical safety, concise international chemical assessment document no. 5, limonene.

Mikkelsen, SH. Warming M. Syska, J (2014): Survey of n-hexane; part of the LOUS review. Final report 07.07.2014 (Consultant draft) Danish Ministry of the environement

Masuck I, Hutzler C, Jann O, Luch A (2010) Investigations on the emission of fragrance allergens from scented toys by means of headspace solid-phase microextraction gas chromatography-mass. Journal of Chromatography A, 1217 (2010) pp 3136-3143

Masuck I, Hutzler C, Jann O, Luch A (2011) Inhalation exposure of children to fragrances present in scented toys. Indoor Air. 2011 Dec;21(6):501-11.

NMC (2012): Karen Dahl Jensen: Fragrance requirements in Nordic Ecolabelling criteria, Policy adopted by NMN Dec 2012 http://www.nordic-ecolabel.org/CmsGlobal/Policies/Fragrance_policy_December_2012.pdf

Nordic SPIN Database, 2014: http://195.215.202.233/DotNetNuke/

Nordic Swan Ecolabel www.ecolabel.dk

OECD SIDS Report (NA): SIDS Initial Assessment Report for Benzaldehyde, CAS: 100-52-7.

OECD SIDS Report (1997): SIDS Initial Assessment Report for Propan-2-ol CAS: 67-63-0.

OECD SIDS Report (2001a): SIDS Initial Assessment Report for Benzyl alcohol, CAS: 100-51-6.

OECD SIDS Report (2001b): SIDS Initial Assessment Report for n-butyl alcohol CAS: 71-36-3

OECD SIDS Report (2001c): SIDS Initial Assessment Report for Citral, CAS: 5392-40-5.

OECD SIDS Report (2001d): SIDS Initial Assessment Report for Disodium disulphite CAS: 7681-57-4

OECD SIDS Report (2002): SIDS Initial Assessment Report for Sodium hydroxide CAS: 1310-73-2

OECD SIDS Report (2004): SIDS Initial Assessment Report for Isobutanol CAS: 78-83-1

Park MVDZ, Janssen PCJM, van Raaij MTM (2006) Risk assessment for scented products: a pre-study RIVM report 320105002 / 2006

Pors J., and Fuhlendorff R. (2003). Mapping of chemical substances in air fresheners and other fragrance liberating products. Report Danish Ministry of the Environment, Environmental Protection Agency (EPA). Survey of Chemicals in Consumer Products, No 30.

Rastogi S C, Heydorn S, Johansen J D, Basketter D A. (2001) Fragrance chemicals in domestic and occupational products. Contact Dermatitis 2001: 45: 221-225.

Rastogi, S. C. (2002). Contents of selected fragrance materials in cleaning products and other consumer products. Report Danish Ministry of the Environment, Environmental Protection Agency (EPA). Survey of Chemicals in Consumer Products, No 8.

Rastogi, S. C., Hellerup Jensen, G., Johansen, J. D. (2007a). Survey and risk assessment of chemical substances in deodorants. Report Danish Ministry of the Environment, Environmental Protection Agency (EPA). Survey of Chemicals in Consumer Products, No 86.

Rastogi, S. C., Johansen, J. D., Bossi, R. (2007b). Selected important fragrance sensitizers in perfumes - current exposures. Contact Dermatitis. 56, 201-204.

REACH Registration data: data searched by CAS number (http://echa.europa.eu/web/guest/information-on-chemicals/registered-substances)

SCCS (Scientific Committee on Consumer Safety) (2012) Opinion on Fragrance allergens in cosmetic products, SCCS/1459/11, 2012

SCCS (Scientific Committee on Consumer Safety) (2012b) Opinion on hydroxyisohexyl 3-cyclohexene carboxaldehyde (HICC) SCCP/1456/11. Available at: http://ec.europa.eu/health/scientific_committees/consumer_safety/docs/sccs_o_074.pdf

SCCNFP (The Scientific Committee on Cosmetic and Non-Food-Products intended for Consumers) (2003) Opinion concerning hydroxyisohexyl 3-cyclohexene carboxaldehyde (HICC) SCCNFP/0743/03 Available at: http://ec.europa.eu/health/ph_risk/committees/sccp/documents/out249_en.pdf

SCCNFP (The Scientific Committee on Cosmetic and Non-Food-Products intended for Consumers) Opinion concerning Fragrance allergy in consumers – a review of the problem SCCNFP/0017/98, 30. September 1999

Simonsen AB, Deleuran M, Mortz CG, Johansen JD, Sommerlund M (2014) Allergic contact dermatitis in Danish children referred for patch testing – a nationwide multicentre study

SWECO Environment AB (2008): Screening Report 2008:2; Screening of musk substances. http://www3.ivl.se/miljo/projekt/dvss/pdf/SWECO_muskamnen.pdf

Ter Burg W1, Bouma K, Schakel DJ, Wijnhoven SW, van Engelen J, van Loveren H, Ezendam J. Assessment of the risk of respiratory sensitization from fragrance allergens released by air fresheners. Inhal Toxicol. 2014 Apr;26(5):310-8.

Ternesten-Hassèus E, Lowhagen O, Millquist E (2007) Quality of life and Capsaicin Sensitivity in patietns with airway symptoms induced by chemicals and scents: A longitudinal study Environmental Health Perspective Vol 115 No 3 pp 425-

US-EPA ECOTOX Database, data search on CAS number http://cfpub.epa.gov/ecotox/quick_query.htm

Uter W, Schnuch A, Geier J, Pfahlberg A and Gefeller O (2001) Association between occupation and contact allergy to the fragrance mix: a multifactorial analysis of national surveillance data Occup Environ Med 58 pp 392-398

WHO (2005): Concise International Chemical Assessment Document 64 (CICADS) Butyl acetates

WHO (1991): ENVIRONMENTAL HEALTH CRITERIA 122 n-hexane

WHO (1998): Concise International Chemical Assessment Document 5 (CICADS) Limonene

VWA (2007). Dutch Food and Consumer Product Safety Authority. Cosmetische producten voor kinderen: Inventarisatie van de markt en de veiligheidsborging door producenten en importeurs. Report ND040065/ ND050170 [report in dutch]

Wijnhoven SWP, Ezendam J, Schuur AF, van Loveren H, Van Engelen JGM (2008) Allergens in consumer products. RIVM report 320025001. Bilthoven: Institute for Public Health and the Environment

Yazar K, Johnsson S, Lind M L, Boman A, Liden C. (2011) Preservatives and fragrances in selected consumer-available cosmetics and detergents. Contact Dermatitis 2011: 64: 265-272.

Appendix 1: Harmonised and notified classifications (according to the C&L inventory) of fragrances registered under REACH (use group: PC28 Fragrance/Perfumes)

Classification of fragrance substances retrieved from the ECHA database. 827 substances are according to the database included in the product category PC28 which constitutes perfumes/fragrances (retrieved July 3 2014). The blue colour shows substances appointed a harmonised classification AND being on the IFRA list of used fragrances. The light yellow colour shows fragrances with a harmonised classification, but NOT on the IFRA list.

For notified classification only sensitisation and CMR are investigated for human health.

* SPIN is only consulted for substances with a harmonised or notified classification. Please note that the SPIN data may cover other uses, than the use in perfumes.

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
1	NA	NA	Hydrocarbons, C10-C13, n-alkanes, <2% aromatics	NA	NA	NA		-	
2	NA	NA	Hydrocarbons, C10-C13, isoalkanes, cyclics, <2% aromatics	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	4 of 5	NA	
3	NA	NA	Hydrocarbons, C11-C12, isoalkanes, cyclics, <2% aromatics	NA	NA	NA		-	
4	NA	NA	Phenol, reaction products with 1-halo-4-phenoxybenzene and 1,1'–oxybis[4-halobenzene], halogenated	NA	NA	NA		-	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
5	200-018-0	50-21-5	Lactic acid	NA	NA	H400 (toxic to aquatic life)	50 of 1,642	152.1t/123 prep.	Yes
6	200-143-0	52-51-7	Bronopol	H302 (Harmful if swallowed) H312 (Harmful in contact with skin) H315 (Causes skin irritation) H318 (Causes serious eye damage) H335 (May cause respiratory irritation)	H400 (Very toxic to aquatic life)	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	1,586 of 1,587 1 of 1,587 126 of 1,587	5.9t/ 584 prep.	No
7	200-272-2	56-40-6	Glycine	NA	NA	NA		0.6t /17 prep.	No
8	200-273-8	56-41-7	L-alanine	NA	NA	NA		Not applied in Denmark (Applied in Sweden)	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
9	200-274-3	56-45-1	L-serine	NA	NA	NA		Not applied in Denmark (Applied in Sweden)	No
10	200-289-5	56-81-5	Glycerol	NA	NA	NA		-	Yes
11	200-291-6	56-84-8	Aspartic acid	NA	NA	NA		Not applied in Denmark (Applied in Sweden).	No
12	200-311-3	57-09-0	Cetrimonium bromide	NA	NA	H341 (Suspected of causing genetic defects) H361 (Suspected of damaging fertility or the unborn child) H400 (very toxic to aquatic life) H410 (very toxic to aquatic life, with long lasting effects)	1 of 477 1 of 477 441 of 477 63 of 477	26t/8 prep. (corrected from -26t to 26 t)	No
13	200-312-9	57-10-3	Palmitic acid	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	61 of 924	0.2t/ 26 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
14	200-313-4	57-11-4	Stearic acid	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	60 of 1614	1.7t/497 prep.	Yes
15	200-338-0	57-55-6	Propane-1,2-diol	NA	NA	H410 (very toxic to aquatic life, with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	43 of 4335 1 of 4335	2,348.9 t/2561 prep.	Yes
16	200-353-2	57-88-5	Cholesterol	NA	NA	H361 (Suspected of damaging fertility or the unborn child)	3 of 153	Not applied in Denmark (Applied in Sweden).	Yes
17	200-449-4	60-00-4	Edetic acid	H319 (causes serious eye irritation)	NA	H361 (Suspected of damaging fertility or the unborn child) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	2 of 1109 2 of 1109 40 of 1109	41.2t/89 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
18	200-456-2	60-12-8	2-phenylethanol	NA	NA	NA		0.7t/241 prep.	Yes
19	200-522-0	61-90-5	L-leucine	NA	NA	NA		-	No
20	200-529-9	62-33-9	Sodium calcium edetate	NA	NA	NA		-	No
21	200-573-9	64-02-8	Tetrasodium ethylenediaminetetraacetate	H302 (Harmful if swallowed) H318 (Causes serious eye damage)	NA	H351 (Suspected of causing cancer)	1 of 2,653	1,262.3 t /651 prep.	Yes
22	200-578-6	64-17-5	Ethanol	NA	NA	H360 (May damage fertility or the unborn child) H361 (Suspected of damaging fertility or the unborn child) H400 (Very toxic to aquatic life)	2 of 5,628 7 of 5,628 1 of 5,628	16,0142.0 t/2,502 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						H410 (Very toxic to aquatic life with long lasting effects)	1 of 5,628		
23	200-652-8	67-43-6	N-carboxymethyliminobis(ethylenenitrilo)tetra(acetic acid)	NA	NA	H361(D) (Suspected of damaging the unborn child) H411 (Toxic to aquatic life with long lasting effects)	210 of 344 1 of 344	Not applied in Denmark (Applied in Sweden, Norway and Finland).	No
24	200-661-7	67-63-0	Propan-2-ol	H319 (Causes serious eye irritation) H336 (May cause drowsiness or dizziness)	NA	NA		5,122.3 t/2,811 prep.	Yes
25	200-675-3	68-04-2	Trisodium citrate	NA	NA	NA		-	Yes
26	200-679-5	68-12-2	N,N-dimethylformamide	H312 (Harmful in contact with skin) H319 (Causes serious eye irritation) H332 (Harmful if	NA	H360 (D) May damage fertility or the unborn child	1,732 of 1,732	40.7t/20 prep (Corrected from -40.7t to 40.7t)	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
				inhaled) H361D Suspected of damaging the unborn child					
27	200-746-9	71-23-8	Propan-1-ol	H318 (Causes serious eye damage) H336 (May cause drowsiness or dizziness)	NA	NA		-	Yes
28	200-751-6	71-36-3	Butan-1-ol	H302 (Harmful if swallowed) H315 Causes skin irritation) H318 (Causes serious eye damage) H335 (May cause respiratory irritation) H336 (May cause drowsiness or dizziness)	NA	NA			Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
29	200-752-1	71-41-0	Pentan-1-ol	H315 (causes skin irritation) H332 (harmful if inhaled) H335 (May cause respiratory irritation)	NA	NA			Yes
30	200-773-6	72-18-4	L-valine	NA	NA	NA		-	No
31	200-811-1	74-79-3	Arginine	NA	NA	NA		-	No
32	200-827-9	74-98-6	Propane	NA	NA	H340 (May cause genetic defects) H350 (May cause cancer) H351 (Suspected of causing cancer)	2 of 1,455 2 of 1,455 1 of 1,455	56,002.6 t/994 prep.	No
33	200-837-3	75-08-1	Ethanethiol	H332 (Harmful if inhaled)	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	332 of 332 332 of 332	1.6t /7 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
34	200-838-9	75-09-2	Dichloromethane	H351 (Suspected of causing cancer)	NA	H340 (May cause genetic defects) H341 (Suspected of causing genetic defects) H351 (Suspected of causing cancer)H360 H400 (Very toxic to aquatic life) H411 (Toxic to aquatic life with long lasting effects)	1 of 1,288 352 of 1,288 1,288 of 1,288 1 of 1,288 2 of 1,288	39.1t/ 22 prep	No
35	200-846-2	75-18-3	Dimethyl sulphide	NA	NA	H317 (May cause an allergic skin reaction)	1 of 1,054	69t/10 prep.	Yes
36	200-857-2	75-28-5	Isobutane	NA	NA	H317 (May cause an allergic skin reaction)	3 of 260	68.7 t/469	No
37	200-861-4	75-33-2	Propane-2-thiol	NA	NA	H317 (May cause an allergic skin reaction) H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	7 of 893 10 of 893 11 of 893	Not applied in Denmark (Applied in Sweden)	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
38	200-879-2	75-56-9	Methyloxirane	H302 (Harmful if swallowed) H312 (Harmful in contact with skin) H315 (Causes skin irritation) H319 (Causes serious eye irritation) H332 (Harmful if inhaled) H335 (May cause respiratory irritation) H340 May cause genetic defects) H350 May cause cancer)	NA	H340 (May cause genetic defects) H350 (May cause cancer) H402 (Harmful to aquatic life) H412 (Harmful to aquatic life with long lasting effects)	1,599 of 1,600 1,599 of 1,600 5 of 1,600 1 of 1,600	20.1t/179 prep.	No
39	200-890-2	75-66-1	2-methylpropane-2-thiol	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	3 of 422 3 of 422	Not applied in Denmark (Applied in Sweden and Norway)	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
40	200-945-0	76-22-2	bornan-2-one	NA	NA	H341 (Suspected of causing genetic defects) H360 (May damage fertility or the unborn child) H413 (May cause long lasting harmful effects to aquatic life)	1 of 1,122 1 of 1,122 1 of 1,122	0.3 t/ 60 prep.	Yes
41	201-061-8	77-83-8	Ethyl 2,3-epoxy-3-phenylbutyrate	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	53 of 1,149 77 of 1,149 1,018 of 1,149	0t/71 prep.	Yes
42	201-064-4	77-86-1	Trometamol	NA	NA	NA		-	Yes
43	201-069-1	77-92-9	Citric acid	NA	NA	NA		-	Yes
44	201-070-7	77-93-0	Triethyl citrate	NA	NA	H340 (May cause genetic defects) H350 (May cause cancer)	12 of 1,316 12 of 1,316	4.3t/19 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
45	201-089-0	78-16-0	2-ethyl-2-[[(1-oxoheptyl)oxy]methyl]propane-1,3-diyl bisheptanoate	NA	NA	NA		-	No
46	201-133-9	78-69-3	3,7-dimethyloctan-3-ol	NA	NA	NA		-	Yes
47	201-134-4	78-70-6	Linalool	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	9 of 1,656 1 of 1,656 1 of 1,656	0.4t/312 prep.	Yes
48	201-142-8	78-78-4	2-methylbutane	H304 (May be fatal if swallowed and enters airways) H336 (May cause drowsiness or dizziness)	H411 (Toxic to aquatic life with long lasting effects)	H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	1 of 623 622 of 623	128.2t/75 prep.	No
49	201-148-0	78-83-1	2-methylpropan-1-ol	H315 (Causes skin irritation) H318 (Causes serious eye damage)	NA	NA		519.0 t/ 1,606 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
				H335 (May cause respiratory irritation) H336 (May cause drowsiness or dizziness)					
50	201-159-0	78-93-3	Butanone	H319 (Causes serious eye irritation) H336 (May cause drowsiness or dizziness)	NA	NA		890.1 t /1,108 prep.	Yes
51	201-180-5	79-14-1	Glycollic acid	NA	NA	H360 (May damage fertility or the unborn child)	7 of 1,792	35.3t /85 prep.	No
52	201-196-2	79-33-4	l-(+)-lactic acid	NA	NA	NA			Yes
53	201-202-3	79-39-0	Methacrylamide	NA	NA	H350 (May cause cancer)	1 of 631	Yes confidential	No
54	201-204-4	79-41-4	Methacrylic acid	H302 (Harmful if swallowed) H312 (Harmful in contact with skin)	NA	H341 (Suspected of causing genetic defects) H350 (May cause cancer)	1 of 1 of	81.9t /370 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
				H314 (Causes severe skin burns and eye damage)					
55	201-224-3	79-77-6	(E)-4-(2,6,6-trimethyl-1-cyclohexen-1-yl)-3-buten-2-one	NA	NA	H400 (Toxic to aquatic life) H411 (Toxic to aquatic life with long lasting effects)	3 of 1,083 1,058 of 1,083	0.2t/ 75 prep.	Yes
56	201-228-5	79-81-2	Retinyl palmitate	NA	NA	NA		-	No
57	201-265-7	80-26-2	p-menth-1-en-8-yl acetate	NA	NA	NA		-	Yes
58	201-289-8	80-54-6	2-(4-tert-butylbenzyl)propionaldehyde	NA	NA	NA		-	Yes
59	201-291-9	80-56-8	Pin-2(3)-ene	NA	NA	NA		-	Yes
60	201-550-6	84-66-2	Diethyl phthalate	NA	NA	H317 (May cause an allergic skin reaction) H361 (Suspected of damaging fertility or the unborn child) H361(D) (Suspected of damaging the unborn child)	1 of 80 3 of 80 1 of 80	1.7t/165 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	7 of 80 5 of 80		
61	201-928-0	89-65-6	2,3-didehydro-D-erythro-hexono-1,4-lactone	NA	NA	NA		-	No
62	201-939-0	89-78-1	Menthol	NA	NA	NA		-	Yes
63	201-944-8	89-83-8	Thymol	NA	NA	NA		-	Yes
64	201-961-0	90-02-8	Salicylaldehyde	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	95 of 2,167	NA	Yes
65	201-972-0	90-17-5	2,2,2-trichloro-1-phenylethyl acetate	NA	NA	NA		-	Yes
66	202-045-3	91-16-7	Veratrole	NA	NA	NA		-	Yes
67	202-086-7	91-64-5	Coumarin	NA	NA	H351 (Suspected of causing cancer) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting	53 of 1,370 4 of 1,370 of 1,370	22.5t/185 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						effects)			
68	202-213-6	93-04-9	Methyl 2-naphthyl ether	NA	NA	NA		-	Yes
69	202-216-2	93-08-3	2'-acetonaphthone	NA	NA	NA		-	Yes
70	202-288-5	93-92-5	1-phenylethyl acetate	NA	NA	NA		-	Yes
71	202-476-7	96-09-3	(Epoxyethyl)benzene	H312 (Harmful in contact with skin) H319 (Causes serious eye irritation) H350 (May cause cancer)	NA	H317 (May cause an allergic skin reaction) H340 (May cause genetic defects) H341 (Suspected of causing genetic defects) H350 (May cause cancer)	48 of 244 1 of 244 47 of 244 244 of 244	NA	No
72	202-615-1	97-88-1	Butyl methacrylate	H315 (Causes skin irritation) H317 (May cause an allergic skin reaction) H319 (Causes serious eye irritation) H336 (May cause	NA	H317 (May cause an allergic skin reaction)	1,136 of 1,136	7.8t/626 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
				drowsiness or dizziness)					
73	202-680-6	98-55-5	p-menth-1-en-8-ol	NA	NA	NA		-	Yes
74	202-707-1	98-85-1	1-phenylethanol	NA	NA	NA		-	Yes
75	202-859-9	100-51-6	Benzyl alcohol	H302 (Harmful if swallowed) H332 (Harmful if inhaled)	NA	H317 (May cause an allergic skin reaction)	1 of 822	244.8t/905 prep.	Yes
76	202-860-4	100-52-7	Benzaldehyde	H302 (Harmful if swallowed)	NA	H317 (May cause an allergic skin reaction)	446 of 598	0.2t/148 prep.	Yes
77	202-938-8	101-39-3	α-methylcinnamaldehyde	NA	NA	H317 (May cause an allergic skin reaction)	1,059 of 1,060	Yes, confidential	Yes
78	202-981-2	101-84-8	Diphenyl ether	NA	NA	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	66 of 1,301 58 of 1,301 1,142 of 1,301	0.5t/135 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
79	203-013-1	102-20-5	Phenethyl phenylacetate	NA	NA	H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	1,131 of 1,156 1 of 1,156	0.1t /11 prep.	Yes
80	203-049-8	102-71-6	2,2',2''-nitrilotriethanol	NA	NA	H317 (May cause an allergic skin reaction) H413 (May cause long lasting harmful effects to aquatic life)	43 of 2,207 1 of 2,207	1,052t /927 prep.	Yes
81	203-051-9	102-76-1	Triacetin	NA	NA	H317 (May cause an allergic skin reaction)	95 of 1,356	0.1t/7 prep.	Yes
82	203-079-1	103-09-3	2-ethylhexyl acetate	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	1 of 574	0.4t /31 prep.	Yes
83	203-090-1	103-23-1	Bis(2-ethylhexyl) adipate	NA	NA	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	46 of 77 11 of 77 1 of 77	5.8t /78 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
84	203-113-5	103-45-7	Phenethyl acetate	NA	NA	NA		-	Yes
85	203-118-2	103-50-4	Dibenzyl ether	NA	NA	H317 (May cause an allergic skin reaction) H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	237 of 1,403 814 of 1,403 813 of 1,403 237 of1,403	ot/ 4 prep.	Yes
86	203-127-1	103-60-6	2-phenoxyethyl isobutyrate	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	1 of 950	ot /13 prep.	Yes
87	203-139-7	103-73-1	Phenetole	NA	NA	NA		-	**No**
88	203-148-6	103-82-2	Phenylacetic acid	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	19 of 57	ot /25 prep.	Yes
89	203-161-7	103-95-7	3-p-cumenyl-2-methylpropionaldehyde	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	1,065 1,135 1,018 of 1,135	0.1t /108 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						H361 (Suspected of damaging fertility or the unborn child)	191 of 1,135		
90	203-212-3	104-54-1	Cinnamyl alcohol	NA	NA	H317 (May cause an allergic skin reaction)	1,108 of 1,160	0t/ 105 prep.	Yes
91	203-213-9	104-55-2	Cinnamaldehyde	NA	NA	H317 (May cause an allergic skin reaction) H400 (Very toxic to aquatic life)	190 of 195 5 of 195	0.1t /40 prep.	Yes
92	203-219-1	104-61-0	Nonan-4-olide	NA	NA	NA		-	Yes
93	203-225-4	104-67-6	Undecan-4-olide	NA	NA	H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	203 of 409 113 of 409	0t/120 prep.	Yes
94	203-253-7	104-93-8	4-methylanisole	NA	NA	H361 (Suspected of damaging fertility or the unborn child) H412 (Harmful to aquatic life with long lasting effects)	868 of 1,125 1,092 of 1,125	0t/9 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
95	203-273-6	105-13-5	4-methoxybenzyl alcohol	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	1,118 of 1,168 1 of 1,168	0t/59 prep.	Yes
96	203-341-5	105-87-3	Geranyl acetate	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	178 of 1,277 1,071 of 1,277 177 of 1,277	0t/132 prep.	Yes
97	203-347-8	105-95-3	1,4-dioxacycloheptadecane-5,17-dione	NA	NA	H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	1,139 of 1,191 1 of 1,191	0t/22 prep.	Yes
98	203-350-4	105-99-7	Dibutyl adipate	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	23 of 196	0.4t/15 prep.	No
99	203-354-6	106-02-5	Pentadecan-15-olide	NA	NA	H317 (May cause an allergic skin reaction) H400 (Very toxic to	881 of 1,070 1 of 1,070	0t /11 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	2 of 1,070 56 of 1,070		
100	203-366-1	106-14-9	12-hydroxystearic acid	NA	NA	NA		-	No
101	203-374-5	106-21-8	3,7-dimethyloctan-1-ol	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	1,064 of 1,147	0t/39 prep.	Yes
102	203-375-0	106-22-9	Citronellol	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects) H413 (May cause long lasting harmful effects to aquatic life)	1,5,19 of ,547 183 of 1,547 19 of 1,547	0.9t/279 prep.	Yes
103	203-376-6	106-23-0	Citronellal	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	1,136 of 1,197 983 of 1,197	0.1t/75 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
104	203-377-1	106-24-1	Geraniol	NA	NA	H317 (May cause an allergic skin reaction) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	1,548 of 1,583 2 of 1,583 4 of 1,583	0.2t/300 prep.	Yes
105	203-378-7	106-25-2	Nerol	NA	NA	H317 (May cause an allergic skin reaction) H400 (Very toxic to aquatic life) H412 (Harmful to aquatic life with long lasting effects)	44 of 1,256 3 of 1,256 2 of 1,256	0.1t /114 prep.	Yes
106	203-425-1	106-70-7	Methyl hexanoate	NA	NA	H317 (May cause an allergic skin reaction) H410 (Very toxic to aquatic life with long lasting effects)	1,506 of 1,569 2 of of 1,569	Not applied in Denmark and the Nordic countries	Yes
107	203-448-7	106-97-8	Butane	H340 (May cause genetic defects) H350 (May cause	NA	H340 (May cause genetic defects)	149 of 1,169	48,250.6 t/928 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
				cancer)		H350 (May cause cancer)	149 of 1,169		
108	203-529-7	107-88-0	Butane-1,3-diol	NA	NA	H413 (May cause long lasting harmful effects to aquatic life)	4 of 1,530	0t/ 10 prep.	Yes
109	203-561-1	108-21-4	Isopropyl acetate	H319 (Causes serious eye irritation) H336 (May cause drowsiness or dizziness)	NA	H317 (May cause an allergic skin reaction) H412 (Harmful to aquatic life with long lasting effects)	1 of 2,184 1 of 2,184	3.5t/25 prep.	Yes
110	203-564-8	108-24-7	Acetic anhydride	H302 (Harmful if swallowed) H314 (Causes severe skin burns and eye damage) H332 (Harmful if inhaled)	NA	NA		7,931.5 t/28 prep.	No
111	203-672-5	109-43-3	Dibutyl sebacate	NA	NA	H317 (May cause an allergic skin reaction)	2 of 574	14.2t/43 prep.	Yes
112	203-686-1	109-60-4	Propyl acetate	H319 (Causes serious eye	NA	NA		223t /53 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
				irritation) H336 (May cause drowsiness or dizziness)					
113	203-692-4	109-66-0	Pentane	H304 (May be fatal if swallowed and enters airways) H336 (May cause drowsiness or dizziness)	H411 (Toxic to aquatic life with long lasting effects)	H411 (Toxic to aquatic life with long lasting effects)	1,012 of 1,012	224.4.0t/ 207 prep.	No
114	203-714-2	109-87-5	Dimethoxymethane	NA	NA	H317 (May cause an allergic skin reaction)	6 of 305	14.3t/95 prep.	No
115	203-728-9	110-01-0	Tetrahydrothiophene	H302 (Harmful if swallowed) H312 (Harmful in contact with skin) H315 (Causes skin irritation) H319 (Causes serious eye irritation) H332 (Harmful if	H412 (Harmful to aquatic life with long lasting effects)	H412 (Harmful to aquatic life with long lasting effects)	172 of 201	Yes confidential	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
				inhaled)					
116	203-745-1	110-19-0	Isobutyl acetate	NA	NA	NA		-	Yes
117	203-751-4	110-27-0	Isopropyl myristate	NA	NA	H410 (Very toxic to aquatic life with long lasting effects)	1 of 1,828	0.3t/146 prep.	Yes
118	203-757-7	110-33-8	Dihexyl adipate	NA	NA	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	1 of 13 1 of 13	NA	No
119	203-765-0	110-41-8	2-methylundecanal	NA	NA	H317 (May cause an allergic skin reaction) H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	82 of 1,039 54 of 1,039 82 of 1,039 957 of 1,039	0t/71 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
120	203-766-6	110-42-9	Methyl decanoate	NA	NA	H411 (Toxic to aquatic life with long lasting effects) H413 (May cause long lasting harmful effects to aquatic life)	98 of 236 23 of 236	Yes confidential	Yes
121	203-777-6	110-54-3	n-hexane	H304 (May be fatal if swallowed and enters airways) H315 (Causes skin irritation) H336 (May cause drowsiness or dizziness) H361f (Suspected of damaging fertility or the unborn child) H373 (May cause damage to organs through prolonged or repeated exposure)	H411 (Toxic to aquatic life with long lasting effects)	H361(f) (Suspected of damaging fertility or the unborn child) H411 (Toxic to aquatic life with long lasting effects) H413 (May cause long lasting harmful effects to aquatic life)	2,662 of 2,662 2,657 of 2,662 3 of 2,662	9,324.3 t/235 prep.	Yes
122	203-825-6	111-01-3	2,6,10,15,19,23-hexamethyltetracosane	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
123	203-835-0	111-11-5	Methyl octanoate	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	952 of 1,169 1 of 1,169	Yes confidential	No
124	203-846-0	111-21-7	2,2'-[ethane-1,2-diylbis(oxy)]bisethyl diacetate	NA	NA	NA		-	No
125	203-852-3	111-27-3	Hexan-1-ol	H302 (Harmful if swallowed)	NA	NA		647.8t/148 prep.	Yes
126	203-881-1	111-55-7	Ethylene di(acetate)	NA	NA	NA		-	No
127	203-898-4	111-71-7	Heptanal	NA	NA	H400 (Very toxic to aquatic life)	24 of 1,049	Yes confidential	Yes
128	203-910-8	111-81-9	Methyl undec-10-enoate	NA	NA	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	36 of 854 36 of 854 812 of 854	Not applied in Denmark and the Nordic countries	Yes
129	203-911-3	111-82-0	Methyl laurate	NA	NA	H400 (Very toxic to aquatic life)	259 of 360	0.5t/18 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						H411 (Toxic to aquatic life with long lasting effects)	221 of 360		
130	203-917-6	111-87-5	Octan-1-ol	NA	NA	H341 (Suspected of causing genetic defects H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	3 of 2,106 36 of 2,106 169 of 2,106	53.3t/41 prep.	Yes
131	203-919-7	111-90-0	2-(2-ethoxyethoxy)ethanol	NA	NA	H360 (May damage fertility or the unborn child) H361 (Suspected of damaging fertility or the unborn child)	1 of 2,735 2 of 2,735	120.9t/492 prep.	Yes
132	203-935-4	112-11-8	Isopropyl oleate	NA	NA	NA		-	No
133	203-940-1	112-15-2	2-(2-ethoxyethoxy)ethyl acetate	NA	NA	NA		-	No
134	203-953-2	112-27-6	2,2'-(ethylenedioxy)diethanol	NA	NA	NA			Yes
135	203-956-9	112-30-1	Decan-1-ol	NA	NA	H411 (Toxic to aquatic life	1,526 of 1,958	0.3t/220 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	 237 of 1,958		
136	203-957-4	112-31-2	Decanal	NA	NA	H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	3 of 1,309 1,117 of 1,309	0t/161 prep.	Yes
137	203-966-3	112-39-0	Methyl palmitate	NA	NA	NA		-	Yes
138	203-967-9	112-40-3	Dodecane	NA	NA	NA		-	Yes
139	203-970-5	112-42-5	Undecan-1-ol	NA	NA	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	865 of 1,155 22 of 1,155 254 of 1,155	Yes confidential	Yes
140	203-973-1	112-45-8	Undec-10-enal	NA	NA	H317 (May cause an allergic skin reaction)	80 of 1,009	0t/ 39 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	959 of 1,009 1 of 1,009		
141	203-982-0	112-53-8	Dodecan-1-ol	NA	NA	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	1,819 of 1,893 195 of 1,893 177 of 1,893 1 of 1,893	3.1t/122 prep.	Yes
142	203-983-6	112-54-9	Dodecanal	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	58 of 1,284 1,228 of 1,284	0t/85 prep.	Yes
143	203-989-9	112-60-7	3,6,9-trioxaundecane-1,11-diol	NA	NA	NA		-	No
144	204-000-3	112-72-1	Tetradecanol	NA	NA	H410 (Very toxic to	143 of 875	0.2t/17 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	47 of 875 320 of 875		
145	204-010-8	112-85-6	Docosanoic acid	NA	NA	NA		-	No
146	204-017-6	112-92-5	Octadecan-1-ol	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	47 of 587	0.7t/23 prep.	No
147	204-018-1	112-95-8	Icosane	NA	NA	NA		-	Yes
148	204-062-1	115-07-1	Propene	NA	NA	NA		-	No
149	204-112-2	115-86-6	Triphenyl phosphate	NA	NA	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	1,106 of 1,241 1,184 of 1,241 6 of 1,241	1.8t/65 prep	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						H413 (May cause long lasting harmful effects to aquatic life)	19 of 1,241		
150	204-116-4	115-95-7	Linalyl acetate	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	21 of 1,261	0.4t/190 prep.	Yes
151	204-262-9	118-58-1	Benzyl salicylate	NA	NA	H317 (May cause an allergic skin reaction) H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	1,168 of 1,274 1 of 1,274 1 of 1,274 1,131 of 1,274 33 of 1,274	0.3t/84 prep.	Yes
152	204-263-4	118-60-5	2-ethylhexyl salicylate	NA	NA	NA		-	Yes
153	204-279-1	118-82-1	2,2',6,6'-tetra-tert-butyl-4,4'-methylenediphenol	NA	NA	H411 (Toxic to aquatic life with long lasting effects) H413 (May cause long	43 of 182	0.5t/17 prep	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						lasting harmful effects to aquatic life)	45 of 182		
154	204-317-7	119-36-8	Methyl salicylate	NA	NA	H360 (May damage fertility or the unborn child) H361 (Suspected of damaging fertility or the unborn child)	3 of 1,606 50 of 1,606	2t/124 prep.	Yes
155	204-402-9	120-51-4	Benzyl benzoate	H302 (Harmful if swallowed)	H411 (Toxic to aquatic life with long lasting effects)	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	2 of 1,995 1,979 of 1,995	0.1t/158 prep.	Yes
156	204-409-7	120-57-0	Piperonal	NA	NA	H317 (May cause an allergic skin reaction)	62 of 1,085	0t/138 prep.	Yes
157	204-464-7	121-32-4	3-ethoxy-4-hydroxybenzaldehyde	NA	NA	NA		-	Yes
158	204-534-7	122-32-7	1,2,3-propanetriyl trioleate	NA	NA	NA		-	No
159	204-558-8	122-62-3	Bis(2-ethylhexyl) sebacate	NA	NA	NA		-	Yes
160	204-559-3	122-63-4	Benzyl propionate	NA	NA	NA		-	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
161	204-589-7	122-99-6	2-phenoxyethanol	H302 (Harmful if swallowed) H319 (Causes serious eye irritation)	NA	H341 (Suspected of causing genetic defects) H351 (Suspected of causing cancer)	1 of 2,724 1 of 2,724	117.3t/292 prep.	Yes
162	204-602-6	123-11-5	Anisaldehyde	NA	NA	H317 (May cause an allergic skin reaction) H412 (Harmful to aquatic life with long lasting effects)	4 of 2,542 1 of 2,542	0t/ 81 prep.	Yes
163	204-622-5	123-35-3	7-methyl-3-methyleneocta-1,6-diene	NA	NA	H317 (May cause an allergic skin reaction) H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	4 of 1,149 3 of 1,149 3 of 1,149 2 of 1,149 250 of 1,149	10.7t/44 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
164	204-633-5	123-51-3	3-methylbutan-1-ol	NA	NA	H341 (Suspected of causing genetic defects) H351 (Suspected of causing cancer)	1 of 1,667 1 of 1,1667	0t/21 prep.	Yes
165	204-658-1	123-86-4	n-butyl acetate	H336 (May cause drowsiness or dizziness)	NA	H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	38 of 3,283 1 of 3,283	3,771.2 t/3,199 prep.	Yes
166	204-662-3	123-92-2	Isopentyl acetate	NA	NA	H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	2 of 1,980 96 of 1,980	0.8t/99 prep.	Yes
167	204-677-5	124-07-2	Octanoic acid	NA	NA	NA		-	Yes
168	204-686-4	124-18-5	Necane	NA	NA	H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	7 of 283 2 of 283	0.2t/4 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
169	204-688-5	124-19-6	Nonanal	NA	NA	H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	2 of 1,112 1,026 of 1,112	0t/117 prep.	Yes
170	204-727-6	125-12-2	Exo-1,7,7-trimethylbicyclo[2.2.1]hept-2-yl acetate	NA	NA	NA		-	Yes
171	204-771-6	126-13-6	Sucrose di(acetate) hexaisobutyrate	NA	NA	NA		-	No
172	204-823-8	127-09-3	Sodium acetate	NA	NA	NA		-	Yes
173	204-872-5	18172-67-3, 127-91-3	Pin-2(10)-ene	NA	NA	CAS: 18172-67-3 H317 (May cause an allergic skin reaction) H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	292 of 297 140 of 297 141 of 297 1 of 297	CAS: 18172-67-3 0t/12 prep. CAS: 127-91-3 5.4t/81 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						CAs: 127-91-3 H317 (May cause an allergic skin reaction) H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects) H413 (May cause long lasting harmful effects to aquatic life)	1,254 of 1,332 552 of 1,332 310 of 1,332 10 of 1,332 47 of 1,332		
174	204-881-4	128-37-0	2,6-di-tert-butyl-p-cresol	NA	NA	H317 (May cause an allergic skin reaction) H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life	46 of 3,151 1,742 of 3,151 2,190 of 3,151	85.9t/2,402prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						with long lasting effects) H412 (Harmful to aquatic life with long lasting effects) H413 (May cause long lasting harmful effects to aquatic life)	32 of 3,151 15 of 3,151 305 of 3,151		
175	205-011-6	131-11-3	Dimethyl phthalate	NA	NA	H361 (Suspected of damaging fertility or the unborn child) H402 (Harmful to aquatic life) H412 (Harmful to aquatic life with long lasting effects)	3 of 1,364 1 of 1,364 1 of 1,364	20.3t/52 prep.	No
176	205-281-5	137-16-6	Sodium N-lauroylsarcosinate	NA	NA	H317 (May cause an allergic skin reaction)	1 of 282	2.2t/ 62 prep.	No
177	205-358-3	139-33-3	Disodium dihydrogen ethylenediaminetetraacetate	NA	NA	H351 (Suspected of causing cancer)	1 of 1,396	0.4t/14 prep.	No
178	205-381-9	139-89-9	Trisodium 2-(carboxylatomethyl(2-	NA	NA	H400 (Very toxic to	351 of 679	0.8t/16 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
			hydroxyethyl)amino)ethyliminodi(acetate)			aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	351 of 679		
179	205-391-3	140-01-2	Pentasodium (carboxylatomethyl)iminobis(ethylenenitrilo)tetraacetate	NA	NA	H361 (Suspected of damaging fertility or the unborn child) H411 (Toxic to aquatic life with long lasting effects)	467 of 748 48 of 748	6.2t/58 prep.	No
180	205-399-7	140-11-4	Benzyl acetate	NA	NA	H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	1 of 1,167 28 of 1,167	0.5t/261 prep.	Yes
181	205-438-8	140-88-5	Ethyl acrylate	H302 (Harmful if swallowed) H312 (Harmful in contact with skin) H315 (Causes skin irritation)	NA	H317 (May cause an allergic skin reaction) H412 (Harmful to aquatic life with long lasting effects)	2,231 of 2,231 254 of 2,231	0.3t/246 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
				H317 (May cause an allergic skin reaction) H319 (Causes serious eye irritation) H332 (Harmful if inhaled) H335 (May cause respiratory irritation)					
182	205-465-5	141-17-3	Bis(2-(2-butoxyethoxy)ethyl) adipate	NA	NA	NA		-	Yes
183	205-500-4	141-78-6	Ethyl acetate	H319 (Causes serious eye irritation) H336 (May cause drowsiness or dizziness)	NA	H317 (May cause an allergic skin reaction)	1 of 3,663	5,356.4 t/1,156 prep.	Yes
184	205-526-6	142-18-7	2,3-dihydroxypropyl laurate	NA	NA	NA		-	Yes
185	205-550-7	142-62-1	Hexanoic acid	NA	NA	NA		-	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
186	205-553-3	142-71-2	Copper di(acetate)	NA	NA	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	152 of 376 108 of 376 1 of 376 62 of 376	Yes, confidential	No
187	205-571-1	142-91-6	Isopropyl palmitate	NA	NA	NA		-	Yes
188	205-572-7	142-92-7	Hexyl acetate	NA	NA	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	12 of 1,186 12 of 1,186 1,045 of 1,186	0t/17 prep.	Yes
189	205-582-1	143-07-7	Lauric acid	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life	18 of 2,115 18 of 2,115	483.6 t/162 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	134 of 2,115		
190	205-583-7	143-08-8	Nonan-1-ol	NA	NA	H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	863 of 1,152 3 of 1,152	0t/34 prep.	Yes
191	205-633-8	144-55-8	Sodium hydrogencarbonate	NA	NA	NA		-	Yes
192	205-702-2	147-85-3	L-proline	NA	NA	NA		-	No
193	205-775-0	150-84-5	Citronellyl acetate	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	2 of 1,201 1,170 of 1,201	0.2t/32 prep.	Yes
194	206-016-6	287-92-3	Cyclopentane	NA	H412 (Harmful to aquatic life with long lasting effects)	H412 (Harmful to aquatic life with long lasting effects)	387 of 411	293t/64 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
195	206-059-0	298-14-6	Potassium hydrogencarbonate	NA	NA	NA		-	No
196	207-431-5	470-82-6	Cineole	NA	NA	H317 (May cause an allergic skin reaction) H412 (Harmful to aquatic life with long lasting effects)	62 of 1,185 1 of 1,185	0.9t/31 prep.	Yes
197	207-439-9	471-34-1	Calcium carbonate	NA	NA	NA		-	No
198	207-838-8	497-19-8	Sodium carbonate	H319 (Causes serious eye irritation)	NA	NA		7,167.8t/776 prep.	No
199	208-043-9	506-51-4	Tetracosanol	NA	NA	NA		-	No
200	208-168-9	513-78-0	Cadmium carbonate	NA	NA	H341 (Suspected of causing genetic defects) H350 (May cause cancer) H361 (Suspected of damaging fertility or the unborn child) H400 (toxic to aquatic life) H410 (Very toxic to	9 of 39 9 of 39 9 of 39 30 of 39 39 of 39	No uses in Denmark and the Nordic countries	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						aquatic life with long lasting effects)			
201	208-580-9	533-96-0	Trisodium hydrogendicarbonate	NA	NA	NA		-	No
202	208-759-1	540-84-1	2,2,4-trimethylpentane	H304 (May be fatal if swallowed and enters airways) H315 (Causes skin irritation) H336 (May cause drowsiness or dizziness)	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	449 of 488 488 of 488	1.8t/13 prep.	No
203	208-878-9	544-76-3	Hexadecane	NA	NA	NA			Yes
204	208-901-2	546-46-3	Trizinc dicitrate	NA	NA	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	4 of 25 5 of 25	Yes, confidential	No
205	209-097-6	555-43-1	Glycerol tristearate	NA	NA	NA		-	No
206	209-283-7	565-62-8	3-methylpent-3-en-2-one	NA	NA	NA		-	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
207	209-529-3	584-08-7	Potassium carbonate	NA	NA	NA		-	No
208	209-578-0	586-62-9	p-mentha-1,4(8)-diene	NA	NA	H317 (May cause an allergic skin reaction) H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	830 of 1,312 80 of 1,312 88 of 1,312 1,251 of 1,312	3.1t/145 prep.	Yes
209	210-514-9	617-48-1	DL-malic acid	NA	NA	NA		-	No
210	210-647-2	620-67-7	Propane-1,2,3-triyl trisheptanoate	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	23 of 34	Not applied in Denmark applied in Sweden	No
211	210-826-5	624-03-3	Ethane-1,2-diyl palmitate	NA	NA	NA		-	No
212	210-852-7	624-54-4	Pentyl propionate	NA	NA	H317 (May cause an allergic skin reaction)	1 of 1,368	Not applied in Denmark and the Nordic countries	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
213	210-868-4	624-89-5	Ethyl methyl sulphide	NA	NA	H402 (Harmful to aquatic life) H412 (Harmful to aquatic life with long lasting effects)	1 of 147 8 of 147	Not applied in Denmark and the Nordic countries	No
214	211-020-6	627-93-0	Dimethyl adipate	NA	NA	H361 (Suspected of damaging fertility or the unborn child)	4 of 726	55.8t/198 prep.	Yes
215	211-077-7	629-15-2	Ethylene diformate	NA	NA	NA		-	No
216	211-093-4	629-50-5	Tridecane	NA	NA	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	93 of 329 93 of 329	Yes confidential	Yes
217	211-096-0	629-59-4	Tetradecane	NA	NA	H413 (May cause long lasting harmful effects to aquatic life)	23 of 259	Yes confidential	Yes
218	211-112-6	629-82-3	Dioctyl ether	NA	NA	NA		-	No
219	211-119-4	629-96-9	Icosan-1-ol	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
220	211-463-5	646-06-0	1,3-dioxolane	NA	NA	NA		-	No
221	211-522-5	657-84-1	Sodium toluene-4-sulphonate	NA	NA	H317 (May cause an allergic skin reaction) H341 (Suspected of causing genetic defects) H351 (Suspected of causing cancer) H400 (toxic to aquatic life)	123 of 229 123 of 229 123 of 229 123 of 229	No uses in Denmark, applied in Finland Norway and Sweden.	No
222	211-546-6	661-19-8	Docosan-1-ol	NA	NA	NA		-	No
223	211-694-1	687-47-8	Ethyl (S)-2-hydroxypropionate	H318 (Causes serious eye damage) H335 (May cause respiratory irritation)	NA	NA		0t/ 7 prep.	Yes
224	211-889-1	705-86-2	Decan-5-olide	NA	NA	NA		-	Yes
225	211-892-8	706-14-9	Decan-4-olide	NA	NA	NA		-	Yes
226	211-932-4	713-95-1	Dodecan-5-olide	NA	NA	NA		-	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
227	212-391-7	813-94-5	Tricalcium dicitrate	NA	NA	NA		-	No
228	212-755-5	866-84-2	Tripotassium citrate	NA	NA	NA		-	Yes
229	212-769-1	868-14-4	Potassium hydrogen tartrate	NA	NA	NA		-	No
230	213-192-8	928-96-1	cis-hex-3-en-1-ol	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	1 of 1,117	0t/36 prep.	Yes
231	214-275-1	1119-34-2	(+)-L-arginine hydrochloride	NA	NA	NA		-	No
232	214-277-2	1119-40-0	Dimethyl glutarate	NA	NA	NA		-	Yes
233	214-291-9	1119-97-7	Tetradonium bromide	NA	NA	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	82 of 516 60 of 516	8.2t/7 prep.	No
234	214-300-6	1120-21-4	Undecane	NA	NA	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life	93 of 326 93 of 326 2 of 326	Yes, confidential	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						with long lasting effects)			
235	214-604-9	1163-19-5	Bis(pentabromophenyl) ether	NA	NA	H341 (Suspected of causing genetic defects) H351 (Suspected of causing cancer) H413 (May cause long lasting harmful effects to aquatic life)	24 of 256 2 of 256 24 of 256	Yes, confidential	No
236	214-730-4	1191-16-8	3-methyl-2-butenyl acetate	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	1 of 1,170	0t/5 prep.	Yes
237	214-946-9	1222-05-5	1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylindeno[5,6-c]pyran (HHCB)	NA	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	1,172 of 1,200 1,172 of 1,200	0.2t/183 prep.	Yes
238	215-090-9	1300-72-7	Sodium xylenesulphonate	NA	NA	NA		-	No
239	215-134-7	1304-76-3	Dibismuth trioxide	NA	NA	H413 (May cause long lasting harmful effects to aquatic life)	93 of 324	0t/9 prep.	No
240	215-137-3	1305-62-0	Calcium dihydroxide	NA	NA	H412 (Harmful to aquatic	1 of 4,005	36,717.8 t/470	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						life with long lasting effects)		prep.	
241	215-138-9	1305-78-8	Calcium oxide	NA	NA	NA		-	No
242	215-146-2	1306-19-0	Cadmium oxide	H330 (Fatal if inhaled) H341 (Suspected of causing genetic defects) H350 (May cause cancer) H361fd Suspected of damaging fertility or the unborn child H372 (Causes damage to organs through prolonged or repeated exposure)	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	H341 (Suspected of causing genetic defects) H350 (May cause cancer) H361fd Suspected of damaging fertility or the unborn child H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	423 of 423 423 of 423 421 of 423 423 of 423 423 of 423	Yes confidential	No
243	215-147-8	1306-23-6	Cadmium sulphide	H302 (Harmful if swallowed) H341 (Suspected of causing genetic	H413 (May cause long lasting harmful effects to aquatic life)	H341 (Suspected of causing genetic defects) H350 (May cause cancer) H361(fd) Suspected of	151 of 151 151 of 151	No uses in Denmark. Applied in Norway and	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
				defects) H350 (May cause cancer) H361fd Suspected of damaging fertility or the unborn child H372 (Causes damage to organs through prolonged or repeated exposure)		damaging fertility or the unborn child H411 (Toxic to aquatic life with long lasting effects) H413 (May cause long lasting harmful effects to aquatic life)	151 of 151 9 of 151 142 of 151	Finland	
244	215-168-2	1309-37-1	Diiron trioxide	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	207 of 2,116	4,482.9 t /1,802 prep.	No
245	215-170-3	1309-42-8	Magnesium hydroxide	NA	NA	NA		-	No
246	215-181-3	1310-58-3	Potassium hydroxide	H302 (Harmful if swallowed) H314 (Causes severe skin burns and eye damage)	NA	H412 (Harmful to aquatic life with long lasting effects)	1 of 3,032	7,283.9 t/1,269 prep.	No
247	215-183-4	1310-65-2	Lithium hydroxide	NA	NA	H411 (Toxic to aquatic life	19 of 787	0.1t/66 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	 543 of 787		
248	215-185-5	1310-73-2	Sodium hydroxide	H314 (Causes severe skin burns and eye damage)	NA	H402 (Harmful to aquatic life) H412 (Harmful to aquatic life with long lasting effects)	1 of 3,918 9 of 3,918	53,168.0 t/2,630 prep.	Yes
249	215-222-5	1314-13-2	Zinc oxide	NA	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	H317 (May cause an allergic skin reaction) H341 (Suspected of causing genetic defects) H350 (May cause cancer) H360 (May damage fertility or the unborn child) H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	1 of 4,075 1 of 4,075 1 of 4,075 142 of 4,075 3,991 of 4,075 4,037 of 4,075	739.1 t/937 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
250	215-251-3	1314-98-3	Zinc sulphide	NA	NA	H317 (May cause an allergic skin reaction) H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	26 of 647 13 of 647 26 of 647	6.4t/39prep.	No
251	215-277-5	1317-61-9	Triiron tetraoxide	NA	NA	H361 (Suspected of damaging fertility or the unborn child)	1 of 1,350	457.7 t/612 prep.	No
252	215-282-2	1317-80-2	Rutile (TiO2)	NA	NA	H351 (Suspected of causing cancer)	7 of 622	369.3 t/175 prep.	No
253	215-478-8	1327-43-1	Silicic acid, aluminum magnesium salt	NA	NA	H400 (toxic to aquatic life)	7 of 43	0.1t/26 prep.	No
254	215-553-5	1330-86-5	Diisooctyl adipate	NA	NA	NA		-	No
255	215-635-0	1335-46-2	Ionone, methyl-	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	109 of 1,185 1,184 of 1,185	0t/149 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						H412 (Harmful to aquatic life with long lasting effects)	1 of 1,185		
256	215-663-3	1338-39-2	Sorbitan laurate	NA	NA	NA		-	No
257	215-664-9	1338-41-6	Sorbitan stearate	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	3 of 402	0.1t/54 prep.	No
258	215-681-1	1343-88-0	Silicic acid, magnesium salt	NA	NA	NA		-	No
259	215-687-4	1344-09-8	Silicic acid, sodium salt	NA	NA	NA		-	No
260	215-710-8	1344-95-2	Silicic acid, calcium salt	NA	NA	NA		-	No
261	218-690-9	2216-51-5	L-menthol	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	28 of 1,154	0.3t/27 prep.	Yes
262	219-280-2	2402-58-6	Didodecyl fumarate	NA	NA	NA		-	No
263	219-370-1	2425-77-6	2-hexyldecan-1-ol	NA	NA	NA		-	No
264	219-847-4	2550-26-7	4-phenylbutan-2-one	NA	NA	NA		-	Yes
265	222-294-1	3407-42-9	3-(5,5,6-trimethylbicyclo[2.2.1]hept-	NA	NA	H412 (Harmful to aquatic life with long lasting	73 of 779	0t/83 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
			2-yl)cyclohexan-1-ol			effects)			
266	222-619-7	3558-60-9	(2-methoxyethyl)benzene	NA	NA	NA		-	Yes
267	222-960-1	3681-71-8	(Z)-hex-3-enyl acetate	NA	NA	NA		-	Yes
268	222-980-0	3687-45-4	(Z)-octadec-9-enyl oleate	NA	NA	NA		-	No
269	222-981-6	3687-46-5	Decyl oleate	NA	NA	NA		-	No
270	223-118-6	3738-00-9	Dodecahydro-3a,6,6,9a-tetramethylnaphtho[2,1-b]furan	NA	NA	NA		-	Yes
271	223-470-0	3913-02-8	2-butyloctan-1-ol	NA	NA	H400 (toxic to aquatic life) H411 (Toxic to aquatic life with long lasting effects)		Yes, confidential	No
272	223-775-9	4067-16-7	3,6,9,12-tetraazatetradecamethylenediamine	H314 (Causes severe skin burns and eye damage) H317 (May cause an allergic skin reaction)	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	H317 (May cause an allergic skin reaction) H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	938 of 938 934 of 938 938 of 938	ot/ 17 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
273	224-052-0	4180-23-8	(E)-anethole	NA	NA	H317 (May cause an allergic skin reaction) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	937 of 1,029 2 of 1,029 66 of 1,029	1.9t/23 prep.	Yes
274	224-292-6	4292-10-8	(carboxymethyl)dimethyl-3-[(1-oxododecyl)amino]propylammonium hydroxide	NA	NA	H400 (toxic to aquatic life) H412 (Harmful to aquatic life with long lasting effects)	19 of 494 3 of 494	Not applied in Denmark (Applied in Sweden and Norway)	No
275	225-768-6	5064-31-3	Trisodium nitrilotriacetate	H302 (Harmful if swallowed) H319 (Causes serious eye irritation) H351 (Suspected of causing cancer)	NA	H351 (Suspected of causing cancer)	1,214 of 1,325	51.4t/472prep.	No
276	225-878-4	5131-66-8	1-butoxypropan-2-ol	H315 (Causes skin irritation) H319 (Causes	NA	H317 (May cause an allergic skin reaction) H341 (Suspected of	1 of 2,180	83.3 t/276 prep	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
				serious eye irritation)		causing genetic defects) H351 (Suspected of causing cancer) H360 (May damage fertility or the unborn child) H400 (toxic to aquatic life) H412 (Harmful to aquatic life with long lasting effects)	1 of 2,180 1 of 2,180 1 of 2,180 1 of 2,180 1 of 2,180		
277	226-242-9	5333-42-6	2-octyldodecan-1-ol	NA	NA	NA		-	Yes
278	226-394-6	5392-40-5	Citral	H315 (Causes skin irritation) H317 (May cause an allergic skin reaction)	NA	H317 (May cause an allergic skin reaction) H412 (Harmful to aquatic life with long lasting effects)	2,083 of 2,084 1 of 2,084	0.9t/224 prep.	Yes
279	226-501-6	5413-60-5	3a,4,5,6,7,7a-hexahydro-4,7-methanoinden-6-yl acetate	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	1,137 of 1,139	0t/46 prep.	Yes
280	226-775-7	83834-59-7,	2-ethylhexyl 4-methoxycinnamate	NA	NA	NA	37 of 1,203	CAS: 5466-77-3	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
		5466-77-3				(CAS: 5466-77-3 H413 (May cause long lasting harmful effects to aquatic life)		Yes confidential	
281	227-813-5	5989-27-5	(R)-p-mentha-1,8-diene	H315 (Causes skin irritation) H317 (May cause an allergic skin reaction)	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	H317 (May cause an allergic skin reaction) H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	1,976 of 1,976 1,879 of 1,976 1,975 of of 1,976	81.3t/361 prep.	Yes
282	227-815-6	5989-54-8	(S)-p-mentha-1,8-diene	H315 (Causes skin irritation) H317 (May cause an allergic skin reaction)	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	H317 (May cause an allergic skin reaction) H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	1,070 of 1,070 1,051 of 1,070 1,070 of 1,070	0.1t /15 prep.	Yes
283	228-250-8	6197-30-4	Octocrilene	NA	NA	H410 (Very toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic	10 of 391 20 of 391	13 t/7 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						life with long lasting effects) H413 (May cause long lasting harmful effects to aquatic life)	347 of 391		
284	228-408-6	6259-76-3	Hexyl salicylate	NA	NA	H317 (May cause an allergic skin reaction) H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	1,062 of 1,120 956 of 1,120 1,097 of 1,120	0.1t/ 34 prep.	Yes
285	228-507-4	6284-43-1	2,3-dihydroxypropyl 12-hydroxyoctadecanoate	NA	NA	NA		-	No
286	228-626-1	6309-51-9	Isopentyl laurate	NA	NA	NA		-	No
287	229-114-0	6413-10-1	Ethyl 2-methyl-1,3-dioxolane-2-acetate	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	1 of 992 1 of 992	0 t/5 prep.	Yes
288	229-146-5	6419-19-8	Nitrilotrimethylenetris(phosphonic	NA	NA	H412 (Harmful to aquatic life with long lasting	29 of 621	106.7 t/125 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
			acid)			effects) H317 (May cause an allergic skin reaction) H351 (Suspected of causing cancer)	4 of 621 3 of 621		
289	229-352-5	6485-40-1	l-p-mentha-1(6),8-dien-2-one	NA	NA	H317 (May cause an allergic skin reaction) H412 (Harmful to aquatic life with long lasting effects)	1,093 of 1,158 1 of 1,158	0 t/11 prep.	Yes
290	229-912-9	6834-92-0	Disodium metasilicate	H314 (Causes severe skin burns and eye damage) H335 (May cause respiratory irritation)	NA	NA		-	No
291	230-029-6	6920-22-5	DL-hexane-1,2-diol	NA	NA	NA		-	Yes
292	230-072-0	6938-94-9	Diisopropyl adipate	NA	NA	H400 (toxic to aquatic life)	3 of 290	Not applied in Denmark (applied in Sweden)	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
								0 t/5 prep.	
293	230-597-5	7212-44-4	3,7,11-trimethyldodeca-1,6,10-trien-3-ol,mixed isomers	NA	NA	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	345 of 1,293 1,266 of 1,293	0 t/6 prep.	Yes
294	230-785-7	7320-34-5	Tetrapotassium pyrophosphate	NA	NA	NA		-	No
295	231-072-3	7429-90-5	Aluminium (pyrophoric) /AP Aluminium (stabilised) /AS	AP: NA AS: NA	AP: NA AS: NA	AP: H413 (May cause long lasting harmful effects to aquatic life) H400 (toxic to aquatic life) AS: H413 (May cause long lasting harmful effects to aquatic life) H400 (toxic to aquatic life)	23 of 3,219 11 of 3,219 23 of 3,219 11 of 3,219	155.7 t/572 prep.	No
296	231-113-5	7440-03-1	niobium	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
297	231-157-5	7440-47-3	Chromium	NA	NA	H317 (May cause an allergic skin reaction) H334 (May cause allergy or asthma symptoms or breathing difficulties if inhaled) H413 (May cause long lasting harmful effects to aquatic life) H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H351 (Suspected of causing cancer)	360 of 1,573 357 of 1,573 93 of 1,573 126 of 1,573 93 of 1,573 4 of 1,573	33.1 t/256 prep.	No
298	31-208-1	7446-70-0	Aluminium chloride	H314 (Causes severe skin burns and eye damage)	NA	NA		-	No
299	231-225-4	7452-79-1	Ethyl 2-methylbutyrate	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	1 of 1,117	0 t/19 prep.	Yes
300	231-493-2	7585-39-9	Cycloheptapentylose	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
301	231-545-4	7631-86-9	Silicon dioxide	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	1 of 3,701	1,759.9 t/3,635 prep.	Yes
302	231-548-0	7631-90-5	Sodium hydrogensulfite	H302 (Harmful if swallowed)	NA	Na		-	No
303	231-592-0	7646-85-7	Zinc chloride	H302 (Harmful if swallowed) H314 (Causes severe skin burns and eye damage)	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H413 (May cause long lasting harmful effects to aquatic life)	963 of 993 968 of 993 23 of 993	32.3 t/28 prep.	No
304	231-548-0	7631-90-5	Sodium hydrogensulfite	H302 (Harmful if swallowed)	NA	NA		-	No
305	231-592-0	7646-85-7	Zinc chloride	H302 (Harmful if swallowed) H314 (Causes severe skin burns and eye	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long	H317 (May cause an allergic skin reaction) H400 (toxic to aquatic life)	960 of 993 964 of 993 23 of 993	32.3 t/28 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
				damage)	lasting effects)	H410 (Very toxic to aquatic life with long lasting effects) H413 (May cause long lasting harmful effects to aquatic life)	1 of 993		
306	231-598-3	7647-14-5	Sodium chloride	NA	NA	NA		-	Yes
307	231-633-2	7664-38-2	Orthophosphoric acid	H314 (Causes severe skin burns and eye damage)	NA	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	1 of 3,212 1 of 3,212 1 of 3,212	2,102.1 t/1071 prep.	No
308	231-639-5	7664-93-9	Sulphuric acid	H314 (Causes severe skin burns and eye damage)	NA	NA		-	No
309	231-659-4	7681-11-0	Potassium iodide	NA	NA	H317 (May cause an allergic skin reaction) H334 (May cause allergy or asthma symptoms or	83 of 377 35 of 377	53.1 t/16 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						breathing difficulties if inhaled) H351 (Suspected of causing cancer) H361 (Suspected of damaging fertility or the unborn child) H411 (Toxic to aquatic life with long lasting effects)	57 of 377 27 of 377 4 of 377		
310	231-668-3	7681-52-9	Sodium hypochlorite	H314 (Causes severe skin burns and eye damage)	H400 (toxic to aquatic life)	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	1,761 of 2,033 218 of 2,033 156 of 2,033 312 of 2,033	1,065.6 t/212 prep.	No
311	231-673-0	7681-57-4	Disodium disulphite	H302 (Harmful if swallowed) H318 (Causes	NA	H317 (May cause an allergic skin reaction) H334 (May cause allergy	2 of 2,170 2 of 2,170	902.5 t/98 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
				serious eye damage)		or asthma symptoms or breathing difficulties if inhaled) H412 (Harmful to aquatic life with long lasting effects)	2 of 2,170		
312	231-710-0	7695-91-2	3,4-dihydro-2,5,7,8-tetramethyl-2-(4,8,12-trimethyltridecyl)-2H-benzopyran-6-yl acetate	NA	H413 (May cause long lasting harmful effects to aquatic life)	NA		56.2 t/13 prep.	Yes
313	231-722-6	7704-34-9	Sulfur	H315 (Causes skin irritation)	NA	NA		-	No
314	231-793-3	7733-02-0	Zinc sulphate	H302 (Harmful if swallowed) H318 (Causes serious eye damage)	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	H317 (May cause an allergic skin reaction) H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	815 of 837 797 of 837 1 of 837 1 of 837 1 of 837	0.1 t/16 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						H413 (May cause long lasting harmful effects to aquatic life)			
315	231-821-4	7757-83-7	Sodium sulphite	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	5 of 1,685	160.0 t/208 prep.	No
316	231-838-7	7758-29-4	Pentasodium triphosphate	NA	NA	NA		-	No
317	231-853-9	7761-88-8	Silver nitrate	H314 (Causes severe skin burns and eye damage)	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects) H361 (Suspected of damaging fertility or the unborn child)	691 of 694 685 of 694 1 of 694 1 of 694	0.0 t/6 prep.	No
318	231-867-5	7772-98-7	Sodium thiosulphate	NA	NA	NA		-	Yes
319	231-890-0	7775-14-6	Sodium dithionite	H302 (Harmful if swallowed)	NA	H412 (Harmful to aquatic life with long lasting effects)	28 of 458	2,564.8 t/17 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
320	231-892-1	7775-27-1	Disodium peroxodisulphate	NA	NA	H317 (May cause an allergic skin reaction) H334 (May cause allergy or asthma symptoms or breathing difficulties if inhaled)	1,027 of 1,110 973 of 1,110	1.8 t/40 prep.	No
321	231-900-3	7778-18-9	Calcium sulfate	NA	NA	H317 (May cause an allergic skin reaction) H334 (May cause allergy or asthma symptoms or breathing difficulties if inhaled) H412 (Harmful to aquatic life with long lasting effects)	3 of 778 3 of 778 3 of 778	11,898.8 t/396 prep.	No
322	231-913-4	7778-77-0	Potassium dihydrogenorthophosphate	NA	NA	NA		-	No
323	231-943-8	7779-88-6	Zinc nitrate	NA	NA	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long	138 of 208 164 of 208	5.4 t/8 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						lasting effects) H411 (Toxic to aquatic life with long lasting effects)	10 of 208		
324	231-944-3	7779-90-0	Trizinc bis(orthophosphate)	NA	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	1,408 of 1501 1,408 of 1501	67.2 t/641 prep.	No
325	231-982-0	7783-18-8	Ammonium thiosulphate	NA	NA	NA		-	No
326	232-056-9	7784-30-7	Aluminium orthophosphate	NA	NA	NA		-	No
327	232-077-3	7785-26-4	(-)-pin-2(3)-ene	NA	NA	H317 (May cause an allergic skin reaction) H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	428 of 484 374 of 484 343 of 484 34 of 484 5 of 484	0 t/60 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						H412 (Harmful to aquatic life with long lasting effects)			
328	232-087-8	7785-70-8	(+)-pin-2(3)-ene	NA	NA	H317 (May cause an allergic skin reaction) H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	772 of 800 200 of 800 200 of 800 21 of 800	0 t/6 prep.	Yes
329	232-088-3	7785-84-4	Trisodium trimetaphosphate	NA	NA	NA		-	No
330	232-094-6	7786-30-3	Magnesium chloride	NA	NA	H317 (May cause an allergic skin reaction)	39 of 1,246	0.9 t/772 prep.	Yes
331	232-268-1	8000-41-7	Terpineol	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting	5 of 1,643 4 of 1,643 1 of 1,643	2.7 t/321 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						effects)			
332	232-292-2	8001-78-3	Castor oil, hydrogenated	NA	NA	NA		-	Yes
333	232-315-6	8002-74-2	Paraffin waxes and Hydrocarbon waxes	NA	NA	H413 (May cause long lasting harmful effects to aquatic life)	3 of 1,809	8.9 t/547 prep.	No
334	232-360-1	8007-43-0	Sorbitan, (Z)-9-octadecenoate (2:3)	NA	NA	NA		-	No
335	232-373-2	8009-03-8	Petrolatum	H350 (May cause cancer)	NA	H361 (Suspected of damaging fertility or the unborn child) H413 (May cause long lasting harmful effects to aquatic life)	53 of 1,252 30 of 1,252	20.7 t/82 prep.	No
336	232-393-1	8013-17-0	Sugar, invert	NA	NA	NA		-	No
337	232-395-2	8013-75-0	Fusel oil	NA	NA	NA		-	Yes
338	232-433-8	8028-48-6	Orange, sweet, ext.	NA	NA	H317 (May cause an allergic skin reaction) H400 (toxic to aquatic life) H410 (Very toxic to	1,416 of 1,759 1,149 of 1,759 1,284 of 1,759	22.0 t/310 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	99 of 1,759 61 of 1,759		
339	232-455-8	8042-47-5	White mineral oil (petroleum)	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects) H413 (May cause long lasting harmful effects to aquatic life)	110 of 2,632 44 of 2,632 2 of 2,632	789.4 t/460 prep.	Yes
340	232-475-7	8050-09-7	Rosin	H317 (May cause an allergic skin reaction)	NA	H317 (May cause an allergic skin reaction) H334 (May cause allergy or asthma symptoms or breathing difficulties if inhaled) H410 (Very toxic to aquatic life with long	2,169 of 2,169 23 of 2,169 3 of 2,169	28.1 t/316 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						lasting effects) H411 (Toxic to aquatic life with long lasting effects)	 1 of 2,169		
341	232-476-2	8050-15-5	Resin acids and Rosin acids, hydrogenated, Me esters	NA	NA	H317 (May cause an allergic skin reaction) H412 (Harmful to aquatic life with long lasting effects)	127 of 1,281 50 of 1,281	0.1 t/30 prep.	Yes
342	232-478-3	8050-25-7	Resin acids and Rosin acids, esters with triethylene glycol	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	72 of 72	0.2 t/11 prep.	No
343	232-479-9	8050-26-8	Resin acids and Rosin acids, esters with pentaerythritol	NA	NA	H317 (May cause an allergic skin reaction)	2 of 275	0.2 t/9 prep.	No
344	232-482-5	8050-31-5	Resin acids and Rosin acids, esters with glycerol	NA	NA	NA		-	Yes
345	232-694-8	9007-13-0	Resin acids and Rosin acids, calcium salts	NA	NA	H317 (May cause an allergic skin reaction)	2 of 430	0.5 t/6 prep.	No
346	233-141-3	10043-67-1	Aluminium potassium bis(sulphate)	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
347	233-226-5	10094-45-8	(Z)-N-octadecyldocos-13-enamide	NA	NA	NA		-	No
348	233-296-7	10108-64-2	Cadmium chloride	H301 (Toxic if swallowed H330 (Fatal if inhaled) H340 (May cause genetic defects) H350 (May cause cancer) H360FD (May damage fertility. May damage the unborn child.) H372 (Causes damage to organs through prolonged or repeated exposure)	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	H360FD (May damage fertility. May damage the unborn child.) H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	110 of 110 110 of 110 21 of 110	Not applied in Denmark and the Nordic countries	No
349	233-321-1	10117-38-1	Potassium sulphite	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	1 of 221	3.1 t/16 prep.	No
350	233-343-1	10124-56-8	Sodium metaphosphate	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
351	233-433-0	10163-15-2	Disodium fluorophosphate	NA	NA	NA		-	No
352	233-469-7	10192-30-0	Ammonium hydrogensulphite	NA	NA	NA		-	No
353	233-484-9	10196-04-0	Ammonium sulphite	NA	NA	NA		-	No
354	233-560-1	10233-13-3	Isopropyl laurate	NA	NA	NA		-	No
355	233-666-8	10294-66-3	Potassium thiosulphate	NA	NA	NA		-	No
356	233-710-6	10325-94-7	Cadmium nitrate	NA	NA	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H361fd Suspected of damaging fertility or the unborn child	33 of 33 33 of 33 3 of 33	-	No
357	233-732-6	10339-55-6	3,7-dimethylnona-1,6-dien-3-ol	NA	NA	H317 (May cause an allergic skin reaction) H412 (Harmful to aquatic life with long lasting effects)	1 of 1,046 1 of 1,046	0t /5 prep.	Yes
358	233-739-4	10341-03-4	Ditetradecyl fumarate	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
359	233-881-7	10411-92-4	Cis-4-tert-butylcyclohexyl acetate	NA	NA	H411 (Toxic to aquatic life with long lasting effects) H317 (May cause an allergic skin reaction)	77 of 78 1 of 78	Not applied in Denmark and the Nordic countries	No
360	234-919-5	12040-43-6	Silicic acid, aluminum magnesium sodium salt	NA	NA	NA		-	No
361	235-049-9	12062-81-6	Iron manganese trioxide	NA	NA	NA		-	No
362	235-849-8	13007-85-7	Sodium D-glycero-D-gulo-heptonate	NA	NA	NA		-	No
363	236-004-6	13092-66-5	Magnesium bis(dihydrogenorthophosphate)	NA	NA	NA		-	No
364	236-675-5	13463-67-7	Titanium dioxide	NA	NA	H351 (Suspected of causing cancer) H412 (Harmful to aquatic life with long lasting effects) H413 (May cause long lasting harmful effects to aquatic life)	77 of 2,872 25 of 2,872 7 of 2,872	9,342.8t/4,532 prep.	Yes
365	236-719-3	13466-78-9	3,7,7-trimethylbicyclo[4.1.0]hept-3-ene	NA	NA	H317 (May cause an allergic skin reaction)	984 of 988	535t /21 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						H400 (toxic to aquatic life) H410 (Very toxic to aquatic 367life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	765 of 988 56 of 988 23 of 988 23 of 988		
366	237-067-2	13598-37-3,13986-21-5	Zinc bis(dihydrogen phosphate)	NA	NA	H400 (toxic to aquatic life) H411 (Toxic to aquatic life with long lasting effects)	75 of 81 13 of 81	13598-37-3: Yes, confidential	No
367	237-403-8	13774-25-9	Magnesium dihydrogen disulphite	NA	NA	NA		-	No
368	237-574-9	13845-36-8	Pentapotassium triphosphate	NA	NA	NA		-	No
369	237-865-0	14025-21-9	Disodium [[N,N'-ethylenediylbis[N-(carboxylatomethyl)glycinato]](4-)-N,N',O,O',ON,ON']zincate(2-)	NA	NA	NA		-	No
370	238-687-6	14639-97-5	Diammonium tetrachlorozincate(2-)	NA	NA	H400 (toxic to aquatic	3 of 3	-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						life) H411 (Toxic to aquatic life with long lasting effects)	3 of 3		
371	238-969-9	14901-07-6	4-(2,6,6-trimethylcyclohex-1-ene-1-yl)-but-3-ene-2-one	NA	NA	H317 (May cause an allergic skin reaction) H334 (May cause allergy or asthma symptoms or breathing difficulties if inhaled) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	1548 of 1,573 1 of 1,573 1 of 1,573 1 of 1,573	0.1t/42prep.	Yes
372	239-802-2	15708-41-5	Sodium feredetate	NA	NA	NA		-	No
373	239-854-6	15763-76-5	Sodium p-cumenesulphonate	NA	NA	NA		-	No
374	239-931-4	15827-60-8	[[(phosphonomethyl)imino]bis[ethane-2,1-diylnitrilobis(methylene)]]tetrakisphosphonic acid	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
375	240-362-9	16251-77-7	3-phenylbutyraldehyde	NA	NA	H317 (May cause an allergic skin reaction)	914 of 934	No uses in Denmark, applied in Norway and Sweden	Yes
376	240-367-6	16260-09-6	(Z)-N-octadec-9-enylhexadecan-1-amide	NA	NA	NA		-	No
377	240-795-3	16731-55-8	Dipotassium disulphite	NA	NA	NA		-	Yes
378	241-029-0	16958-92-2	Bis(tridecyl) adipate	NA	NA	NA		-	No
379	241-420-6	17392-83-5	Methyl (R)-lactate	H319 (Causes serious eye irritation) H335 (May cause respiratory irritation)	NA	NA		-	No
380	241-646-5	17671-27-1	Docosyl docosanoate	NA	NA	NA		-	No
381	242-016-2	18127-01-0	3-(4-tert-butylphenyl)propionaldehyde	NA	NA	H317 (May cause an allergic skin reaction) H361 (Suspected of damaging fertility or the	1,120 of 1,122 1,119 of 1,122	0t/6 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						unborn child) H361F (Suspected of damaging fertility.) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	1,046 of 1,122 35 of 1,122 32 of 1,122		
382	242-354-0	18472-51-0	D-gluconic acid, compound with N,N''-bis(4-chlorophenyl)-3,12-diimino-2,4,11,13-tetraazatetradecanediamidine (2:1)	NA	NA	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	93 of 101 36 of 101	2.4t/57 prep.	No
383	242-362-4	18479-58-8	2,6-dimethyloct-7-en-2-ol	NA	NA	NA		-	Yes
384	242-734-6	18996-35-5	Sodium dihydrogen citrate	NA	NA	NA		-	No
385	242-960-5	19321-40-5	Pentaerythritol tetraoleate	NA	NA	NA		-	No
386	243-697-9	20292-08-4	2-ethylhexyl laurate	NA	NA	NA		-	No
387	243-718-1	20298-69-5	Cis-2-tert-butylcyclohexyl acetate	NA	NA	H411 (Toxic to aquatic life	162 of 162	No uses in	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						with long lasting effects)		Denmark, applied in Norway, Sweden and Finland	
388	243-814-3	20427-58-1	Zinc hydroxide	NA	NA	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	148 of 167 30 of 167 3 of 167	No uses in Denmark, applied in Norway and Sweden	No
389	243-900-0	20592-85-2	[nitrilotris(methylene)]trisphosphonic acid, sodium salt	NA	NA	NA		-	No
390	244-063-4	20824-56-0	Diammonium dihydrogen ethylenediaminetetraacetate	NA	NA	H317 (May cause an allergic skin reaction)	47 of 186	Yes, confidential	No
391	244-168-5	21041-95-2	Cadmium hydroxide	NA	NA	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	44 of 44 44 of 44 4 of 44	NO uses in Denmark, applied in Norway	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						H361fd Suspected of damaging fertility or the unborn child			
392	244-742-5	22036-77-7	[ethylenebis[nitrilobis(methylene)]]tetrakisphosphonic acid, sodium salt	NA	NA	NA		-	No
393	244-751-4	22042-96-2	[[(phosphonomethyl)imino]bis[(ethylenenitrilo)bis(methylene)]]tetrakisphosphonic acid, sodium salt	NA	NA	H413 (May cause long lasting harmful effects to aquatic life)	34 of 394	4.1t/58 prep.	No
394	244-754-0	22047-49-0	2-ethylhexyl stearate	NA	NA	NA		-	No
395	244-949-0	22393-85-7	Tetradecyl oleate	NA	NA	NA		-	No
396	246-466-0	24800-44-0	[(methylethylene)bis(oxy)]dipropanol	NA	NA	NA		-	No
397	246-495-9	24851-98-7	Methyl 3-oxo-2-pentylcyclopentaneacetate	NA	NA	NA		-	Yes
398	246-665-2	25151-96-6	2,2-bis(hydroxymethyl)-1,3-propanediyl dioleate	NA	NA	NA		-	No
399	246-770-3	25265-71-8	Oxydipropanol	NA	NA	NA		-	Yes
400	246-807-3	25307-17-9	2,2'-(octadec-9-	NA	NA	H400 (toxic to aquatic	629 of 651	2.8t/44 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
			enylimino)bisethanol			life) H410 (Very toxic to aquatic life with long lasting effects) H317 (May cause an allergic skin reaction)	242 of 651 39 of 651		
401	247-045-4	25498-49-1	[2-(2-methoxymethylethoxy)methylethoxy]propanol	NA	NA	NA		-	Yes
402	247-568-8	26266-57-9	Sorbitan palmitate	NA	NA	H411 (Toxic to aquatic life with long lasting effects) H413 (May cause long lasting harmful effects to aquatic life)	3 of 174 2 of 174	Yes, confidential	No
403	247-569-3	26266-58-0	anhydro-D-glucitol trioleate	NA	NA	NA		-	No
404	247-655-0	26399-02-0	2-ethylhexyl oleate	NA	NA	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H317 (May cause an	629 of 651 196 of 651 39 of 651	1.7t/10 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						allergic skin reaction)			
405	247-891-4	26658-19-5	Sorbitan tristearate	NA	NA	NA		-	No
406	248-299-9	27178-16-1	Diisodecyl adipate	NA	NA	NA		-	Yes
407	248-470-8	27458-93-1	Isooctadecan-1-ol	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	2 of 1,400	No uses in Denmark, applied in Sweden	Yes
408	248-660-0	27794-93-0	[nitrilotris(methylene)]trisphosphonic acid, potassium salt	NA	NA	NA		-	No
409	248-704-9	27871-49-4	Methyl (S)-(-)-lactate	H319 (Causes serious eye irritation) H335 (May cause respiratory irritation)	NA	NA		-	No
410	248-908-8	106185-75-5, 28219-61-6	2-ethyl-4-(2,2,3-trimethyl-3-cyclopenten-1-yl)-2-buten-1-ol	NA	NA	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	1,109 of 1,109 195 of 1,109 1 of 1,109	28219-61-6: 0t/34prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						H411 (Toxic to aquatic life with long lasting effects)			
411	249-047-0	28473-19-0	Diisodecyl sebacate	NA	NA	NA		-	No
412	249-559-4	29329-71-3	(1-hydroxyethylidene)bisphosphonic acid, sodium salt	NA	NA	H410 (Very toxic to aquatic life with long lasting effects) H413 (May cause long lasting harmful effects to aquatic life)	94 of 246 35 of 246	0.4t/15 prep.	No
413	249-862-1	29806-73-3	2-ethylhexyl palmitate	NA	NA	NA		-	No
414	249-951-5	29911-28-2	1-(2-butoxy-1-methylethoxy)propan-2-ol	NA	NA	NA		-	Yes
415	249-978-2	29964-84-9	Isodecyl methacrylate	NA	NA	H317 (May cause an allergic skin reaction) H410 (Very toxic to aquatic life with long lasting effects)	32 of 686 7 of 686	0.2t/10 prep	No
416	250-480-2	31138-65-5	Sodium glucoheptonate	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
417	250-575-9	31335-74-7	2,2-dimethyl-1,3-propanediyl dioctanoate	NA	NA	NA		-	No
418	250-705-4	31566-31-1	Stearic acid, monoester with glycerol	NA	NA	NA		-	No
419	250-954-9	32210-23-4	4-tert-butylcyclohexyl acetate	NA	NA	H411 (Toxic to aquatic life with long lasting effects) H317 (May cause an allergic skin reaction)	1,531 of 1,680 91 of 1,680	0.4t/193 prep.	Yes
420	251-020-3	32388-55-9	[3R-(3α,3aβ,7β,8aα)]-1-(2,3,4,7,8,8a-hexahydro-3,6,8,8-tetramethyl-1H-3a,7-methanoazulen-5-yl)ethan-1-one	NA	NA	H317 (May cause an allergic skin reaction) H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	987 of 1,111 1,014 of 1,111 1,083 of 1,111	0t/93 prep.	Yes
421	251-649-3	33704-61-9	1,2,3,5,6,7-hexahydro-1,1,2,3,3-pentamethyl-4H-inden-4-one	NA	NA	H411 (Toxic to aquatic life with long lasting effects) H317 (May cause an allergic skin reaction)	940 of 944 101 of 944	Yes, confidential	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
422	251-908-0	34274-28-7	[nitrilotris(methylene)]trisphosphonic acid, ammonium salt	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	11 of 14	No uses in Denmark, applied in Sweden	No
423	251-932-1	34316-64-8	Hexyl laurate	NA	NA	NA		-	No
424	252-104-2	34590-94-8	(2-methoxymethylethoxy)propanol	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	19 of 2,915	513.3t/1,261 prep.	Yes
425	252-156-6	34690-00-1	[[(phosphonomethyl)imino]bis[hexamethylenenitrilobis(methylene)]]tetrakisphosphonic acid	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	1 of 40	NO uses in Denmark, applied in Norway and Sweden	No
426	2-862-4	36078-10-1	Dodecyl oleate	NA	NA	NA		-	No
427	253-149-0	36653-82-4	Hexadecan-1-ol	NA	NA	H400 (toxic to aquatic life) H412 (Harmful to aquatic life with long lasting effects) H413 (May cause long lasting harmful effects to	516 of 1,816 28 of 1,816 1 of 1,816	1.2t/88 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						aquatic life)			
428	253-425-0	37247-91-9	Calcium magnesium oxide	NA	NA	NA		-	No
429	254-135-7	38820-59-6	[hexane-1,6-diylbis[nitrilobis(methylene)]]tetrakisphosphonic acid, potassium salt	NA	NA	NA		-	No
430	254-384-1	39255-32-8	Ethyl 2-methylvalerate	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	1 of 1,118	0t/12 prep.	Yes
431	255-713-1	42222-50-4	2,2-dimethyl-1,3-propanediyl dioleate	NA	NA	NA		-	No
432	257-036-7	51181-50-1	Sodium [N-[2-[bis(carboxymethyl)amino]ethyl]-N-(2-hydroxyethyl)glycinato(4-)]ferrate(1-)	NA	NA	NA		-	No
433	257-098-5	51274-00-1	iron hydroxide oxide yellow	NA	NA	NA		-	No
434	257-288-8	51566-62-2	3,7-dimethyloct-6-enenitrile	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	894 of 1,147	0t/37 prep.	Yes
435	257-467-0	51839-25-9	Carbonic acid, zinc salt, basic	NA	NA	H400 (toxic to aquatic life)	45 of 45 18 of 45	No uses in Denmark, applied in	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						H411 (Toxic to aquatic life with long lasting effects)		Finland and Sweden	
436	257-573-7	51981-21-6	Tetrasodium N,N-bis(carboxylatomethyl)-L-glutamate	NA	NA	NA		-	No
437	258-054-8	52628-25-8	Ammonium zinc chloride	NA	NA	H410 (Very toxic to aquatic life with long lasting effects)	3 of 3	No uses in Denmark, applied in Finland and Sweden	No
438	258-476-2	53320-86-8	Silicic acid, lithium magnesium sodium salt	NA	NA	NA		-	No
439	259-423-6	54982-83-1	1,4-dioxacyclohexadecane-5,16-dione	NA	NA	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	1,032 of 1,060 120 of 1,060 50 of 1,060	No uses in Denmark, applied in Norway and Sweden	Yes
440	259-461-3	55066-48-3	3-methyl-5-phenylpentanol	NA	NA	NA		-	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
441	259-910-3	55934-93-5	[(butoxymethylethoxy)methylethoxy]propan-1-ol	NA	NA	NA		-	No
442	261-235-4	58398-71-3	Calcium magnesium dihydroxide oxide	NA	NA	NA		-	No
443	261-385-0	58670-89-6	2-decyltetradecanol	NA	NA	NA		-	No
444	261-605-5	59113-36-9	Oxybispropanediol	NA	NA	NA		-	No
445	263-061-4	61789-45-5	Fatty acids, dehydrated castor-oil	NA	NA	NA		-	No
446	263-142-4	61790-50-9	Resin acids and Rosin acids, potassium salts	NA	NA	H317 (May cause an allergic skin reaction) H400 (toxic to aquatic life) H411 (Toxic to aquatic life with long lasting effects)	93 of 346 28 of 346 2 of 346	Yes, confidential	No
447	263-144-5	61790-51-0	Resin acids and Rosin acids, sodium salts	NA	NA	H317 (May cause an allergic skin reaction) H334 (May cause allergy or asthma symptoms or breathing difficulties if inhaled) H411 (Toxic to aquatic life	52 of 299 8 of 299	7.4t/31 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						with long lasting effects)	8 of 299		
448	263-174-9	61791-42-2	Ethanesulfonic acid, 2-(methylamino)-, N-coco acyl derivs., sodium salts	NA	NA	NA		-	No
449	263-212-4	61792-09-4	Pentasodium pentahydrogen [[(phosphonatomethyl)imino]bis[ethane-2,1-diylnitrilobis(methylene)]]tetrakisphosphonate	NA	NA	NA		-	No
450	263-214-5	61792-11-8	3,7-dimethylnona-2,6-dienenitrile	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	73 of 973	0t/6 prep.	Yes
451	263-423-1	62125-22-8	2,2-bis[[(1-oxoisooctadecyl)oxy]methyl]-1,3-propanediyl bis(isooctadecanoate)	NA	NA	NA		-	No
452	264-038-1	63231-60-7	Paraffin waxes and Hydrocarbon waxes, microcryst.	NA	NA	NA		-	No
453	264-119-1	63393-93-1	Fatty acids, lanolin, iso-Pr esters	NA	NA	H413 (May cause long lasting harmful effects to aquatic life)	359 of 370	No uses in Denmark, applied in Sweden	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
454	264-848-5	64365-17-9	Resin acids and Rosin acids, hydrogenated, esters with pentaerythritol	NA	NA	NA		-	No
455	265-043-1	64741-43-1	Gas oils (petroleum), straight-run	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	261 of 293	Yes, confidential	No
456	265-044-7	64741-44-2	Distillates (petroleum), straight-run middle	NA	NA	H361 (Suspected of damaging fertility or the unborn child) H411 (Toxic to aquatic life with long lasting effects) H413 (May cause long lasting harmful effects to aquatic life)	50 of 1,004 81 of 1,004 93 of 1,004	0t/6 prep.	No
457	265-144-0	64742-42-3	Hydrocarbon waxes (petroleum), clay-treated microcryst.	NA	NA	H317 (May cause an allergic skin reaction)	1 of 178	17.2t/29 prep.	No
458	265-145-6	64742-43-4	Paraffin waxes (petroleum), clay-treated	NA	NA	H413 (May cause long lasting harmful effects to aquatic life)	93 of 621	0.4t/35 prep.	No
459	265-154-5	64742-51-4	Paraffin waxes (petroleum), hydrotreated	NA	NA	H H413 (May cause long lasting harmful effects to	48 of 498	3.6t/55 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						aquatic life)			
460	265-163-4	64742-60-5	Hydrocarbon waxes (petroleum), hydrotreated microcryst.	NA	NA	NA		-	No
461	265-165-5	64742-61-6	Slack wax (petroleum)	H350 (May cause cancer)	NA	H361 (Suspected of damaging fertility or the unborn child) H413 (May cause long lasting harmful effects to aquatic life)	357 of 999 59 of 999	1.6t/28 prep.	No
462	265-206-7	64743-01-7	Petrolatum (petroleum), oxidized	H350 (May cause cancer)	NA	H412 (Harmful to aquatic life with long lasting effects) H361 (Suspected of damaging fertility or the unborn child)	357 of 534 2 of 534	6.3/37 prep.	No
463	265-232-9	64771-71-7	Paraffins (petroleum), normal C>10	NA	NA	H413 (May cause long lasting harmful effects to aquatic life)	93 of 627	19.5t/19 prep.	No
464	265-745-8	65405-77-8	(Z)-3-hexenyl salicylate	NA	NA	H317 (May cause an allergic skin reaction) H410 (Very toxic to	857 of 1,049	0t/8 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	944 of 1,049 87 of 1,049		
465	266-041-3	65997-06-0	Rosin, hydrogenated	NA	NA	H411 (Toxic to aquatic life with long lasting effects) H317 (May cause an allergic skin reaction)	7 of 583 3 of 583	512.9t/206 prep.	Yes
466	266-042-9	65997-13-9	Resin acids and Rosin acids, hydrogenated, esters with glycerol	NA	NA	H413 (May cause long lasting harmful effects to aquatic life)	6 of 210	1.1t/23 prep.	No
467	266-100-3	66068-84-6	4-(5,5,6-trimethylbicyclo[2.2.1]hept-2-yl)cyclohexan-1-ol	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	23 of 230	No uses in Denmark, applied in Norway and Sweden	Yes
468	266-925-9	67701-01-3	Fatty acids, C12-18	NA	NA	NA		-	No
469	266-928-5	67701-03-5	Fatty acids, C16-18	NA	NA	NA		-	No
470	266-929-0	67701-05-7	Fatty acids, C8-18 and C18-unsatd.	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
471	266-930-6	67701-06-8	Fatty acids, C14-18 and C16-18-unsatd.	NA	NA	NA		-	No
472	266-944-2	67701-26-2	Glycerides, C12-18	NA	NA	NA		-	No
473	266-945-8	67701-27-3	Glycerides, C14-18	NA	NA	NA		-	No
474	266-946-3	67701-28-4	Glycerides, C8-18 and C18-unsatd.	NA	NA	NA		-	No
475	266-952-6	67701-33-1	Glycerides, C14-18 mono- and di-	NA	NA	NA		-	No
476	267-007-0	67762-26-9	Fatty acids, C14-18 and C16-18-unsatd., Me esters	NA	NA	NA		-	No
477	267-015-4	67762-38-3	Fatty acids, C16-18 and C18-unsatd., Me esters	NA	NA	NA		-	Yes
478	267-021-7	67762-52-1	Fatty acids, C5-9, hexaesters with dipentaerythritol	NA	NA	NA		-	No
479	267-022-2	67762-53-2	Fatty acids, C5-9, tetraesters with pentaerythritol	NA	NA	NA		-	No
480	267-051-0	67774-74-7	Benzene, C10-13-alkyl derivs.	NA	NA	H400 (toxic to aquatic life) H413 (May cause long lasting harmful effects to	51 of 1,435 28 of 1,435	2.4t/51 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						aquatic life)			
481	267-057-3	67784-87-6	Glycerides, palm-oil mono- and di-, hydrogenated	NA	NA	NA		-	No
482	267-140-4	67801-20-1	3-methyl-5-(2,2,3-trimethyl-3-cyclopenten-1-yl)pent-4-en-2-ol	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	788 of 946	Yes, confidential	Yes
483	267-956-0	67953-76-8	(1-hydroxyethylidene)bisphosphonic acid, potassium salt	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	357 of 438	0.4t/4 prep.	No
484	268-083-8	68002-70-0	Glycerides, C16-22	NA	NA	NA		-	No
485	268-084-3	68002-71-1	Glycerides, C16-18	NA	NA	NA		-	No
486	268-092-7	68002-78-8	Fatty acids, C16-18 and C18 unsatd., triesters with trimethylolpropane	NA	NA	NA		-	No
487	268-093-2	68002-79-9	Fatty acids, C14-18 and C16-18 unsatd., triesters with trimethylolpropane	NA	NA	NA		-	No
488	268-500-3	68109-88-6	Ethyl 9,9-dioctyl-4,7,11-trioxo-3,8,10-trioxa-9-stannatetradeca-5,12-dien-14-oate	NA	NA	H361 (Suspected of damaging fertility or the unborn child) H413 (May cause long lasting harmful effects to	6 of 6	-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						aquatic life)	4 of 6		
489	268-626-9	68131-73-7	Amines, polyethylenepoly-	H302 (Harmful if swallowed) H312 (Harmful in contact with skin) H314 (Causes severe skin burns and eye damage) H317 (May cause an allergic skin reaction)	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	H317 (May cause an allergic H334 (May cause allergy or asthma symptoms or breathing difficulties if inhaled) H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	837 of 837 437 of 837 837 of 837 837 of 837	0t/4 prep	No
490	268-884-2	68153-38-8	Resin acids and Rosin acids, esters with diethylene glycol	NA	NA	H413 (May cause long lasting harmful effects to aquatic life)	1 of 11	Yes, confidential	No
491	269-023-3	68171-33-5	Isopropyl isodecanoate	NA	NA	NA		-	No
492	269-035-9	68186-14-1	Resin acids and Rosin acids, Me esters	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	2 of 222	Yes, confidential	Yes
493	269-056-3	68186-94-7	manganese ferrite black spinel	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
494	269-103-8	68187-51-9	zinc ferrite brown spinel	NA	NA	NA		-	No
495	269-825-3	68334-35-0	Resin acids and Rosin acids, calcium zinc salts	NA	NA	NA		-	No
496	270-115-0	68411-30-3	Benzenesulfonic acid, C10-13-alkyl derivs., sodium salts	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	159 of 1,145	8.4t/86 prep.	No
497	270-232-7	68413-60-5	Diammonium [[N,N'-ethylenebis[N-(carboxymethyl)glycinato]](4-)-N,N',O,O',ON,ON']hydroxyferrate(2-)	NA	NA	NA		-	No
498	270-279-3	68424-19-1	Fatty acids, C16-18 and C18-unsatd., compds. with triethanolamine	NA	NA	NA		-	No
499	270-291-9	68424-31-7	Fatty acids, C5-10, esters with pentaerythritol	NA	NA	NA		-	No
500	270-337-8	68425-17-2	Syrups, corn, hydrogenated	NA	NA	NA		-	No
501	270-434-5	68440-09-5	Fatty acids, lanolin, esters with pentaerythritol	NA	NA	NA		-	No
502	270-700-0	68476-80-2	Oils, vegetable, deodorizer distillates	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
503	271-347-5	68541-50-4	2-ethyl-2-[[(1-oxoisooctadecyl)oxy]methyl]-1,3-propanediyl bis(isooctadecanoate)	NA	NA	NA		-	No
504	271-366-9	68551-17-7	Alkanes, C10-13-iso-	NA	NA	H413 (May cause long lasting harmful effects to aquatic life)	845 of 1,026	2.6t/19 prep.	Yes
505	271-516-3	68583-51-7	Decanoic acid, mixed diesters with octanoic acid and propylene glycol	NA	NA	NA		-	No
506	271-689-5	68604-38-6	Fatty acids, C16-18 and C18-unsatd., hexaesters with dipentaerythritol	NA	NA	NA		-	No
507	271-694-2	68604-44-4	Fatty acids, C16-18 and C18-unsatd., tetraesters with pentaerythritol	NA	NA	NA		-	No
508	271-729-1	68606-18-8	Glycerides, mixed coco, decanoyl and octanoyl	NA	NA	NA		-	No
509	271-996-4	68648-53-3	Resin acids and Rosin acids, hydrogenated, esters with triethylene glycol	NA	NA	NA		-	Yes
510	272-341-5	68814-87-9	Distillates (petroleum), full-range straight-run middle	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	308 of 308	No uses in Denmark, applied in Finland and	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
								Sweden	
511	272-469-1	68855-18-5	Heptanoic acid, ester with 2,2-dimethyl-1,3-propanediol	NA	NA	NA		-	No
512	272-805-7	68912-13-0	3a,4,5,6,7,7a-hexahydro-4,7-methano-1H-indenyl propionate	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	268 of 268	0t/5 prep.	Yes
513	272-817-2	68915-96-8	Distillates (petroleum), heavy straight-run	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	378 of 378	No uses in Denmark, applied in Norway and Sweden	No
514	272-818-8	68915-97-9	Gas oils (petroleum), straight-run, high-boiling	No results found	No results found	No results found		-	No
515	273-086-2	68937-75-7	Fatty acids, C8-10	NA	NA	NA		-	No
516	273-195-5	68953-27-5	Fatty acids, sunflower-oil, conjugated	NA	NA	NA		-	No
517	273-606-8	68990-52-3	Fatty acids, vegetable-oil, Me esters	NA	NA	NA		-	No
518	274-307-5	70084-85-4	Fatty acids, hydrogenated tallow, distn. residues	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
519	274-581-6	70356-09-1	1-[4-(1,1-dimethylethyl)phenyl]-3-(4-methoxyphenyl)propane-1,3-dione	NA	NA	H400 (toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects) H413 (May cause long lasting harmful effects to aquatic life)	1,139 of 1,215 29 of 1,215 23 of 1,215 23 of 1,215 19 of 1,215	Yes, confidential	Yes
520	274-764-0	70693-32-2	Decanoic acid, mixed esters with neopentyl glycol and octanoic acid	NA	NA	NA		-	No
521	274-798-6	70714-66-8	[[(phosphonomethyl)imino]bis[ethylenenitrilobis(methylene)]]tetrakisphosphonic acid, ammonium salt	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	8 of 38	Not applied in Denmark and the Nordic Countries	No
522	275-093-6	70983-72-1	Fatty acids, C5-10, esters with dipentaerythritol	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
523	275-118-0	71010-76-9	Decanoic acid, mixed esters with heptanoic acid, octanoic acid, pentaerythritol and valeric acid	NA	NA	NA		-	No
524	275-156-8	71048-82-3	[1α(E),2β]-1-(2,6,6-trimethylcyclohex-3-en-1-yl)but-2-en-1-one	NA	NA	H317 (May cause an allergic skin reaction) H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	96 of 96 37 of 96 95 of 96	No uses in Denmark applied in Norway	Yes
525	276-171-2	71902-01-7	Sorbitan, isooctadecanoate	NA	NA	NA		-	No
526	276-594-2	72361-35-4	Triisotridecyl benzene-1,2,4-tricarboxylate	NA	NA	H413 (May cause long lasting harmful effects to aquatic life)	1 of 385	ot /5 prep.	No
527	276-719-0	72576-80-8	Isooctadecyl palmitate	NA	NA	NA		-	No
528	277-452-2	73398-61-5	Glycerides, mixed decanoyl and octanoyl	NA	NA	NA		-	Yes
529	278-012-2	74869-22-0	Lubricating oils	H350 (May cause cancer)	NA	H350 (May cause cancer) H361 (Suspected of damaging fertility or the	489 of 1,120	2,015.3 t/126 prep.	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						unborn child) H413 (May cause long lasting harmful effects to aquatic life)	134 of 1,120 1 of 1,120		
530	278-306-0	75782-86-4	Alcohols, C12-13	NA	NA	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	835 of 835 746 of 835 2 of 835	No uses in Denmark, applied in Finland and Sweden	No
531	278-717-5	77538-19-3	Docosanoic acid, ester with 1,2,3-propanetriol	NA	NA	NA		-	No
532	279-815-0	81782-77-6	4-methyl-3-decen-5-ol	NA	NA	H400 (Very toxic to aquatic life)	42 of 953	Yes, Confidential	Yes
533	281-192-5	83897-84-1	Dolomite ($CaMg(CO_3)_2$), calcined	NA	NA	NA		-	
534	282-013-3	84082-68-8, 8008-45-5	Myristica fragrans, ext.	NA	NA	**84082-68-8:** H317 (May cause an allergic skin reaction)	901 of 931	ot / 4 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						H341 (Suspected of causing genetic defects) H350 (May cause cancer) H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects) **8008-45-5:** H317 (May cause an allergic skin reaction) H341 (Suspected of causing genetic defects) H350 (May cause cancer) H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life	897 of 931 896 of 931 856 of 931 888 of 931 12 of 931 68 of 153 6 of 153 69 of 153 65 of 153 65 of 153 3 of 153	ot / 5 prep.	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						with long lasting effects)			
535	282-015-4	84082-70-2	Peppermint, ext.	NA	NA	H317 (May cause an allergic skin reaction) H334 (May cause allergy or asthma symptoms or breathing difficulties if inhaled) H402 (Harmful to aquatic life) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	267 of 1,091 2 of 1,091 8 of 1,091 135 of 1,091 795 of 1,091	0 t /7 prep.	Yes
536	282-775-7	84418-63-3	Isononanoic acid, mixed esters with dipentaerythritol, heptanoic acid and pentaerythritol	NA	NA	NA		-	No
537	283-406-2	84625-32-1	Eucalyptus globulus, ext.	NA	NA	H317 (May cause an allergic skin reaction) H400 (Very toxic to aquatic life) H411 (Toxic to aquatic life	1,146 of 1,215 1 of 1,215	1.8t/ 76 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						with long lasting effects)	1,016 of 1,215		
538	283-479-0	84649-98-9	Cinnamomum zeylanicum, ext.	NA	NA	H317 (May cause an allergic skin reaction) H334 (May cause allergy or asthma symptoms or breathing difficulties if inhaled) H341 (Suspected of causing genetic defects) H350 (May cause cancer) H400 (Very toxic to aquatic life) H402 (Harmful to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	914 of 945 1 of 945 609 of 945 606 of 945 1 of 945 1 of 945 4 of 945 1 of 945 660 of 945	Yes, confidential	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
539	283-480-6	84649-99-0	Cocoa, ext.	NA	NA	NA		-	Yes
540	284-362-7	84852-49-3	[[(phosphonomethyl)imino]bis[ethylenenitrilobis(methylene)]]tetrakisphosphonic acid, potassium salt	NA	NA	NA		-	No
541	284-366-9	84852-53-9	1,1'-(ethane-1,2-diyl)bis[pentabromobenzene]	NA	NA	H413 (May cause long lasting harmful effects to aquatic life)	358 of 497	No uses in Denmark, applied in Norway and Sweden	No
542	284-515-8	84929-31-7	Lemon, ext.	NA	NA	H317 (May cause an allergic skin reaction) H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	1,205 of 1,235 893 of 1,235 1,073 of 1,235 1 of 1,235	1.2t/ 39 prep.	Yes
543	284-660-7	84961-70-6	Benzene, mono-C10-13-alkyl derivs., distn. residues	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
544	284-664-9	84961-74-0	Benzenesulfonic acid, 4-C10-13-sec-alkyl derivs., compds. with 2-propanamine	NA	NA	NA		-	No
545	284-863-0	84988-74-9	Fatty acids, C16-18 and C18-unsatd., Bu esters	NA	NA	NA		-	No
546	284-864-6	84988-75-0	Fatty acids, C14-18 and C16-18-unsatd., esters with propylene glycol	NA	NA	NA		-	No
547	284-868-8	84988-79-4	Fatty acids, C16-18 and C18-unsatd., iso-Bu esters	NA	NA	NA		-	No
548	284-957-1	85005-25-0	Fatty acids, C14-18 and C18-unsatd., branched and linear, esters with neopentyl glycol	NA	NA	NA		-	No
549	285-202-9	85049-33-8	Fatty acids, C8-18 and C18-unsatd., esters with pentaerythritol	NA	NA	NA		-	No
550	285-207-6	85049-37-2	Fatty acids, C16-18 and C18-unsatd., 2-ethylhexyl esters	NA	NA	NA		-	No
551	285-533-9	85116-81-0	Fatty acids, C14-18 and C16-18-unsatd., esters with neopentyl glycol	NA	NA	NA		-	No
552	285-541-2	85116-88-7	Fatty acids, C14-18 and C16-18-	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
			unsatd., isotridecyl esters						
553	285-561-1	85117-09-5	Lime (chemical), hydraulic	NA	NA	NA		-	No
554	286-072-6	85186-86-3	Fatty acids, C8-18 and C18-unsatd., esters with neopentyl glycol	NA	NA	NA		-	No
555	286-072-6	85186-86-3	Fatty acids, C8-18 and C18-unsatd., esters with neopentyl glycol	NA	NA	NA		-	No
556	286-075-2	85186-89-6	Fatty acids, C8-18 and C18-unsatd., esters with trimethylolpropane	NA	NA	NA		-	No
557	286-078-9	85186-92-1	Fatty acids, C14-18 and C16-18-unsatd., mixed esters with neopentyl glycol and trimethylolpropane	NA	NA	NA		-	No
558	286-081-5	85186-95-4	Fatty acids, C12-16, esters with neopentyl glycol	NA	NA	NA		-	No
559	286-490-9	85251-77-0	Glycerides, C16-18 mono- and di-	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	2 of 134	Yes, confidential	No
560	287-039-9	85408-76-0	Fatty acids, C16-18, Bu esters	NA	NA	NA		-	No
561	287-370-9	85480-89-3	[ethylenebis[nitrilobis(methylene)]]tetrakisphosphonic acid, calcium	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
			sodium salt						
562	287-487-5	85536-06-7	Glycerides, C8-18	NA	NA	NA		-	No
563	287-488-0	85536-07-8	Glycerides, C8-10 mono- and di-	NA	NA	NA		-	No
564	287-494-3	85536-14-7	Benzenesulfonic acid, 4-C10-13-sec-alkyl derivs.	NA	NA	H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	93 of 503 138 of 503	22.4t/113 prep.	No
565	287-636-4	85566-26-3	Fatty acids, C8-10, Me esters	NA	NA	NA		-	No
566	287-640-6	85566-29-6	Fatty acids, coco, triesters with trimethylolpropane	NA	NA	NA		-	No
567	287-824-6	85586-21-6	Fatty acids, C16-18, Me esters	NA	NA	NA		-	No
568	287-827-2	85586-24-9	Fatty acids, C8-10, tetraesters with pentaerythritol	NA	NA	NA		-	No
569	288-305-7	85711-45-1	Fatty acids, C16-18 and C18-unsatd., esters with pentaerythritol	NA	NA	NA		-	No
570	288-668-1	85865-69-6	Fatty acids, C16-18, iso-Bu esters	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
571	290-058-5	90063-97-1	Mentha arvensis, ext.	NA	NA	H317 (May cause an allergic skin reaction) H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects) H412 (Harmful to aquatic life with long lasting effects)	957 of 1,013 12 of 1,013 18 of 1,013 931 of 1,013 10 of 1,013	0.5t/21 prep.	Yes
572	291-169-1	90342-32-8	Decanol, branched and linear	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	1 of 1	-	No
573	292-334-0	90604-40-3	Alcohols, C12-15-branched and linear	NA	NA	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	10 of 10 3 of 10	No uses in Denmark applied in Finland and Sweden	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
574	292-587-7	90640-66-7	Amines, polyethylenepoly-, tetraethylenepentamine fraction	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	401 of 401 401 of 401	1.5t/ 11 prep.	No
575	292-588-2	90640-67-8	Amines, polyethylenepoly-, triethylenetetramine fraction	NA	NA	H317 (May cause an allergic skin reaction) H412 (Harmful to aquatic life with long lasting effects)	411 of 411 411 of 411	10.2t/16 prep.	No
576	292-660-3	90669-78-6	Slack wax (petroleum), clay-treated	H350 (May cause cancer)	NA	H350 (May cause cancer) H361 (Suspected of damaging fertility or the unborn child)	13 of 20 5 of 20	Not applied in Denmark and the Nordic countries	No
577	292-769-6	90990-08-2	Fatty acids, C8-18	NA	NA	NA		-	No
578	292-772-2	90990-11-7	Fatty acids, C18-22	NA	NA	NA		-	No
579	292-832-8	91001-61-5	Fatty acids, C16-18 and C18-unsatd., mixed esters with adipic acid and trimethylolpropane	NA	NA	NA		-	No
580	292-927-4	91031-27-5	Fatty acids, C6-18, 2,2-dimethyl-1,3-propanediyl esters	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
581	292-932-1	91031-31-1	Fatty acids, C16-18, esters with ethylene glycol	NA	NA	NA		-	No
582	292-947-3	91031-45-7	Fatty acids, C16-18, 1,2-ethanediylbis(oxy-2,1-ethanediyl) esters	NA	NA	NA		-	No
583	292-951-5	91031-48-0	Fatty acids, C16-18, 2-ethylhexyl esters	NA	NA	NA		-	No
584	292-997-6	91031-91-3	Fatty acids, coco, isotridecyl esters	NA	NA	NA		-	No
585	293-026-9	91050-80-5	Fatty acids, C16-18, tetraesters with 3,3'-oxybis[1,2-propanediol]	NA	NA	NA		-	No
586	293-029-5	91050-82-7	Fatty acids, C16-18, tetraesters with pentaerythritol	NA	NA	NA		-	No
587	293-035-8	91050-88-3	Fatty acids, C6-18, triesters with trimethylolpropane	NA	NA	NA		-	No
588	293-187-5	91052-28-7	Glycerides, C14-18 and C16-18-unsatd. mono-, di- and tri-	NA	NA	NA		-	No
589	293-208-8	91052-47-0	Glycerides, C16-18 mono-	NA	NA	NA		-	No
590	293-209-3	91052-49-2	Glycerides, C12-18 mono- and di-	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
591	293-215-6	91052-54-9	Glycerides, C16-18 mono-, di- and tri-	NA	NA	NA		-	No
592	293-659-0	91081-53-7	Rosin, reaction products with formaldehyde	NA	NA	NA		-	No
593	294-571-5	91744-09-1	Glycerides, C16-18 and C18-unsatd. mono-	NA	NA	NA		-	No
594	294-582-5	91744-20-6	Glycerides, C16-18 and C18-unsatd. mono-, di and tri-	NA	NA	NA		-	No
595	294-590-9	91744-28-4	Glycerides, C12-18 di- and tri-	NA	NA	NA		-	No
596	294-600-1	91744-38-6	Glycerides, C16-18 mono-, di- and tri-, hydrogenated, citrates, potassium salts	NA	NA	NA		-	No
597	295-118-4	91844-53-0	Sorbitan, octanoate (2:3)	NA	NA	NA		-	No
598	295-366-3	92044-87-6	Fatty acids, coco, 2-ethylhexyl esters	NA	NA	NA		-	No
599	295-458-3	92045-76-6	Paraffin waxes and Hydrocarbon waxes, microcryst., hydrotreated	NA	NA	NA		-	No
600	295-459-9	92045-77-7	Petrolatum (petroleum), hydrotreated	H350 (May cause cancer)	NA	H350 (May cause cancer) H361 (Suspected of	4 of 8 2 of 8	Yes, confidential	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						damaging fertility or the unborn child)			
601	295-523-6	92062-09-4	Slack wax (petroleum), hydrotreated	H350 (May cause cancer)	NA	H350 (May cause cancer) H361 (Suspected of damaging fertility or the unborn child)	68 of 122 25 of 122	110.7 t/40 prep.	No
602	295-855-1	92129-53-8	Resin acids and Rosin acids, reaction products with formaldehyde, potassium salt	NA	NA	NA		-	No
603	297-627-7	93685-79-1	Hydrocarbons, C4, 1,3-butadiene-free, polymd., pentaisobutylene fraction, hydrogenated	NA	NA	NA		-	No
604	297-628-2	93685-80-4, 4390-04-9	Hydrocarbons, C4, 1,3-butadiene-free, polymd., tetraisobutylene fraction, hydrogenated	NA	NA	NA		-	Yes
605	297-629-8	93685-81-5, 13475-82-6	Hydrocarbons, C4, 1,3-butadiene-free, polymd., triisobutylene fraction, hydrogenated	NA NA	NA NA	H413 (May cause long lasting harmful effects to aquatic life) H410 (Very toxic to aquatic life with long	63 of 514 34 of 101	(cas :93685-81-5) 21.1t/19 prep (cas: 13475-82-6 5.9t/7 prep.)	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						lasting effects)			
606	298-361-4	93803-87-3	2-octyldodecyl isooctadecanoate	NA	NA	NA		-	No
607	298-364-0	93803-89-5	2,2-bis[[(1-oxoisononyl)oxy]methyl]-1,3-propanediyl diisononanoate	NA	NA	NA		-	No
608	303-553-9	94200-74-5	sodium 2-butyloctyl sulphate	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	2 of 2	-	No
609	304-780-6	94279-36-4	1,2,4-Benzenetricarboxylic acid, tri-C9-11-alkyl esters	NA	NA	NA		-	No
610	305-536-1	94624-12-1	Pentanol, branched and linear	NA	NA	NA		-	No
611	305-748-4	95009-22-6	Cocoa, powd., alkalized	NA	NA	NA		-	No
612	306-082-7	95912-86-0	Fatty acids, C8-10, C12-18-alkyl esters	NA	NA	NA		-	Yes
613	306-083-2	95912-87-1	Fatty acids, C16-18, C12-18-alkyl esters	NA	NA	NA		-	Yes
614	306-084-8	95912-88-2	Fatty acids, C16-18, isotridecyl esters	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
615	306-085-3	95912-89-3	Fatty acids, C8-10, mixed esters with adipic acid and trimethylolpropane	NA	NA	NA		-	No
616	306-232-1	96690-38-9	Fatty acids, C16-18, 2-octyldodecyl esters	NA	NA	NA		-	No
617	306-657-2	97358-80-0	Isooctadecanoic acid, mono- and diesters with glycerol	NA	NA	NA		-	No
618	306-797-4	97404-33-6	Fatty acids, C16-18, C16-18-alkyl esters	NA	NA	NA		-	No
619	307-751-6	97722-02-6	Glycerides, tall-oil mono-, di-, and tri-	NA	NA	H413 (May cause long lasting harmful effects to aquatic life)	2 of 134	-	No
620	308-551-1	98072-94-7	Ilmenite (FeTiO3), conc.	NA	NA	NA		-	No
621	309-706-6	100684-33-1	Petrolatum (petroleum), clay-treated	H350 (May cause cancer)	NA	H350 (May cause cancer) H361 (Suspected of damaging fertility or the unborn child)	454 of 455 1 of 455	0.4t/8 prep	No
622	309-832-1	101227-09-2	Fatty acids, C16-18, 2-hexyldecyl esters	NA	NA	NA	NA	-	No
623	400-410-3	25485-88-5	cyclohexyl 2-hydroxybenzoate	NA	NA	H400 (Very toxic to	8 of 106	0t/30 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	8 of 106 98 of 106		
624	402-770-7	92585-24-5	2-methyl-4-phenylpentanol	H317 (May cause an allergic skin reaction)	H411 (Toxic to aquatic life with long lasting effects)	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	197 of 198 198 of 198	NA	Yes
625	403-080-9	92484-48-5	sodium 3-(2H-benzotriazol-2-yl)-5-sec-butyl-4-hydroxybenzenesulfonate	H318 (Causes serious eye damage)	NA	H412 (Harmful to aquatic life with long lasting effects)	94 of 128	No uses in Denmark, applied in Sweden and Norway	Yes
626	403-140-4	103694-68-4	3-(2,2-dimethyl-3-hydroxypropyl)toluene	NA	H412 (Harmful to aquatic life with long lasting effects)	H412 (Harmful to aquatic life with long lasting effects)	862 of 862	0t/ 5 prep.	Yes
627	403-610-9	NA	[Name not available]	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	30 of 30	-	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
628	404-290-3	7216-95-7	Pentapotassium 2-[2-[2-(bis(carboxylatomethyl)amino)ethyl-(carboxylatomethyl)amino]ethyl-(carboxylatomethyl)amino]acetate	NA	NA	NA	NA	-	No
629	405-040-6	63500-71-0	A mixture of: cis-tetrahydro-2-isobutyl-4-methylpyran-4-ol; trans-tetrahydro-2-isobutyl-4-methylpyran-4-ol	H319 (Causes serious eye irritation)	NA	NA		NA	Yes
630	406-880-6	NA	A mixture of RR and RS isomers of: (2-(2-methoxy-1-methyl)ethoxy)-1-methylethyl acetate; (2-(2-methoxy-2-methyl)ethoxy)-1-methylethyl acetate; (2-(2-methoxy-2-methyl)ethoxy)-2-methylethyl acetate; (2-(2-methoxy-1-methyl)ethoxy)-2-methylethyl acetate	NA	NA	NA	NA	-	
631	407-870-4	97384-48-0	2-benzyl-2-methyl-3-butenitrile	H302 (Harmful if swallowed)	H412 (Harmful to aquatic life with long lasting effects)	H412 (Harmful to aquatic life with long lasting effects)	953 of 953	NA	Yes
632	411-580-3	107898-54-4	(+/-) trans-3,3-dimethyl-5-(2,2,3-trimethyl-cyclopent-3-en-1-yl)pent-4-en-2-ol	H315 (Causes skin irritation)	H400 (Very toxic to aquatic life) H410 (Very toxic to	H400 (Very toxic to aquatic life) H410 (Very toxic to	976 of 984	Yes, confidential	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
					aquatic life with long lasting effects)	aquatic life with long lasting effects)	984 of 984		
633	411-580-3	107898-54-4	(+/-) trans-3,3-dimethyl-5-(2,2,3-trimethyl-cyclopent-3-en-1-yl)pent-4-en-2-ol	NA	NA	NA	NA	-	Yes
634	412-050-4	125109-85-5	β-methyl-3-(1-methylethyl)benzenepropanal	NA	H411 (Toxic to aquatic life with long lasting effects)	H411 (Toxic to aquatic life with long lasting effects)	1,018 of 1,018	No uses in Denmark, applied in Finland, Sweden and Norway	yes
635	412-280-5	2511-00-4	ethyl 2-cyclohexylpropionate	NA	H411 (Toxic to aquatic life with long lasting effects)	H411 (Toxic to aquatic life with long lasting effects)	822 of 822	NA	Yes
636	412-450-9	131766-73-9	A mixture of: trans-4-acetoxy-4-methyl-2-propyl-tetrahydro-2H-pyran; cis-4-acetoxy-4-methyl-2-propyl-tetrahydro-2H-pyran	H317 (May cause an allergic skin reaction)	NA	H317 (May cause an allergic skin reaction)	923 of 923	No uses in Denmark and the Nordic countries	Yes
637	413-800-3		A mixture of: N,N-di(hydrogenated alkyl C14-C18)phthalamic acid; dihydrogenated alkyl (C14-C18)amine	NA	H413 (May cause long lasting harmful effects to aquatic life)	H413 (May cause long lasting harmful effects to aquatic life)	2 of 3	NA	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
638	416-210-4	128119-70-0	Reaction mass of 2-methyl-3-{[(2R)-1,7,7-trimethylbicyclo[2.2.1]hept-2-yl]oxy}propan-1-ol and 2-methyl-3-{[(2S)-1,7,7-trimethylbicyclo[2.2.1]hept-2-yl]oxy}propan-1-ol	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	10 of 32	Not applied in Denmark and the Nordic Countries	Yes
639	416-530-4	178949-82-1	l-aspartic acid, N,N'-1,2-ethanediylbis-, trisodium salt	NA	NA	NA		-	No
640	417-060-2	151006-61-0	A mixture of isomers of branched tetracosane	H332 (Harmful if inhaled)	H413 (May cause long lasting harmful effects to aquatic life)	H413 (May cause long lasting harmful effects to aquatic life)	366 of 368	NA	No
641	417-310-0	72903-27-6	Diethyl 1,4-cyclohexanedicarboxylate	NA	H411 (Toxic to aquatic life with long lasting effects)	H411 (Toxic to aquatic life with long lasting effects)	563 of 563	NA	Yes
642	422-040-1	426218-78-2	A mixture of: 4-(2,2,3-trimethylcyclopent-3-en-1-yl)-1-methyl-2-oxabicyclo[2.2.2]octane; 1-(2,2,3-trimethylcyclopent-3-en-1-yl)-5-methyl-6-oxabicyclo[3.2.1]octane; spiro[cyclohex-3-en-1-yl-[(4,5,6,6a-tetrahydro-3,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]furan];	H315 (Causes skin irritation) H319 (Causes serious eye irritation)	H411 (Toxic to aquatic life with long lasting effects)	H411 (Toxic to aquatic life with long lasting effects) H413 (May cause long lasting harmful effects to aquatic life)	2 of 748 746 of 748	NA	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
			spiro[cyclohex-3-en-1-yl-[4,5,6,6a-tetrahydro-4,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]]furan]						
643	422-520-0	74338-72-0	2,4,4,7-tetramethyl-6-octen-3-one	H315 (Causes skin irritation)	H411 (Toxic to aquatic life with long lasting effects)	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	1 of 1,259 1,259 of 1,259	Yes, confidential	Yes
644	422-580-8	75490-39-0	2,2,4-trimethyl-4-phenyl-butane-nitrile	H302 (Harmful if swallowed)	H411 (Toxic to aquatic life with long lasting effects)	H411 (Toxic to aquatic life with long lasting effects)	141 of 141	No uses in Denmark and the Nordic countries	Yes
645	423-460-8	3508-98-3	2-phenylhexanenitrile	H302 (Harmful if swallowed)	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	162 of 162 162 of 162	Yes, confidential	Yes
646	423-740-1	10461-98-0	2-cyclohexylidene-2-phenylacetonitrile	H302 (Harmful if swallowed)	H411 (Toxic to aquatic life with long lasting effects)	H411 (Toxic to aquatic life with long lasting effects)	961 of 961	No uses in Denmark, applied in Norway and Sweden	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
647	425-200-9	188570-78-7	Cyclopropanecarboxylic acid, (3Z)-3-hexenyl ester	NA	NA	NA		-	Yes
648	427-090-8		A mixture of: ethyl (2R,3R)-3-isopropylbicyclo[2.2.1]hept-5-ene-2-carboxylate; ethyl (2S,3S)-3-isopropylbicyclo[2.2.1]hept-5-ene-2-carboxylate	H317 (May cause an allergic skin reaction)	H411 (Toxic to aquatic life with long lasting effects)	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	781 of 781 781 of 781	NA	No
649	429-750-0	180898-37-7	Disodium 2,2'-(1,4-Phenylene)bis-(1H-benzimidazole-4,6-disulfonic acid or monosulfonic acid, monosulfonate or disulfonate	NA	NA	NA		-	No
650	429-900-5		Muscenone Delta	H317 (May cause an allergic skin reaction)	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	H317 (May cause an allergic skin reaction) H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	111 of 111 82 of 111 111 of 111	NA	No
651	432-790-1		Perestane ®	H302 (Harmful if swallowed) H312 (Harmful in contact with skin)	NA	NA		NA	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
				H314 (Causes severe skin burns and eye damage) H332 (Harmful if inhaled) H371 (May cause damage to organs)					
652	438-390-3	NA	Alkane 6	NA	NA	NA		-	No
653	439-790-0	292605-05-1	(3Z)-hex-3-en-1-yl 2-methylprop-2-en-1-yl ether	NA	NA	NA		-	Yes
654	439-840-1	20846-91-7	N,N'-1,2-ethanediylbis-L-aspartic acid	NA	NA	NA		-	No
655	441-420-8	113889-23-9	Reaction mass of 3a, 4, 5, 6, 7, 7a-hexahydro-1H-4, 7-methanoinden-5-yl butyrate and 3a, 4, 5, 6, 7, 7a-hexahydro-1H-4, 7-methanoinden-6-yl butyrate	NA	NA	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	36 of 65 65 of 65	-	Yes
656	443-460-1	188199-50-0	Belambre	NA	NA	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long	36 of 36 36 of 36	-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						lasting effects)			
657	446-220-4	365411-50-3	Reaction mass of (4aR,8R,9bS)-7,7,8,9,9-pentamethyl-4,4a,5,6,7,8,9,9b-octahydroindeno[4,5-d][1,3]dioxine and (4aR,8S,9bS)-7,7,8,9,9-pentamethyl-4,4a,5,6,7,8,9,9b-octahydroindeno[4,5-d][1,3]dioxine	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	102 of 102 102 of 102	NA	Yes
658	460-490-0	477218-42-1	Serenolide	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	92 of 124 124 of 124	NA	Yes
659	468-180-7		Humulus scandens dry extract	NA	NA	NA		-	
660	482-220-0	848301-69-9	C18-C50 branched, cyclic and linear hydrocarbons – Distillates	NA	NA	NA		-	No
661	482-330-9	144020-22-4	Reaction products of acetic anhydride and 1,5,10-trimethyl-1,5,9-cyclodecatriene	NA	NA	H317 (May cause an allergic skin reaction) H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long	68 of 123 68 of 123 68 of 123	NA	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						lasting effects) H411 (Toxic to aquatic life with long lasting effects)	55 of 123		
662	482-330-9	144020-22-4	Reaction products of acetic anhydride and 1,5,10-trimethyl-1,5,9-cyclodecatriene					-	Yes
663	482-330-9	144020-22-4	Reaction products of acetic anhydride and 1,5,10-trimethyl-1,5,9-cyclodecatriene					-	Yes
664	482-330-9	144020-22-4	Reaction products of acetic anhydride and 1,5,10-trimethyl-1,5,9-cyclodecatriene					-	Yes
665	486-070-7		Perestane ®	NA	NA	NA		-	
666	500-018-3	9005-64-5	Sorbitan monolaurate, ethoxylated (1-6.5 moles ethoxylated)	NA	NA	H317 (May cause an allergic skin reaction) H412 (Harmful to aquatic life with long lasting effects)	93 of 1,119 2 of 1,119	82.3t/35 prep.	Yes
667	500-039-8	25322-69-4	propane-1,2-diol, propoxylated	NA	NA	H317 (May cause an allergic skin reaction)	21 of 1,592	1,106.9t/682 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						H334 (May cause allergy or asthma symptoms or breathing difficulties if inhaled) H351 (Suspected of causing cancer)	20 of 1,592 20 of 1,592		
668	500-163-2	65997-05-9	Oligomers of rosin	NA	NA	H317 (May cause an allergic skin reaction) H334 (May cause allergy or asthma symptoms or breathing difficulties if inhaled)	194 of 454 136 of 454	13.4t/76 prep.	No
669	500-183-1	68037-01-4	Dec-1-ene, homopolymer, hydrogenated	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	6 of 596	3,136.5t/216 prep.	No
670	500-220-1	68515-73-1	D-Glucopyranose, oligomeric, C8-10 glycosides	NA	NA	NA		-	No
671	500-228-5	68649-11-6	Dec-1-ene, dimers, hydrogenated	NA	NA	NA		-	No
672	500-295-0	106233-09-4	Alcohols, C16-18 (even numbered) ethoxylated, phosphates, mono- and diesters	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
673	500-393-3	157707-86-3	Dec-1-ene, trimers, hydrogenated	NA	NA	NA		-	No
674	600-975-8	110615-47-9	D-Glucopyranose, oligomeric, C10-16(even numbered) alkyl glycosides	NA	NA	H317 (May cause an allergic skin reaction)	1 of 686	21.9t/78 prep.	No
675	601-722-4	120570-77-6	2,2'-oxybis-ethanol diformate	NA	NA	NA		-	No
676	602-769-3	122397-96-0	2-Ethoxy-4-formylphenyl β-D-glucopyranoside	NA	NA	H317 (May cause an allergic skin reaction)	1 of 66	NA	No
677	603-309-4	128973-77-3	Undecanol, branched and linear	NA	NA	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	48 of 48 47 of 48 1 of 48	NA	No
678	604-250-7	141773-73-1	Reaction mass of (1S,1'R)-2-[1-(3',3'-dimethyl-1'-cyclohexyl)ethoxy]-2-methylpropyl propanoate, (1R,1'R)-2-[1-(3',3'-dimethyl-1'-cyclohexyl)ethoxy]-2-methylpropyl propanoate and 2-methyl-2-{[(1R*,2R*)-2,6,6-trimethylcycloheptyl]oxy}propyl	NA	NA	H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	13 of 99 64 of 99	No uses in Denmark applied in Norway and Sweden	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
			propanoate						
679	604-608-2	147853-32-5	C36 fatty diol	NA	NA	H317 (May cause an allergic skin reaction)	56 of 91	NA	No
680	604-766-2	151006-58-5	1-Dodecene dimer with 1-Decene, hydrogenated	NA	H413 (May cause long lasting harmful effects to aquatic life)	H413 (May cause long lasting harmful effects to aquatic life)	1 of 1	NA	No
681	604-767-8	151006-60-9	Reaction products of 1-decene and 1-dodecene, hydrogenated	NA	NA	NA		-	No
682	604-769-9	151006-63-2	1-Dodecene, homopolymer, hydrogenated (Consisting of 50 wt % or more of species of the same M.Wt)	NA	NA	NA		-	No
683	605-150-6	15848-49-4	ethyl cyclopent-2-en-1-ylacetate	NA	NA	NA		-	No
684	605-315-2	163149-28-8	Reaction products of 1-decene, 1-dodecene and 1-octene, hydrogenated	NA	NA	NA		-	No
685	605-694-4	173832-46-7	Fatty acids, C18 unsat trimers di and triesters with 2-ethylhexanol	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
686	607-255-2	236391-76-7	reaction mass of (1S,1'R)-[1-(3',3'-dimethyl-1'-cyclohexyl)ethoxycarbonyl]methyl propanoate, (1R,1'R)-[1-(3',3'-dimethyl-1'-cyclohexyl)ethoxycarbonyl]methyl propanoate and (1R*,2'R*)-(2,6,6-trimethyl-1-cycloheptyloxycarbonyl)methyl propanoate	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	89 of 89	No uses in Denmark, applied in Sweden	Yes
687	607-759-2	25618-55-7	1,2,3-Propanetriol, homopolymer	NA	NA	NA		-	No
688	611-025-7	53651-69-7	propyl (2S)-2-hydroxypropanoate	NA	NA	NA		-	No
689	613-868-6	65997-12-8	Esters of rosin oligomers with pentaerythritol	NA	NA	NA		-	No
690	614-523-2	68475-37-6	Esters of rosin oligomers with glycerol	NA	NA	NA		-	No
691	614-557-8	68515-81-1	nonanol, branched and linear	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	1 of 1	NA	No
692	614-695-9	68649-12-7	Reaction products of 1-decene, hydrogenated	NA	NA	NA		-	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
693	616-261-4	75782-87-5	Alcohols, C14-15	NA	NA	H410 (Very toxic to aquatic life with long lasting effects)	1 of 19	Yes, confidential	No
694	618-141-7	883233-48-5	Alkene, polymer with 1-dodecene, distn. Residues, hydrogenated, C24-56 fraction	NA	NA	NA		-	No
695	618-142-2	883233-91-8	1-Tetradecene, polymer with 1-dodecene, distn. residues, hydrogenated, C36-84 fraction	NA	NA	NA		-	No
696	618-143-8	883233-93-0	1-Tetradecene, polymer with 1-dodecene, distn. residues, hydrogenated, C24-84 fraction	NA	NA	NA		-	No
697	619-079-3	949109-75-5	Not applicable-UVCB	NA	NA	NA		-	No
698	629-693-3	740817-83-8	Alcohols, C12-13-branched and linear	NA	NA	H400 (Very toxic to aquatic life) H411 (Toxic to aquatic life with long lasting effects)	4 of 4 4 of 4	NA	No
699	629-776-4	308065-15-8	Fatty acids, C12-14 (even numbered), methyl ester	NA	NA	H400 (Very toxic to aquatic life) H411 (Toxic to aquatic life	128 of 133 93 of 133	NA	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						with long lasting effects)			
700	639-864-4	43133-95-5	Methylpentane	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	29 of 29	Yes, confidential	No
701	641-136-6	1160164-88-4	Alcohols, C18-22, distn. residues	NA	NA	NA		-	No
702	688-011-2	1243654-79-6	Reaction products of N-(1-oxododecyl)-glutamic anhydride, L-lysine and sodium hydroxide.	NA	NA	NA		-	No
703	692-614-6	5660-53-7	2-isobutyl-2-methyl-1,3-dioxolane-4-methanol	NA	NA	NA		-	No
704	692-946-1	649747-80-8	Fatty acids, C8-10 (even numbered), 2-ethylhexyl esters	NA	NA	NA		-	No
705	694-886-1	1365095-43-7	Fatty acids, C8-10 (even numbered), 3-methylbutyl esters	NA	NA	NA		-	No
706	700-103-7	NA	reaction mass of (2S,5R)-2-tert-butyl-5-methyl-2-propyl-2,5-dihydrofuran and (2S,5S)-2-tert-butyl-5-methyl-2-propyl-2,5-dihydrofuran	NA	NA	NA		-	
707	700-146-1	1141487-54-8	5-cyclohexyl-2-methylpentan-1-ol	NA	NA	H400 (Very toxic to	1 of 1	NA	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	1 of 1		
708	700-150-3	156572-81-5	Sodium 2-(dodecanoyloxy)propane-1-sulfonate	NA	NA	NA		-	No
709	700-184-9	1000172-11-1	not available. UVCB substance	NA	NA	NA		-	No
710	700-380-4	NA	[Name not available]					-	
711	700-420-0	7605-52-9	3-Methyl-cyclohexanecarboxylic acid methyl ester	NA	NA	NA		-	No
712	700-488-1	873888-84-7	(4Z)-hept-4-en-2-yl salicylate	NA	NA	NA		-	No
713	700-497-0	NA	C20-C22 (even numbered, linear and branched) and C24 (branched) alkenes.	NA	NA	NA		-	
714	700-527-2	1271488-66-4	methyl trans-3-oxo-2-pentylcyclopentanecarboxylate	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	1 of 1	NA	No
715	700-789-8	14352-61-5	methyl cyclohexylacetate	NA	NA	H317 (May cause an allergic skin reaction)	24 of 24	NA	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						H412 (Harmful to aquatic life with long lasting effects)	24 of 24		
716	700-805-3	NA	reaction mass of 1-vinylcyclohex-3-enecarbaldehyde and 4-vinylcyclohex-1-enecarbaldehyde	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	1 of 1 1 of 1	NA	
717	700-812-1	1189052-95-6	tridecafluorooctyl-phosphonic acid sodium salt (1:1)	NA	NA	H317 (May cause an allergic skin reaction) H412 (Harmful to aquatic life with long lasting effects)	1 of 1 1 of 1	NA	No
718	700-880-2	NA	Distillate of aerobic enzymatic oxidation products of patchouli oil alpha-guaiene rich fraction	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	1 of 1 1 of 1	NA	
719	700-903-6	255830-15-0	{[bis(phosphonomethyl)nitroryl]methyl}phosphonic acid - potassium (1 : 5)	NA	NA	NA		-	No
720	700-927-7	NA	Reaction mass of 5-[(2R)-butan-2-yl]-2-[(1R,2R)-2,4-	NA	NA	H400 (Very toxic to aquatic life)	1 of 1	NA	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
			dimethylcyclohex-3-en-1-yl]-5-methyl-1,3-dioxane and 5-[(2R)-butan-2-yl]-2-[(1R,2S)-2,4-dimethylcyclohex-3-en-1-yl]-5-methyl-1,3-dioxane and 5-[(2R)-butan-2-yl]-2-[(1S,2R)-2,4-dimethylcyclohex-3-en-1-yl]-5-methyl-1,3-dioxane and 5-[(2R)-butan-2-yl]-2-[(1S,2S)-2,4-dimethylcyclohex-3-en-1-yl]-5-methyl-1,3-dioxane and 5-[(2S)-butan-2-yl]-2-[(1S,2R)-2,4-dimethylcyclohex-3-en-1-yl]-5-methyl-1,3-dioxane and 5-[(2S)-butan-2-yl]-2-[(1S,2S)-2,4-dimethylcyclohex-3-en-1-yl]-5-methyl-1,3-dioxane			H410 (ery toxic to aquatic life with long lasting effects)	1 of 1		
721	700-937-1	1312021-45-6	not available	NA	NA	H317 (May cause an allergic skin reaction)	2 of 2	NA	No
722	800-940-9	35836-72-7	(1R,5S)-2-(6,6-dimethylbicyclo[3.1.1]hept-2-en-2-yl) ethyl acetate	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	2 of 2 2 of 2	NA	No
723	801-093-8	1315251-11-6	7,7,8,9,9-pentamethyl-6,7,8,9-	NA	NA	H317 (May cause an	1 of 1	NA	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
			tetrahydro-5H-cyclopenta[h]quinazoline			allergic skin reaction) H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects)	1 of 1 1 of 1		
724	801-829-8	1247790-47-1	3,6-dimethylheptan-2-ol	NA	NA	H317 (May cause an allergic skin reaction)	1 of 1	NA	No
725	902-053-3	NA	Reaction mass of ethanol and propan-2-ol	NA	NA	NA		-	
726	904-693-9	NA	Reaction mass of 1-methyl-4-(propan-2-ylidene)cyclohexyl acetate and 2-(4-methylcyclohex-3-en-1-yl)propan-2-yl acetate	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	5 of 5	NA	
727	905-964-4	NA	Reaction mass of glycerol 1,3-di(acetate) and glycerol acetate and triacetin	NA	NA	NA		-	
728	906-125-5	NA	Reaction mass of 2,6-Octadien-1-ol, 3,7-dimethyl-, (E) and 2,6-Octadien-1-ol, 3,7-dimethyl-, (Z)-	NA	NA	H317 (May cause an allergic skin reaction) H410 (Very toxic to aquatic life with long	101 of 103 1 of 103	NA	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						lasting effects)			
729	906-170-0	NA	Reaction mass of dimethyl adipate and dimethyl glutarate and dimethyl succinate	NA	NA	NA		-	
730	907-706-6	NA	Reaction mass of 4-(2,6,6-trimethylcyclohex-2-ene-1-yl)-but-3-ene-2-one and 4-(2,6,6-trimethylcyclohex-1-ene-1-yl)-but-3-ene-2-one	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	5 of 7	NA	
731	908-918-1	NA	Reaction mass of 2-methylbutyl acetate and pentyl acetate	NA	NA	NA		-	
732	911-280-7	NA	Reaction mass of 2-methylbutyl salicylate and pentyl salicylate	NA	NA	H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	4 of 6 4 of 6 2 of 6	NA	
733	911-369-0	NA	Reaction mass of 3a,4,5,6,7,7a-hexahydro-4,7-methanoinden-5-yl acetate and 3a,4,5,6,7,7a-hexahydro-	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	6 of 6	NA	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
			4,7-methanoinden-6-yl						
734	911-811-2	NA	Reaction mass of [[(2-hydroxyethyl)imino]bis(methylene)] bisphosphonic acid and Phosphonic acid, P-[(tetrahydro-2-hydroxy-2-oxido-4H-1,4,2-oxazaphosphorin-4-yl)methyl]-	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	3 of 3	NA	
735	915-037-6	NA	Reaction mass of calcium disilicide and calcium silicide	NA	NA	NA		-	
736	915-617-9	NA	Reaction mass of 3-(4-hydroxy-4-methylpentyl)cyclohex-3-ene-1-carbaldehyde and 4-(4-hydroxy-4-methylpentyl)cyclohex-3-enecarbaldehyde	NA	NA	H317 (May cause an allergic skin reaction)	4 of 4	NA	
737	915-730-3	NA	Reaction Mass of 1-(1,2,3,4,5,6,7,8-octahydro-2,3,8,8-tetramethyl-2-naphthyl)ethan-1-one and 1-(1,2,3,4,6,7,8,8a-octahydro-2,3,8,8-tetramethyl-2-naphthyl)ethan-1-one and 1-(1,2,3,5,6,7,8,8a-octahydro-2,3,8,8-tetramethyl-2-naphthyl)ethan-1-one	NA	NA	H317 (May cause an allergic skin reaction) H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	43 of 43 12 of 43 31 of 43	NA	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
738	915-741-3	NA	reaction mass of 3-[3-(2,3-dihydroxypropoxy)-2-hydroxypropoxy]propane-1,2-diol, 3-(2,3-dihydroxypropoxy)propane-1,2-diol,3-[3-[3-(2,3-dihydroxypropoxy)-2-hydroxypropoxy]-2-hydroxypropoxy]propane-1,2-diol,	NA	NA	NA		-	
739	917-488-4	NA	Hydrocarbons, C13-C15, n-alkanes, isoalkanes, cyclics, < 2% aromatics	NA	NA	NA		-	
740	917-780-1	1176286-43-3	Fatty acids, soybean oil, conjugated	NA	NA	NA		-	No
741	917-828-1	NA	Hydrocarbons, C14-C17, n-alkanes, <2% aromatics	NA	NA	NA		-	
742	918-167-1	NA	Not Applicable	NA	NA	NA		-	
743	918-271-7	NA	Hydrocarbons, C12-C13, isoalkanes, cyclics, <2% aromatics	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	1 of 1	NA	
744	918-317-6	NA	Hydrocarbons, C10-C13, isoalkanes, cyclics, <2% aromatics	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	4 of 5	NA	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
745	918-481-9	NA	Hydrocarbons, C10-C13, n-alkanes, isoalkanes, cyclics, < 2% aromatics	NA	NA	NA		-	
746	918-811-1	NA	Hydrocarbons, C10, aromatics, <1% naphthalene	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	10 of 10	NA	
747	918-973-3	NA	Not Applicable	NA	NA	NA		-	
748	919-006-8	NA	Not Applicable	NA	NA	NA		-	
749	919-029-3	NA	Hydrocarbons, C16-C20, n-alkanes, isoalkanes, cyclics, <2% aromatics	NA	NA	NA		-	
750	919-857-5	NA	Hydrocarbons, C9-C11, n-alkanes, isoalkanes, cyclics, <2% aromatics	NA	NA	NA		-	
751	920-107-4	NA	Hydrocarbons, C12-C15, n-alkanes, isoalkanes < 2% aromatics	NA	NA	NA		-	
752	920-134-1	NA	Hydrocarbons, C9-C11, isoalkanes, cyclics, <2% aromatics	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	2 of 2	NA	
753	920-274-3	NA	Hydrocarbons, C10-14 (even numbered), n-alkanes, isoalkanes, <2% aromatic	NA	NA	NA		-	
754	920-750-0	NA	Hydrocarbons, C7-C9, n-alkanes,	NA	NA	H411 (Toxic to aquatic life	6 of 6	NA	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
			isoalkanes, cyclics			with long lasting effects)			
755	920-901-0	NA	Not Applicable	NA	NA	NA		-	
756	921-024-6	NA	Hydrocarbons, C6-C7, n-alkanes, isoalkanes, cyclics, <5% n-hexane	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	6 of 6	NA	
757	921-050-8	NA	Hydrocarbons, C13-C15, n-alkanes, isoalkanes, cyclics, < 2% aromatics	NA	NA	NA		-	
758	921-577-3	NA	Hydrocarbons, C5, n-alkanes, isoalkanes	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	7 of 7 47 of 47	NA	
759	921-728-3	NA	Hydrocarbons, C7-C9, isoalkanes	NA	NA	H350 (May cause cancer) H400 Very toxic to aquatic life H410 (Very toxic to aquatic life with long lasting effects) H411 (Toxic to aquatic life with long lasting effects)	1 of 5 1 of 5 1 of 5 3 of 5	NA	
760	921-836-0	NA	Fatty acids, C16-18 (even numbered) and C18-unsatd., adipic acid esters with pentaerythritol	NA	NA	NA		-	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
761	923-037-2	NA	Not Applicable	NA	NA	NA		-	
762	924-803-9	NA	Hydrocarbons, C11-C14, n-alkanes, <2% aromatics	NA	NA	NA		-	
763	925-292-5	NA	Hydrocarbons, C6, n-alkanes, iso-alkanes, cyclics, n-hexane rich	NA	NA	H361 (Suspected of damaging fertility or the unborn child) H411 (Toxic to aquatic life with long lasting effects)	17 of 17 17 of 17	NA	
764	926-141-6	NA	Not Applicable	NA	NA	NA		-	
765	927-033-1	NA	Hydrocarbons, C7-C8, cyclics	NA	NA	NA		-	
766	927-241-2	NA	Not Applicable	NA	NA	NA		-	
767	927-442-5	NA	Ethylendiaminetetraacetic acid ferrous sodium	NA	NA	NA		-	
768	927-510-4	NA	Hydrocarbons, C7, n-alkanes, isoalkanes, cyclics	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	15 of 15	NA	
769	927-632-8	NA	Hydrocarbons, C14-C18, n-alkanes, isoalkanes, cyclics, <2% aromatics	NA	NA	NA		-	
770	928-253-0	NA	Hydrocarbons, C13-C18, n-alkanes,	NA	NA	NA		-	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
			isoalkanes, cyclics, <2% aromatics						
771	928-868-4	NA	Hydrocarbons, C14-C15, n-alkanes, <2% aromatics	NA	NA	NA		-	
772	929-018-5	NA	Hydrocarbons, C10-C13, n-alkanes, <2% aromatics	NA	NA	NA		-	
773	930-389-0	830322-14-0	Reaction mass of cis 4-(3-methylbutyl)cyclohexanol and trans 4-(3-methylbutyl)cyclohexanol	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	1 of 1	No uses in Denmark, applied in Finland and Sweden	Yes
774	930-993-4	NA	Zeolite, synthetic, crystalline, non fibrous, silica and titanium based	NA	NA	NA		-	
775	931-203-0	157905-74-3	Fatty acids, C16-18 (even numbered) and C18 unsatd., reaction products with triethanolamine, di-Me sulfate-quaternized	NA	NA	NA		-	No
776	931-254-9	NA	Hydrocarbons, C6, isoalkanes, <5% n-hexane	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	1 of 8	NA	
777	931-287-9	NA	Alcohols, C14-15-branched and linear	NA	NA	H410 (Very toxic to aquatic life with long	3 of 3	NA	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						lasting effects)			
778	931-294-7	NA	Alcohols, C16-17-branched and linear	NA	NA	NA		-	
779	931-296-8	NA	1-Propanaminium, 3-amino-N-(carboxymethyl)-N,N-dimethyl-, N-C8-18(even numbered) acyl derivs., hydroxides, inner salts			H412 (Harmful to aquatic life with long lasting effects)	105 of 105	NA	
780	931-330-1	69227-24-3	Amides, C8-18 (even numbered) and C18-unsatd., N-(hydroxyethyl)	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	14 of 14	Not applied in Denmark and the Nordic countries	No
781	931-333-8	147170-44-3	1-Propanaminium, 3-amino-N-(carboxymethyl)-N,N-dimethyl-, N-(C8-18(even numbered) and C18 unsaturated acyl) derivs., hydroxides, inner salts	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	93 of 94	0.5t/7 prep.	No
782	931-434-7	NA	Reaction products resulting from the esterification of Sorbitol with C8 – 18 (even) and C18 unsaturated fatty acids in the ratio of 1:1	NA	NA	NA		-	
783	931-505-2	NA	Alkenes, C21-32 linear and branched	NA	NA	NA		-	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
784	931-513-6	NA	1-Propanaminium, 3-amino-N-(carboxymethyl)-N,N-dimethyl-, N-(C12-18(even numbered) acyl) derivs., hydroxides, inner salts	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	10 of 10	NA	
785	931-652-2	NA	Hydrogenated dimerization products of 1-decene and Reaction products of 1-decene, hydrogenated	NA	NA	NA		-	
786	931-671-6	NA	Reaction mass of 2-hexyldecan-1-ol and 2-hexyldodecan-1-ol and 2-octyldecan-1-ol and 2-octyldodecan-1-ol	NA	NA	NA		-	
787	931-893-3	NA	Reaction mass of p-mentha-1,4-diene and p-mentha-1,3-diene and dipentene and p-mentha-1(7),2-diene and p-mentha-1,4(8)-diene	NA	NA	H317 (May cause an allergic skin reaction) H410 (Very toxic to aquatic life with long lasting effects)	37 of 37 3 of 37	NA	
788	932-020-9	NA	Hydrocarbons, C8-C9, isoalkanes	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	1 of 1	NA	
789	932-078-5	NA	Hydrocarbons, C13-C23, n-alkanes, isoalkanes, cyclics, < 0.03% aromatics	NA	NA	NA		-	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
790	932-124-4	NA	Calcium dihydroxide precipitated with carbon dioxide during sugar juice purification	NA	NA	NA		-	
791	932-346-1	NA	Reaction mass of glucose and fructose and water	NA	NA	NA		-	
792	932-349-8	8006-64-2	Turpentine oil	H302 (Harmful if swallowed) H304 (May be fatal if swallowed and enters airways) H312 (Harmful in contact with skin) H315 (Causes skin irritation) H317 (Harmful if swallowed) H319 (Causes serious eye irritation) H332 (Harmful if inhaled)	H411 (Toxic to aquatic life with long lasting effects)	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	1,576 of 1,576 1,576 of 1,576	NA	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
793	934-954-2	NA	Hydrocarbons, C13-C16, n-alkanes, isoalkanes, cyclics, < 0.03% aromatics	NA	NA	NA		-	
794	934-956-3	NA	Hydrocarbons, C15-C20, n-alkanes, isoalkanes, cyclics, < 0.03% aromatics	NA	NA	NA		-	
795	937-234-6	NA	Reaction mass of geranyl acetate and neryl acetate and citronellyl acetate	NA	NA	H317 (May cause an allergic skin reaction) H412 (Harmful to aquatic life with long lasting effects)	94 of 94 94 of 94	NA	
796	938-347-3	28068-91-9	reaction mass of (2R,4R)-4-(2,3-dimethylbutan-2-yl)-2-methylcyclohexanone and (2S,4S)-4-(2,3-dimethylbutan-2-yl)-2-methylcyclohexanone	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	1 of 1 1 of 1	NA	No
797	938-871-2	NA	8-sec-Butyl-5,6,7,8-tetrahydroquinoline	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	1 of 1 1 of 1	NA	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
798	938-945-4	NA	Reaction mass of 4-isopropylidene-1-methylcyclohexene and 1-isopropyl-4-methyl-7-oxabicyclo[2.2.1]heptane and 1,3,3-trimethyl-2-oxabicyclo[2.2.2]octane	NA	NA	NA		-	
799	939-066-9	NA	Fatty acids, C16-18 (even numbered), ammonium salts	NA	NA	NA		-	
800	939-213-7	NA	Reaction mass of 2-methyldecan-1-ol and 2-propyloctan-1-ol and 2-ethylnonan-1-ol and 2-butylheptan-1-ol	NA	NA	H400 (toxic to aquatic life) H411 (Toxic to aquatic life with long lasting effects)	1 of 1 1 of 1	NA	
801	939-227-3	84238-39-1	Reaction Mass of 1,4-dimethyl-7-(prop-1-en-2-yl)-1,2,3,4,5,6,7,8-octahydroazulene and 3,8-dimethyl-5-(prop-1-en-2-yl)-1,2,3,3a,4,5,6,7-octahydroazulene and 4,8a,9,9-tetramethyldecahydro-1,6-methanonaphthalen-1-ol	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	3 of 3	0t/58 prep.	No
802	939-389-5	NA	D-Glucopyranose, oligomeric, butyl glycoside	NA	NA	NA		-	
803	939-429-1	16409-43-1	Reaction mass of (2S-cis)-tetrahydro-4-methyl-2-(2-methyl-1-	NA	NA	H361 (Suspected of damaging fertility or the	150 of 1,078	0t/32 prep.	Yes

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
			propenyl)-2H-pyran and Tetrahydro-4-methyl-2-(2-methylpropen-1-yl)pyran (2R,4R) and Tetrahydro-4-methyl-2-(2-methylpropen-1-yl)pyran (2S,4S) and (2R-cis)-tetrahydro-4-methyl-2-(2-methyl-1-propenyl)-2H-pyran			unborn child) H412 (Harmful to aquatic life with long lasting effects)	885 of 1,078		
804	939-464-2	121617-08-1	Benzenesulfonic acid, 4-C10-13-sec-alkyl derivs., compds. with triethanolamine	NA	NA	NA		-	No
805	939-479-4	NA	Benzenesulfonic acid, 4-C10-13-sec-alkyl derivs.-, compd. with 1-aminopropane-2-ol	NA	NA	NA		-	
806	939-513-8	NA	Reaction mass of [[(2-hydroxyethyl)imino]dimethylene]bis phosphonic acid, sodium salt and 4-(Phosphonomethyl)-2-hydroxy-2-oxo-1,4,2-oxazaphosphorinane, sodium salt	NA	NA	H412 (Harmful to aquatic life with long lasting effects)	6 of 6	NA	
807	939-525-3	NA	Reaction products of (2,2,3-trimethylcyclopent-3-en-1-yl)acetaldehyde and butan-2-one, hydrogenated	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	1 of 1	NA	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
808	939-578-2	NA	Alcohols, C12-14 (even-numbered), ethoxylated, magnesium salts, < 2.5 mol EO	NA	NA	NA	2 of 2	NA	
809	939-588-7	NA	Dodecanoic acid, ester with 1,2,3-propanetriol, acetylated	NA	NA	NA		-	
810	939-604-2	NA	Reaction mass of (1R,2R)-2,4-dimethylcyclohex-3-enecarbaldehyde and (1R,2S)-2,4-dimethylcyclohex-3-enecarbaldehyde	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	3 of 3 3 of 3	NA	
811	939-618-9	NA	Reaction Mass of (1R)-1-[(1S)-3,3-dimethylcyclohexyl]ethyl formate and (1R,2S)-2,6,6-trimethylcycloheptyl formate	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	1 of 1	NA	
812	939-627-8	NA	Reaction mass of (3R,5R)-3,5,6,6-tetramethyl-4-methylideneheptan-2-one and (3R,5S)-3,5,6,6-tetramethyl-4-methylideneheptan-2-one and (E)-3,4,5,6,6-pentamethylhept-3-en-2-one	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	1 of 1 1 of 1	NA	
813	939-633-0	NA	Decanoic acid, ester with 1,2,3-propanetriol, acetylated	NA	NA	NA		-	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
814	939-715-6	NA	Fatty acids, C12-C18 (even numbered), C16-C20 (even numbered)-alkyl esters	NA	NA	NA		-	
815	939-719-8	NA	Reaction Mass of Cis-4-(isopropyl) cyclohexanemethanol and Trans-4-(isopropyl) cyclohexanemethanol	NA	NA	H317 (May cause an allergic skin reaction)	1 of 1	NA	
816	939-728-7	NA	Reaction mass of cis-1-methyl-1-(4-methylcyclohexyl) ethyl acetate and trans-1-methyl-1-(4-methylcyclohexyl) ethyl acetate and cis- 4-isopropyl-1-methylcyclohexyl acetate and trans-4-isopropyl-1-methylcyclohexyl acetate	NA	NA	H317 (May cause an allergic skin reaction) H411 (Toxic to aquatic life with long lasting effects)	1 of 1 1 of 1	NA	
817	939-894-0	NA	Partially hydrogenated β-3,7,11-trimethyldodeca-1,3,6,10-tetraene, reaction products with linear C8-C16 alpha olefin, hydrogenated.	NA	NA	NA		-	
818	940-300-7	1339119-15-1	Reaction mass of (8R)-tricyclo[5.2.1.02,6]dec-8-ylacetaldehyde and (8S)-tricyclo[5.2.1.02,6]dec-8-ylacetaldehyde	NA	NA	H317 (May cause an allergic skin reaction) H400 (Very toxic to aquatic life) H410 (Very toxic to aquatic life with long	1 of 1 1 of 1	NA	No

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
						lasting effects)	1 of 1		
819	940-725-8	NA	Hydrocarbons, C9-C12, n-alkanes, isoalkanes, <2% aromatics	NA	NA	NA		-	
820	940-726-3	NA	NA	NA	NA	NA			
821	940-727-9	NA	Hydrocarbons, C12-C15, n-alkanes, isoalkanes < 2% aromatics	NA	NA	NA			
822	940-728-4	NA	Hydrocarbons, C14-C16, n-alkanes, isoalkanes <2% aromatics	NA	NA	NA			
823	940-730-5	NA	Hydrocarbons, C15-C19, n-alkanes, isoalkanes < 2% aromatics	NA	NA	NA			
824	940-733-1	NA	Hydrocarbons, C8-C11, n-alkanes, isoalkanes, <2% aromatics	NA	NA	H411 (Toxic to aquatic life with long lasting effects)	1 of 1	NA	
825	940-734-7	NA	Hydrocarbons, C18-C24, iso-alkanes <2% aromatics	NA	NA	NA			
826	941-187-7	NA	Alcohols, C12-13-branched	NA	NA	H400 (toxic to aquatic life) H411 (Toxic to aquatic life with long lasting effects)	1 of 1 1 of 1	NA	

Substance no.	EC No.	CAS No.	Substance name (INCI name)	Harmonised Classification addressing human health	Harmonised Classification addressing the environment	Notified classification*	Numbers of notified classifica-tions of total	Total use in DK in 2012/ numbers of preparations (SPIN data)*	Included in IFRAs list of perfumes*
827	941-188-2	NA	Alcohols, C14-15-branched	NA	NA	H410 (Very toxic to aquatic life with long lasting effects)	1 of 1	NA	

Appendix 2: Substance properties

TABLE 2-1

PHYSIO CHEMICAL PROPERTIES OF PERFUME SUBSTANCES WITH A HARMONISED CLASSIFICATION ADRESSING THE ENVIRONMENT (REACH REGISTRATION DATA)

CAS No.	Substance name	Physical state	Molecular Weight (g/mol)	Vapour Pressure at 25 ° C (Pa)	Solubility in water at 25 ° C (mg/L)	Melting Point (°C)	Log Pow	Reference
52-51-7	Bronopol	Solid	199.99	0.001	0.286 (20.2°C)	129	0.22 (24°C)	REACH Registration data
75-08-1	Ethanethiol	Liquid	62.13	58900 (20°C)	88.60 (20°C)	-144.4	1.5 (20°C)	REACH Registration data
78-78-4	2-methylbutane	Liquid	72.15	100,000 (27.5°C)	0.0000485	-159.77	4 (25°C)	REACH Registration data
109-66-0	Pentane	Liquid	72.15	56,580 (20°C)	38.5 (20°C)	-130	3.45	EU Risk Assessment Report, 2003
110-01-0	Tetrahydrothiophene	Liquid	88.17	2,310 (20°C)	5,800 (20°C)	-96.2	1.8 (20°C)	REACH Registration data
110-54-3	**n-hexane**	**Liquid**	**86.118**	**10,000 (9.8°C)**	**9.8**	**-95.35**	**4 (20°C)**	**REACH Registration data**
120-51-4	**Benzyl benzoate**	**Solid**	**212.25**	**0.0305**	**14.1 (20°C)**	**21**	**9.97 (25°C)**	**REACH Registration data**
287-92-3	Cyclopentane	Liquid	70.14	36,225.0165 (21°C)	156	-93.9	3 (25°C)	REACH Registration data
540-84-1	2,2,4-trimethylpentane	Liquid	114.23	2,800 (20°C)	2.2	NA	4.08	REACH Registration data
1222-05-5	**1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylinden**	**Viscous liquid**	**258.41**	**0.0727**	**1.65**	**< -20**	**5.3**	**REACH Registration data**

CAS No.	Substance name	Physical state	Molecular Weight (g/mol)	Vapour Pressure at 25 ° C (Pa)	Solubility in water at 25 ° C (mg/L)	Melting Point (°C)	Log Pow	Reference
	o[5,6-c]pyran (HHCB)							
1306-19-0	Cadmium oxide	Solid	128.41	NA	2.1 (20°C)	950	NA	REACH Registration data
1306-23-6	Cadmium sulphide	Solid	144.47	NA	0.0000006 (20°C)	871	NA	REACH Registration data
1314-13-2	**Zinc oxide**	**Solid**	**81.39**	**NA**	**2.9 (20°C)**	**>1,000**	**NA**	**REACH Registration data**
4067-16-7	3,6,9,12-tetraazatetradecamethylenediamine	Liquid	232.38	0.00168 (20°C)	>500,000 (20°C)	<-70 (100 atm)	-3.67	REACH Registration data
5989-27-5	**(R)-p-mentha-1,8-diene**	**Liquid**	**136.24**	**200**	**12.3**	**-73.7**	**4.4**	**REACH Registration data**
5989-54-8	**(S)-p-mentha-1,8-diene**	**Liquid**	**136.24**	**200**	**12.3**	**-73.7**	**4.4**	**REACH Registration data**
7646-85-7	Zinc chloride	Solid	136.30	NA	851,000 (20°C)	287	NA	REACH Registration data
7681-52-9	Sodium hypochlorite	Liquid	74.44	2,500 (20°C)	Miscible	-28.9	-3.42	REACH Registration data
7695-91-2	**3,4-dihydro-2,5,7,8-tetramethyl-2-(4,8,12-trimethyltridecyl)-2H-benzopyran-6-yl acetate**	**NA**	**472.76**	**8.7E-9**	**<0.8 (20°C)**	**-27.5**	**12.2**	**REACH Registration data**
7733-02-0	Zinc sulphate	Solid	161.45	NA	210,000	>229	NA	REACH Registration

CAS No.	Substance name	Physical state	Molecular Weight (g/mol)	Vapour Pressure at 25 ° C (Pa)	Solubility in water at 25 ° C (mg/L)	Melting Point (°C)	Log Pow	Reference
								data
7761-88-8	Silver nitrate	Crystalline	231.88	NA	710,000	212	NA	REACH Registration data
7779-90-0	Trizinc bis(orthophosphate)	Solid	NA	NA	2.7 (20°C)	846	NA	REACH Registration data
10108-64-2	Cadmium chloride	Solid	183.32	NA	475,000 (20°C)	356	NA	REACH Registration data
68131-73-7	Amines, polyethylenepoly-	Viscous liquid	232.38	0.000765 (20°C)	> 50,000 (20°C)	<20	-3.67	REACH Registration data
EC: 402-770-7	**2-methyl-4-phenylpentanol**	**Liquid**	**NA**	**0.303**	**800 (20°C)**	**<-20**	**3.01**	**REACH Registration data**
103694-68-4	**3-(2,2-dimethyl-3-hydroxypropyl)toluene**	**Liquid**	**178.28**	**2.8 (20°C)**	**265.8**	**24**	**3.38**	**REACH Registration data**
97384-48-0	**2-benzyl-2-methyl-3-butenitrile**	**Liquid**	**178.28**	**1,510 (121.6°C)**	**185 (20°C)**	**-21.3**	**2.3**	**REACH Registration data**
107898-54-4	**(+/-) trans-3,3-dimethyl-5-(2,2,3-trimethyl-cyclopent-3-en-1-yl)pent-4-en-2-ol**	**Liquid**	**222.37**	**0.47 (20°C)**	**0.0129 (23°C)**	**-18**	**4.33**	**REACH Registration data**
125109-85-5	**β-methyl-3-(1-methylethyl)benzenepropanal**	**Liquid**	**190.29**	**1 (20°C)**	**40 (20°C)**	**<-50**	**3.8**	**REACH Registration data**
2511-00-4	**ethyl 2-cyclohexylpropionate**	**Liquid**	**NA**	**21.9**	**86.7 (20°C)**	**-36.5**	**4.03**	**REACH Registration data**
EC: 413-	A mixture of: N,N-	Solid	NA	0.12	1 (20°C)	40.9	>6.2	REACH

CAS No.	Substance name	Physical state	Molecular Weight (g/mol)	Vapour Pressure at 25 ° C (Pa)	Solubility in water at 25 ° C (mg/L)	Melting Point (°C)	Log Pow	Reference
800-3	di(hydrogenated alkyl C14-C18)phthalamic acid; dihydrogenated alkyl (C14-C18)amine							Registration data
151006-61-0	A mixture of isomers of branched tetracosane	Liquid	NA	72 (150°C)	0.13 (19.5°C)	<20	4.82	REACH Registration data
72903-27-6	**Diethyl 1,4-cyclohexanedicarboxylate**	**Liquid**	**NA**	**0.2**	**1,280 (20°C)**	**-11**	**2.5**	**REACH Registration data**
426218-78-2	**A mixture of[3]**	**Liquid**	**NA**	**1.5**	**11.1 (20°C)**	**<-25**	**3.66**	**REACH Registration data**
74338-72-0	**2,4,4,7-tetramethyl-6-octen-3-one**	**Liquid**	**NA**	**22**	**59.1 (20°C)**	**<-52**	**4.5**	**REACH Registration data**
75490-39-0	**2,2,4-trimethyl-4-phenyl-butane-nitrile**	**Liquid**	**NA**	**0.75**	**109 (20°C)**	**<-25**	**3.34**	**REACH Registration data**
3508-98-3	**2-phenylhexanenitrile**	**Liquid**	**NA**	**6.4**	**37.7 (20°C)**	**<-25**	**3.14**	**REACH Registration data**
10461-98-0	**2-cyclohexylidene-2-phenylacetonitrile**	**Liquid**	**NA**	**0.043 (20°C)**	**7.5 (20°C)**	**NA**	**4**	**REACH Registration data**
EC: 427-090-8	A mixture of: ethyl (2R,3R)-3-isopropylbicyclo[2.2.1]hept-5-ene-2-	Liquid	NA	212	16.4 (20°C)	<-19	4.75	REACH Registration data

[3] **4-(2,2,3-trimethylcyclopent-3-en-1-yl)-1-methyl-2-oxabicyclo[2.2.2]octane; 1-(2,2,3-trimethylcyclopent-3-en-1-yl)-5-methyl-6-oxabicyclo[3.2.1]octane; spiro[cyclohex-3-en-1-yl-[(4,5,6,6a-tetrahydro-3,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]furan]; spiro[cyclohex-3-en-1-yl-[4,5,6,6a-tetrahydro-4,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]]furan]**

CAS No.	Substance name	Physical state	Molecular Weight (g/mol)	Vapour Pressure at 25 ° C (Pa)	Solubility in water at 25 ° C (mg/L)	Melting Point (°C)	Log Pow	Reference
	carboxylate; ethyl (2S,3S)-3-isopropylbicyclo[2.2.1]hept-5-ene-2-carboxylate							
EC: 429-900-5	Muscenone Delta	Liquid	NA	0.04	0.899 (20°C)	<-20	6.39	REACH Registration data
151006-58-5	1-Dodecene dimer with 1-Decene, hydrogenated	Liquid	NA	1.9 (20°C)	<0.1 (20°C)	-73	5	REACH Registration data
8006-64-2	**Turpentine oil**	**Liquid**	**148.25**	**2,600**	**351 (20°C)**	**NA**	**NA**	**REACH Registration data**

Appendix 3: Background information to chapter 2 on legal framework

The following annex provides some background information on subjects addressed in Chapter 2. The intention is that the reader less familiar with the legal context may read this concurrently with chapter 2.

EU and Danish legislation

Chemicals are regulated via EU and national legislations, the latter often being a national transposition of EU directives.

There are four main EU legal instruments:

- Regulations (DK: Forordninger) are binding in their entirety and directly applicable in all EU Member States.
- Directives (DK: Direktiver) are binding for the EU Member States as to the results to be achieved. Directives have to be transposed (DK: gennemført) into the national legal framework within a given timeframe. Directives leave margin for manoeuvering as to the form and means of implementation. However, there are great differences in the space for manoeuvering between directives. For example, several directives regulating chemicals previously were rather specific and often transposed more or less word-by-word into national legislation. Consequently and to further strengthen a level playing field within the internal market, the new chemicals policy (REACH) and the new legislation for classification and labelling (CLP) were implemented as Regulations. In Denmark, Directives are most frequently transposed as laws (DK: love) and statutory orders (DK: bekendtgørelser).
-

The European Commission has the right and the duty to suggest new legislation in the form of regulations and directives. New or recast directives and regulations often have transitional periods for the various provisions set-out in the legal text. In the following, we will generally list the latest piece of EU legal text, even if the provisions identified are not yet fully implemented. On the other hand, we will include currently valid Danish legislation, e.g. the implementation of the cosmetics directive) even if this will be replaced with the new Cosmetic Regulation.

- Decisions are fully binding on those to whom they are addressed. Decisions are EU laws relating to specific cases. They can come from the EU Council (sometimes jointly with the European Parliament) or the European Commission. In relation to EU chemicals policy, decisions are e.g. used in relation to inclusion of substances in REACH Annex XVII (restrictions). This takes place via a so-called comitology procedure involving Member State representatives. Decisions are also used under the EU ecolabelling Regulation in relation to establishing ecolabel criteria for specific product groups.
- Recommendations and opinions are non-binding, declaratory instruments.

In conformity with the transposed EU directives, Danish legislation regulate to some extent chemicals via various general or sector specific legislation, most frequently via statutory orders (DK: bekendtgørelser).

Chemicals legislation

REACH and CLP

The REACH Regulation[4] and the CLP Regulation[5] are the overarching pieces of EU chemicals legislation regulating industrial chemicals. The below will briefly summarise the REACH and CLP

[4] Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

[5] Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures

provisions and give an overview of 'pipeline' procedures, i.e. procedures which may (or may not) result in an eventual inclusion under one of the REACH procedures.

(Pre-)Registration
All manufacturers and importers of chemical substance > 1 tonne/year have to register their chemicals with the European Chemicals Agency (ECHA). Pre-registered chemicals benefit from tonnage and property dependent staggered dead-lines:

- 30 November 2010: Registration of substances manufactured or imported at 1000 tonnes or more per year, carcinogenic, mutagenic or toxic to reproduction substances above 1 tonne per year, and substances dangerous to aquatic organisms or the environment above 100 tonnes per year.
- 31 May 2013: Registration of substances manufactured or imported at 100-1000 tonnes per year.
- 31 May 2018: Registration of substances manufactured or imported at 1-100 tonnes per year.

Evaluation
A selected number of registrations will be evaluated by ECHA and the EU Member States. Evaluation covers assessment of the compliance of individual dossiers (dossier evaluation) and substance evaluations involving information from all registrations of a given substance to see if further EU action is needed on that substance, for example as a restriction (substance evaluation).

Authorisation
Authorisation aims at substituting or limiting the manufacturing, import and use of substances of very high concern (SVHC). For substances included in REACH annex XIV, industry has to cease use of those substance within a given deadline (sunset date) or apply for authorisation for certain specified uses within an application date.

Restriction
If the authorities assess that that there is a risks to be addressed at the EU level, limitations of the manufacturing and use of a chemical substance (or substance group) may be implemented. Restrictions are listed in REACH annex XVII, which has also taken over the restrictions from the previous legislation (Directive 76/769/EEC).

Classification and Labelling
The CLP Regulation implements the United Nations Global Harmonised System (GHS) for classification and labelling of substances and mixtures of substances into EU legislation. It further specifies rules for packaging of chemicals.

Two classification and labelling provisions are:

1. **Harmonised classification and labelling** for a number of chemical substances. These classifications are agreed at the EU level and can be found in CLP Annex VI. In addition to newly agreed harmonised classifications, the annex has taken over the harmonised classifications in Annex I of the previous Dangerous Substances Directive (67/548/EEC); classifications which have been 'translated' according to the new classification rules.
2. **Classification and labelling inventory**. All manufacturers and importers of chemicals substances are obliged to classify and label their substances. If no harmonised classification is available, a self-classification shall be done based on available information according to the classification criteria in the CLP regulation. As a new requirement, these self-classifications should be notified to ECHA, which in turn publish the classification and labelling inventory based on all notifications received. There is no tonnage trigger for this obligation. For the purpose of this report, self-classifications are summarised in Appendix 2 to the main report.

Ongoing activities - pipeline
In addition to listing substance already addressed by the provisions of REACH (pre-registrations, registrations, substances included in various annexes of REACH and CLP, etc.), the ECHA web-site also provides the opportunity for searching for substances in the pipeline in relation to certain REACH and CLP provisions. These will be briefly summarised below:

Community Rolling Action Plan (CoRAP)
The EU member states have the right and duty to conduct REACH substance evaluations. In order to coordinate this work among Member States and inform the relevant stakeholders of upcoming substance evaluations, a Community Rolling Action Plan (CoRAP) is developed and published, indicating by who and when a given substance is expected to be evaluated.

Authorisation process; candidate list, Authorisation list, Annex XIV
Before a substance is included in REACH Annex XIV and thus being subject to Authorisation, it has to go through the following steps:

1. It has to be identified as a SVHC leading to inclusion in the candidate list6
2. It has to be prioritised and recommended for inclusion in ANNEX XIV (These can be found as Annex XIV recommendation lists on the ECHA web-site)
3. It has to be included in REACH Annex XIV following a comitology procedure decision (substances on Annex XIV appear on the Authorisation list on the ECHA web-site).

The candidate list (substances agreed to possess SVHC properties) and the Authorisation list are published on the ECHA web-site.

Registry of intentions
When EU Member States and ECHA (when required by the European Commission) prepare a proposal for:

- a harmonised classification and labelling,
- an identification of a substance as SVHC, or
- a restriction.

This is done as a REACH Annex XV proposal.

The 'registry of intentions' gives an overview of intensions in relation to Annex XV dossiers divided into:
- current intentions for submitting an Annex XV dossier,
- dossiers submitted, and
- withdrawn intentions and withdrawn submissions

for the three types of Annex XV dossiers.

International agreements

OSPAR Convention
OSPAR is the mechanism by which fifteen Governments of the western coasts and catchments of Europe, together with the European Community, cooperate to protect the marine environment of the North-East Atlantic.

[6] It should be noted that the candidate list is also used in relation to articles imported to, produced in or distributed in the EU. Certain supply chain information is triggered if the articles contain more than 0.1% (w/w) (REACH Article 7.2 ff).

Work to implement the OSPAR Convention and its strategies is taken forward through the adoption of decisions, which are legally binding on the Contracting Parties, recommendations and other agreements. Decisions and recommendations set out actions to be taken by the Contracting Parties. These measures are complemented by other agreements setting out:

- issues of importance
- agreed programmes of monitoring, information collection or other work which the Contracting Parties commit to carry out.
- guidelines or guidance setting out the way that any programme or measure should be implemented
- actions to be taken by the OSPAR Commission on behalf of the Contracting Parties.

HELCOM - Helsinki Convention

The Helsinki Commission, or HELCOM, works to protect the marine environment of the Baltic Sea from all sources of pollution through intergovernmental co-operation between Denmark, Estonia, the European Community, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden. HELCOM is the governing body of the "Convention on the Protection of the Marine Environment of the Baltic Sea Area" - more usually known as the Helsinki Convention.

In pursuing this objective and vision the countries have jointly pooled their efforts in HELCOM, which is works as:

- an environmental policy maker for the Baltic Sea area by developing common environmental objectives and actions;
- an environmental focal point providing information about (i) the state of/trends in the marine environment; (ii) the efficiency of measures to protect it and (iii) common initiatives and positions which can form the basis for decision-making in other international fora;
- a body for developing, according to the specific needs of the Baltic Sea, Recommendations of its own and Recommendations supplementary to measures imposed by other international organisations;
- a supervisory body dedicated to ensuring that HELCOM environmental standards are fully implemented by all parties throughout the Baltic Sea and its catchment area; and
- a co-ordinating body, ascertaining multilateral response in case of major maritime incidents.

Stockholm Convention on Persistent Organic Pollutants (POPs)

The Stockholm Convention on Persistent Organic Pollutants is a global treaty to protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have adverse effects to human health or to the environment. The Convention is administered by the United Nations Environment Programme and is based in Geneva, Switzerland.

Rotterdam Convention

The objectives of the Rotterdam Convention are:

- to promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm;
- to contribute to the environmentally sound use of those hazardous chemicals, by facilitating information exchange about their characteristics, by providing for a national decision-making process on their import and export and by disseminating these decisions to Parties.
- The Convention creates legally binding obligations for the implementation of the Prior Informed Consent (PIC) procedure. It built on the voluntary PIC procedure, initiated by UNEP and FAO in 1989 and ceased on 24 February 2006.

The Convention covers pesticides and industrial chemicals that have been banned or severely restricted for health or environmental reasons by Parties and which have been notified by Parties for inclusion in the PIC procedure. One notification from each of two specified regions triggers consideration of addition of a chemical to Annex III of the Convention. Severely hazardous pesticide formulations that present a risk under conditions of use in developing countries or countries with economies in transition may also be proposed for inclusion in Annex III.

Basel Convention
The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted on 22 March 1989 by the Conference of Plenipotentiaries in Basel, Switzerland, in response to a public outcry following the discovery, in the 1980s, in Africa and other parts of the developing world of deposits of toxic wastes imported from abroad.

The overarching objective of the Basel Convention is to protect human health and the environment against the adverse effects of hazardous wastes. Its scope of application covers a wide range of wastes defined as “hazardous wastes” based on their origin and/or composition and their characteristics, as well as two types of wastes defined as “other wastes” - household waste and incinerator ash.

The provisions of the Convention center around the following principal aims:

- the reduction of hazardous waste generation and the promotion of environmentally sound management of hazardous wastes, wherever the place of disposal;
- the restriction of transboundary movements of hazardous wastes except where it is perceived to be in accordance with the principles of environmentally sound management; and
- a regulatory system applying to cases where transboundary movements are permissible.

Eco-labels
Eco-label schemes are voluntary schemes where industry can apply for the right to use the eco-label on their products if these fulfil the ecolabelling criteria for that type of product. An EU scheme (the flower) and various national/regional schemes exist. In this project we have focused on the three most common schemes encountered on Danish products.

EU flower
The EU ecolabelling Regulation lays out the general rules and conditions for the EU ecolabel; the flower. Criteria for new product groups are gradually added to the scheme via 'decisions'; e.g. the Commission Decision of 21 June 2007 establishing the ecological criteria for the award of the Community eco-label to soaps, shampoos and hair conditioners.

Nordic Swan
The Nordic Swan is a cooperation between Denmark, Iceland, Norway, Sweden and Finland. The Nordic Ecolabelling Board consists of members from each national Ecolabelling Board and decides on Nordic criteria requirements for products and services. In Denmark, the practical implementation of the rules, applications and approval process related to the EU flower and Nordic Swan is hosted by Ecolabelling Denmark "Miljømærkning Danmark" (http://www.ecolabel.dk/). New criteria are applicable in Denmark when they are published on the Ecolabelling Denmark’s website (according to Statutory Order no. 447 of 23/04/2010).

Appendix 4: Environment

TABLE 4-1

AQUATIC TOXICITY OF SELECTED PERFUME SUBSTANCES AND CALCULATED PNEC AQUATIC AND PNEC SEDIMENT. R= GROWTH RATE. SUBSTANCES HIGHLIGHTED IN BOLD ARE ALSO INCLUDED ON THE IFRA LIST OFFRAGRANCE MATERIALS

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
52-51-7	Bronopol	Fish: LC50 (96h) = 35.7 mg/L Fish: NOEC (49d) = 21.5 mg/L Daphnia: EC50 (48h) = 1.4 mg/L Daphnia: NOEC (21d) =0.27 mg/L Alge (marine): ErC50 (72h) = 0.25 mg/L Alge (marine) NOECr (72h) = 0.08 mg/L	PNECfreshwater = 0.01 mg/L PNECmarine = 0.0008 mg/L PNECfreshwater sed. = 0.041 mg/kg sediment dw. Partition coefficient) PNECmarine sed. = 0.00328 mg/kg sediment dw. Partition coefficient)	REACH Registration data Key studies
75-08-1	Ethanethiol	Fish: LC50 (96h) = 2.4 mg/L Daphnia: EC50 (48h) <0.1 mg/L Alge: ErC50 (72h) = 3 mg/L Alge: ErC10 (72h) = 0.55 mg/L	PNECfreshwater = 0.0001 mg/L PNECmarine = 0.00001 mg/L PNECfreshwater sed. = 0.00049 mg/kg sediment dw (Partition coefficient) PNECmarine sed. = 0.000049 mg/kg sediment dw. (Partition coefficient)	REACH Registration data Key studies
78-78-4	2-methylbutane	Fish: LL50 (96h) = 34.05 mg/L (QSAR) Daphnia: EC50 (48h) = 2.3 mg/L Alge: ErL50 (72h) = 25.12 mg/L (QSAR) Alge: NOELr (72h) = 5.62 mg/L (QSAR)	NA	REACH Registration data Key studies (except Daphnia (Experimental supporting study))
109-66-0	Pentane	Fish: LC50 (96h) = 4.26 mg/L Daphnia: EC50 (48h) = 2.7 mg/L Cheatogammarus marinus:	PNECwater = 27 µg/L* PNEC sediment = 4.24 mg/kg sediment ww.* (equilibrium	REACH Registration data Experimental, supporting studies

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
		EC50 (48h) =3.4 mg/L Alge: ErC50 (72h) = 10.7 mg/L Alge: NOECr (72h) = 2.04 mg/L	partitioning)	*EU Risk assessment Report, 2003
110-01-0	Tetrahydrothiophene	Fish: LC50 (96h) >24 mg/L Daphnia: EC50 (48h) = 24 mg/L Alge: ErC50 (72h) > 153.2 mg/L Alge: NOECr (72h) = 29.1 mg/L	PNECfreshw. =0.024 mg/L PNECmarin = 0.0024 mg/L PNECfreshwater sed.= 0.1361 mg/kg sediment dw. (partition coefficient) PNECmarine sed. = 0.0136 mg/kg sediment dw. (partition coefficient)	REACH Registration data Key studies
110-54-3	**n-hexane**	**Fish: LL50 (96h) = 12.51 mg/L (QSAR)** **Daphnia: EC50 (48h) = 21.85 mg/L (QSAR)** **Alge: NOELr (72h) = 2.08 mg/L (QSAR)**	**NA**	**REACH Registration data Key studies**
120-51-4	**Benzyl benzoate**	**Fish: LC50 (96h) = 2.32 mg/L** **Daphnia: EC50 (48h) = 3.09 mg/L** **Daphnia: NOEC (3 wk.) = 0.258 mg/L** **Alge: ErC50 (72h) 0.475 mg/L; Alge: NOECr (72h) =0.245 mg/L**	**PNECfreshw. =0.0168 mg/L** **PNECmarin = 0.00168 mg/L** **PNECfreshwater sed.= 10.66 mg/kg sediment dw. (partition coefficient)** **PNECmarine sed. = 1.07 mg/kg sediment dw. (partition coefficient)**	**REACH Registration data Key studies**
287-92-3	Cyclopentane	Fish: LC50 (96h) = 29.3 mg/L (QSAR) Daphnia: EC50 (48h) = 51.15 mg/L (QSAR) Alge: EC50 (72h) = 21.58 mg/L (QSAR) Alge NOEC (72h) = 4.829 mg/L (QSAR)	NA	REACH Registration data Key studies

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
540-84-1	2,2,4-trimethylpentane	Fish and daphnids: read across C7-C9 Aliphatic hydrocarbon solvents Alge:EC50(72h) =2.943 mg/L (QSAR) Alge: NOEC (72h) = 0.658 mg/L (QSAR)	NA	REACH Registration data Key studies
1222-05-5	**1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylindeno[5,6-c]pyran (HHCB)**	**Fish: NOEC (21d) = 0.068 mg/L** **Acartia tonsa EC50 (5d) =0.044 mg/L** **Daphnia:EC50 (48h) = 0.47 mg/L** **Daphnia: NOEC (21d) = 111 µg/L** **Alge: ECr50 (72h) > 0.854 mg/L** **Alge: NOECr (72h) = 0.201 mg/L** **Chironomid: EC50 (28d) = 53.5 mg/** **Chironomid: NOEC (28d)= 7.1 mg/kg sediment dw**	**PNECfreshwater = 4.4 µg/L*** **PNECmarine = 0.44 µg/L** **PNEC sed. = 2. mg/kg ww.***	**REACH Registration data Key studies** ***EU Risk Asssessment report, 2008**
1306-19-0	Cadmium oxide	Fish: LC50(96h) = 748 µg/L Fish: NOEC (27d) = 1.3 µg/L (both read across CAS: 10108-64-2) Daphnia: LC50 (48h) = 750 µg/L Daphnia: EC10 (21d) = 1.78 µg/L Alge: Ec50 (72h) = 18 µg/L	PNECfreshwater = 0.19 µg/L PNECmarine = 1.14 µg/L PNECfreshwater sed. = 1.8 mg/kg sediment dw. (partition coefficient) PNECmarine sed. = 0.64 mg/kg sediment dw. (partition coefficient)	REACH Registration data Key studies
1306-23-6	Cadmium sulphide	(all read across CAS: 10108-64-2)	PNECfreshwater = 0.19 µg/L PNECmarine = 1.14 µg/L PNECfreshwater sed. = 1.8 mg/kg sediment dw. PNECmarine sed. = 0.64 mg/kg sediment dw.	REACH Registration data Key studies (read across CAS: 10108-64-2)
1314-13-2	**Zinc oxide**	**Fish: LC50 (96h) = 1.793 mg/L** **Daphnia: EC50 (48h) = 1.7 mg/L** **Alge: ErC50 (72h) =136 µg/L** **Alge: NOECr (72h) =24 µg/L**	**PNECfreshwater = 20.6 µg/L** **PNECmarine = 6.1 µg/L** **PNECfreshwater sed. = 117.8 mg/kg sediment dw.** **PNECmarine sed. = 56.5 mg/kg sediment**	**REACH Registration data Key studies (except fish, short term, supporting study)**

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
			dw.	
4067-16-7	3,6,9,12-tetraazatetradeca methylenediamine	Fish: Ec50 (96h) = 0.18 g/L Daphnia: EC50 (48h) = 17.5 mg/L (long term data: read across) Alge: ErC50 (72h) = 1.7 mg/L Alge: NOEC (72h) = 0.25 mg/L	PNECfreshwater = 2.5 µg/L PNECmarine = 2.5 µg/L PNECfreshwater sed. = 0.22 mg/kg sediment dw. (partition coefficient) PNECmarine sed. = 0.14 mg/kg sediment dw. (partition coefficient)	REACH Registration data Key studies
5989-27-5	**(R)-p-mentha-1,8-diene (d-limonene)**	**Fish: EC50 (96h) = 688 µg/L** **Daphnia: EC50 (48h) =0.36 mg/L**	**PNECfreshwater = 5.4 µg/L** **PNECmarine = 0.54 µg/L** **PNECfreshwater sed. = 1.32 mg/kg sediment dw. (partition coefficient)** **PNECmarine sed. = 0.13 mg/kg sediment dw. (partition coefficient)**	**REACH Registration data Key studies**
5989-54-8	**(S)-p-mentha-1,8-diene (l-limonene)**	**Fish (QSAR): EC50 (96h) = 0.845 mg/L** **Daphnia (QSAR): EC50 (48h) = 0.678 mg/L** **Alge (QSAR): EC50 (96h) =0.904 mg/L** **Alge (QSAR): NOECr = 0.514 mg/L**	**PNECfreshwater = 5.4 µg/L** **PNECmarine = 0.54 µg/L** **PNECfreshwater sed. = 1.32 mg/kg sediment dw. (partition coefficient)** **PNECmarine sed. = 0.13 mg/kg sediment dw. (partition coefficient)**	**REACH Registration data Key studies**
7646-85-7	Zinc chloride	Fish: LC50 (96h) = 112 µg/L Fish: NOEC (30d) = 39 µg/L Daphnia: LC50(48h) = 169 µg/L Daphnia: NOEC (21d) = 35 µg/L Alge: NOECr (3d) = 124 µg/L Hyalella azteca: NOEC (28d) = 32 mg/kg sediment dw (zinc dichloride)	PNECfreshwater = 20.6 µg/L PNECmarine = 6.1 µg/L PNECfreshwater sed. = 117.8 mg/kg sediment dw. (partition coefficient) PNECmarine sed. = 56.5 mg/kg sediment dw. (partition coefficient)	REACH Registration data Key studies
7681-52-9	Sodium hypochlorite	Fish: LC50 (96h) = 0.032 mg TRO /L (Total Residual Oxidant) Fish: NOEC (15d) = 0.014 mg TRO/L	PNECfreshwater = 0.21 µg/L PNECmarine = 0.042 µg/L	REACH Registration data Key studies

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
		Daphnia: EC50 (48h) = 35 µg/L Alge: ErC50 (72h) = 0.0365 mg/L Alge: NOECr (72h) = 0.0054 mg/L	No exposure of sediment expected	
7695-91-2	**3,4-dihydro-2,5,7,8-tetramethyl-2-(4,8,12-trimethyltridecyl)-2H-benzopyran-6-yl acetate**	**Fish: LC50 (96h) > 11 mg/L** **Fish: NOEC (28d) > 100 mg/L** **Daphnia: EC50 (48h) > 20.6 mg/L** **Alge: ErC50 (72h) > 27.8 mg/L** **Alge: NOECr (72h) = 27.8 mg/L**	**PNECfreshwater = 0.27 mg/L** **PNECmarine = 0.027 mg/L** **PNECfreshwater sed. = 212,000 mg/kg sediment dw. (partition coefficient)** **PNECmarine sed. = 212,000 mg/kg sediment dw. (partition coefficient)**	**REACH Registration data Key studies**
7733-02-0	Zinc sulphate	Fish: LC50 (96h) = 330 µg/L Fish: NOEC (27d) = 25 µg/L Daphnia: EC50 (48h) = 259 µg/L Marine Mysid Crustacean NOEC (24d) = 5.6 µg/L Alge: NOECr (72h) = 20 µg/L	PNECfreshwater = 20.6 µg/L PNECmarine = 6.1 µg/L PNECfreshwater sed. 117.8 mg/kg sediment dw (statistical extrapolation) PNECmarine sed. = 56.5 mg/kg sediment dw (partition coefficient)	REACH Registration data Key studies
7761-88-8	Silver nitrate	Fish: LC50 (96h) = 1.2 µg/L Fish: NOEC (32d) =0.351 µg/L Daphnia: EC50 (48h) =0.22 µg/L (all three dissolved silver) Daphnia: NOEC (20d) =0.31 µg/L (total silver) Alge: EC10 (24h) = 0.41 µg/L (dissolved silver) Hyalella azteca: NOEC (10d) =0.012 g/kg	PNECfreshwater = 0.04 µg/L PNECmarine = 0.86 µg/L PNECfreshwater sed. 438.13 mg/kg sediment dw PNECmarine sed. = 438.13 mg/kg sediment dw	REACH Registration data Key studies
7779-90-0	Trizinc bis(orthophosphate)	Fish: read across Daphnia: EC50 (48h) > 2.34 mg/L Alge: ErC50 (72h) = 136 µg/L Alge: NOECr (72h) = 24 µg/L	PNECfreshwater = 20.6 µg/L PNECmarine = 6.1 µg/L PNECfreshwater sed. 117.8 mg/kg sediment dw (statistical extrapolation) PNECmarine sed. = 56.5 mg/kg sediment dw (partition coefficient)	REACH Registration data Key studies
10108-64-2	Cadmium chloride	Fish: LC50 (4h) = 748 µg/L	PNECfreshwater = 0.19	REACH

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
		Fish: NOEC (27d) = 1.3 µg/L Daphnia: : EC50 (48h) = 36 µg/L Daphnia: NOEC (33d) = 2 µg/L Alge: ErC50 (72h) = 70 µg/L Alge: ErC10 (72h) = 18.3 µg/L	µg/L PNECmarine = 1.14 µg/L PNECfreshwater sed. 1.8 mg/kg sediment dw (partition coefficient) PNECmarine sed. = 0.64 mg/kg sediment dw (partition coefficient)	Registration data Key studies
68131-73-7	Amines, polyethylenepoly-	Fish: LC50 (96h) = 100 mg/L Daphnia: EC50 (48h) = 2.2 mg/L Alge: EC50 (72h) = 0.5 mg/L Alge: NOEC (72h) = 0.16 mg/L	PNECfreshwater = 1.6 µg/L PNECmarine = 1.6 µg/L PNECfreshwater sed. 0.14 mg/kg sediment dw (partition coefficient) PNECmarine sed. = 0.14 mg/kg sediment dw (partition coefficient)	REACH Registration data Key studies
EC: 402-770-7	**2-methyl-4-phenylpentanol**	**Fish: LC50 (96h) = 13 mg/L Daphnia: EC50 (48h) = 8.7 mg/L Alge: ErC50 (72h) = 20 mg/L Alge: ErC10 (72h) = 11 mg/L**	**NA**	**REACH Registration data Key studies**
103694-68-4	**3-(2,2-dimethyl-3-hydroxypropyl) toluene**	**Daphnia sp.: EC50 (48h) = 19 mg/L Alge: ErC50 (72h) = 22 mg/L; Alge: NOECr (72h) = 7.2 mg/L**	**NA**	**REACH Registration data Key studies**
97384-48-0	**2-benzyl-2-methyl-3-butenitrile**	**Daphnids: EC50 (24h) = 28 mg/L Alge: ErC50 (72h) = 24 mg/L Alge: NOECr (72h) = 5 mg/L**	**NA**	**REACH Registration data Key studies**
107898-54-4	**(+/-) trans-3,3-dimethyl-5-(2,2,3-trimethyl-cyclopent-3-en-1-yl)pent-4-en-2-ol**	**Daphnids: EC50 (48h) = 1 mg/L Alge: ErC50 (72h) = 1.4 mg/L Alge: NOECr (72h) = 0.45 mg/L**	**NA**	**REACH Registration data Key studies**
125109-85-5	**β-methyl-3-(1-methylethyl)benzenepropanal**	**Fish: LC50 (96h) = 1.082 mg/L Daphnids: EC50 (48h) = 5.48 mg/L Daphnids: NOEC (21d) = 0.71 mg/L Alge: ErC50 (72h) = 11 mg/L**	**PNECfreshwater = 7.1 µg/L PNECmarine = 0.71 µg/L PNECfreshwater sed. = 0.552 mg/kg sediment dw.**	**REACH Registration data Key studies**

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
		Alge: NOECr (72h) = 3.2 mg/L	**(partition coefficient) PNECmarine sed. = 0.0552 mg/kg sediment dw. (partition coefficient)**	
2511-00-4	**ethyl 2-cyclohexylpropionate**	**Fish: LC50 (96h) = 8.6 mg/L Daphnids: EC50 (48h) = 1.1 mg/L Alge: ErC50 (72h) = 94.8 mg/L Alge: NOELr (72h) = 25.5 mg/L**	**NA**	**REACH Registration data Key studies**
EC: 413-800-3	A mixture of: N,N-di(hydrogenated alkyl C14-C18)phthalamic acid; dihydrogenated alkyl (C14-C18)amine	Fish: LC50 (96h) > 1,000 mg/L Daphnids: EC50 (48h) > 1,000 mg/L Alge: ErL50 (72h) > 100 mg/L Alge: NOELr (72h) >100 mg/L	NA	REACH Registration data Key studies
151006-61-0	A mixture of isomers of branched tetracosane	Fish: LL50 (96h) >1,000 mg/L Daphnids: EL50 (48h) >1,000 mg/L Alge: ErL50 (72h) = >1,000 mg/L Alge: NOELr (72h) = 1,000 mg/L	NA	REACH Registration data Key studies
72903-27-6	**Diethyl 1,4-cyclohexanedicarboxylate**	**Fish: LC50 (96h) = 3.2 mg/L Daphnids: EC50 (48h) = 45 mg/L Alge: ErC50 (72h) = 86 mg/L Alge: NOECr (72h) = 25 mg/L**	**PNECfreshwater = 7.1 µg/L PNECmarine = 0.71 µg/L PNECfreshwater sed. = 0.166mg/kg sediment dw. (partition coefficient) PNECmarine sed. = 0.0166mg/kg sediment dw. (partition coefficient)**	**REACH Registration data Key studies**
426218-78-2	**A mixture of[7]**	**Fish: LC50 (96h) = 3.8 mg/L Daphnids: EC50 (48h) = 1.3**	**PNECfreshwater = 1.3 µg/L**	**REACH Registration**

[7]: 4-(2,2,3-trimethylcyclopent-3-en-1-yl)-1-methyl-2-oxabicyclo[2.2.2]octane; 1-(2,2,3-trimethylcyclopent-3-en-1-yl)-5-methyl-6-oxabicyclo[3.2.1]octane; spiro[cyclohex-3-en-1-yl-[(4,5,6,6a-tetrahydro-3,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]furan]; spiro[cyclohex-3-en-1-yl-[4,5,6,6a-tetrahydro-4,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]]furan]

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
		mg/L Alge: ErC50 (72h) = 13 mg/L Alge: NOECr (72h) = 2.6 mg/L	**PNECmarine = 0.13 µg/L PNECfreshwater sed. = 0.289 mg/kg sediment dw. (partition coefficient) PNECmarine sed. = 0.0289 mg/kg sediment dw. (partition coefficient)**	**data Key studies**
74338-72-0	**2,4,4,7-tetramethyl-6-octen-3-one**	**Fish: LC50 (96h) = 8.6 mg/L Daphnids: EC50 (48h) = 2.1 mg/L Alge: ErC50 (72h) = 13.3 mg/L Alge: NOECr (72h) = 1.7 mg/L**	**PNECfreshwater = 2.1 µg/L PNECmarine = 0.21 µg/L PNECfreshwater sed. = 34.1 µg/kg sediment dw. PNECmarine sed. = 3.41 µg/kg sediment dw.**	**REACH Registration data Key studies**
75490-39-0	**2,2,4-trimethyl-4-phenyl-butane-nitrile**	**Fish: LC50 (96h) = 4.6 mg/L Daphnids: EC50 (48h) = 12 mg/L Alge: ErC50 (72h) = 12 mg/L Alge: NOECb (72h) = 4.5 mg/L**	**NA**	**REACH Registration data Key studies**
3508-98-3	**2-phenylhexanenitrile**	**Fish: LC50 (96h) = 2.2 mg/L Daphnids: EC50 (48h) = 1.6 mg/L Alge: ErC50 (72h) > 2.58 mg/L Alge: NOECr (72h) 0.26 mg/L**	**PNECfreshwater =1.6 µg/L PNECmarine = 0.16 µg/L PNECfreshwater sed. = 0.0757 mg/kg sediment dw (partition coefficient) PNECmarine sed. = 0.00757 mg/kg sediment dw (partition coefficient)**	**REACH Registration data Key studies**
10461-98-0	**2-cyclohexylidene-2-phenylacetonitrile**	**Daphnids: EC50 (48h) =2.3 mg/L Alge: ErC50 (72h) > 1.96 mg/L Alge: NOECr (72h) 0.5 mg/L**	**NA**	**REACH Registration data Key studies**
EC: 427-090-8	A mixture of: ethyl (2R,3R)-3-isopropylbicyclo[2.2.1]hept-5-ene-2-	Fish: LC50 (96h) = 4.49 mg/L Daphnids: EC50 (48h) =5.7 mg/L Alge: ErC50 (72h) > 5.9 mg/L	PNECfreshwater = 4.49 µg/L PNECmarine = 0.498 µg/L	REACH Registration data Key studies

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
	carboxylate; ethyl (2S,3S)-3-isopropylbicyclo[2.2.1]hept-5-ene-2-carboxylate	Alge: NOECr (72h) = 2.9 mg/L	PNECfreshwater sed. = 0.563 mg/kg sediment dw (partition coefficient) PNECmarine sed. = 0.0563 mg/kg sediment dw (partition coefficient)	
EC: 429-900-5	Muscenone Delta	Fish: LC50 (96h) = 0.22 mg/L Fish: NOEC (10d) = 0.13 mg/L Daphnids: EC50 (48h) 0,39 mg/L Alge: ErC50 (72h) > 30 mg/L Alge: NOECr (72h) ≥ 30 mg/L	PNECfreshwater = 8.98 µg/L PNECmarine = 0.898 µg/L PNECfreshwater sed. 13.59 mg/kg sediment dw (partition coefficient) PNECmarine sed. = 1.36 mg/kg sediment dw (partition coefficient)	REACH Registration data Key studies
151006-58-5	1-Dodecene dimer with 1-Decene, hydrogenated	Fish: LL50 (96h) > 1000 mg/L Daphnids: EL50 (48h) > 150 mg/L Alge: EL50 (96h) > 1000 mg/L Alge: NOEL (72h) = 1000 mg/L	NA	REACH Registration data Key studies
8006-64-2	**Turpentine oil**	**Fish: LL50 (96h) = 29 mg/L** **Daphnids: EL50 (48h) = 6.4 mg/L** **Alge: ELr50 (72h) = 17.1 mg/L** **Alge: NOELr (72h) = 10 mg/L**	**NA**	**REACH Registration data Key studies**

TABLE 4-2
TOXICITY TO MICROORGANISMS OF SELECTED PERFUME SUBSTANCES AND CALCULATED PNEC STP. SUBSTANCES HIGHLIGHTED IN BOLD ARE ALSO INCLUDED ON THE IFRA LIST OFFRAGRANCE MATERIALS

CAS No.	Substance name	Result on toxicity (microorganism)	Resulting PNEC	Reference
52-51-7	Bronopol	EC20 (150min) = 2 mg/L	0.43 mg/L	REACH Registration data Key studies
75-08-1	Ethanethiol	EC50 (3h) = 880.5 mg/L	0.25 mg/L	Read across (Propane-2-thiol; CAs: 75-33-2)
78-78-4	2-methylbutane	EL (48h) =29.3 mg/L (QSAR) NOEL (48h) = 130.1 mg/L (QSAR)	NA	REACH Registration data Key studies
109-66-0	Pentane	NOEL (48h) = 23.7 mg/L (QSAR)	3600 µg/L	REACH Registration data Key studies
110-01-0	Tetrahydrothiophene	EC50 (3h) = 1530 mg/L EC10 (3h) = 310 mg/L	31 mg/L	REACH Registration data Key studies
110-54-3	**n-hexane**	**NOEC (48h) =10.89 mg/L (QSAR)**	**NA**	**REACH Registration data Key studies**
120-51-4	**Benzyl benzoate**	**EC50 (3h) > 10000 mg/L**	**NA**	**REACH Registration data Key studies**
287-92-3	Cyclopentane	EC50 (48h) = 112.4 mg/L (QSAR) NOEC (48h) =25.16 mg/L (QSAR)	NA	REACH Registration data Key studies
540-84-1	2,2,4-trimethylpentane	EC50 (48h) = 15.33 mg/L (QSAR) NOEC (48h) = 3.431 mg/L (QSAR)	NA	REACH Registration data Key studies
1222-05-5	**1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylindeno[5,6-c]pyran (HHCB)**	**EC0 (5d) = 10 mg/L**	**1 mg/L** **> 2 mg/L (based on PNECwater)***	**REACH Registration data Key studies** ***EU Risk Assessment Report, 2008**
1306-19-0	Cadmium oxide	NOEC (3h) = 353 µg/L	20 µg/L	REACH Registration data Key studies

CAS No.	Substance name	Result on toxicity (microorganism)	Resulting PNEC	Reference
1306-23-6	Cadmium sulphide	Read across	20 µg/L	REACH Registration data Key studies
1314-13-2	**Zinc oxide**	**NOEC (4h) = 0.1 mg/L**	**100 µg/L**	**REACH Registration data Key studies**
4067-16-7	3,6,9,12-tetraazatetradecamethylenediamine	NA	1.64 µg/L	REACH Registration data
5989-27-5	**(R)-p-mentha-1,8-diene**	**NA**	**1.8 mg/L**	**REACH Registration data**
5989-54-8	**(S)-p-mentha-1,8-diene**	**NA**	**1.8 mg/L**	**REACH Registration data**
7646-85-7	Zinc chloride	NOEC (4h) = 0.1 mg/L	100 µg/L	REACH Registration data Key studies
7681-52-9	Sodium hypochlorite	NOEC (3h) = 300 mg/L	4.69 mg/L	REACH Registration data Key studies
7695-91-2	**3,4-dihydro-2,5,7,8-tetramethyl-2-(4,8,12-trimethyltridecyl)-2H-benzopyran-6-yl acetate**	**EC10 > 10,000 mg/L**	**100 mg/L**	**REACH Registration data Key studies**
7733-02-0	Zinc sulphate	EC50(3h) =5.2mg/L	52 µg/L	REACH Registration data Key studies
7761-88-8	Silver nitrate	NOEC (13.3 min) = 0.05 mg Ag/L	0.025 mg/L	REACH Registration data Key studies
7779-90-0	Trizinc bis(orthophosphate)	NOEC (4h) = 0.1 mg/L	100 µg/L	REACH Registration data Key studies
10108-64-2	Cadmium chloride	NOEC (3h) = 200 µg/L	20 µg/L	REACH Registration data Key studies
68131-73-7	Amines, polyethylenepoly-	EC50 (2d) = 319.3 mg/L	3.19 mg/L	REACH Registration data

CAS No.	Substance name	Result on toxicity (microorganism)	Resulting PNEC	Reference
				Key studies
EC: 402-770-7	**2-methyl-4-phenylpentanol**	**NA**	**NA**	
103694-68-4	**3-(2,2-dimethyl-3-hydroxypropyl)toluene**	**NA**	**NA**	
97384-48-0	**2-benzyl-2-methyl-3-butenitrile**	**NA**	**NA**	
107898-54-4	**(+/-) trans-3,3-dimethyl-5-(2,2,3-trimethyl-cyclopent-3-en-1-yl)pent-4-en-2-ol**	**NA**	**NA**	
125109-85-5	**β-methyl-3-(1-methylethyl)benzenepropanal**	**NA**	**NA**	
2511-00-4	**ethyl 2-cyclohexylpropionate**	**NA**	**NA**	
EC: 413-800-3	A mixture of: N,N-di(hydrogenated alkyl C14-C18)phthalamic acid; dihydrogenated alkyl (C14-C18)amine	NA	NA	
151006-61-0	A mixture of isomers of branched tetracosane	NA	NA	
72903-27-6	**Diethyl 1,4-cyclohexanedicarboxylate**	**NOEC (3h) = 320 mg/L**	**32 µg/L**	**REACH Registration data Key studies**
426218-78-2	**A mixture of[8]:**	**NOEC (30 min) = 18 mg/L**	**1.8 mg/L**	**REACH Registration**

[8] **4-(2,2,3-trimethylcyclopent-3-en-1-yl)-1-methyl-2-oxabicyclo[2.2.2]octane; 1-(2,2,3-trimethylcyclopent-3-en-1-yl)-5-methyl-6-oxabicyclo[3.2.1]octane; spiro[cyclohex-3-en-1-yl-[(4,5,6,6a-tetrahydro-3,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]furan]; spiro[cyclohex-3-en-1-yl-[4,5,6,6a-tetrahydro-4,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]]furan]**

CAS No.	Substance name	Result on toxicity (microorganism)	Resulting PNEC	Reference
				data Key studies
74338-72-0	**2,4,4,7-tetramethyl-6-octen-3-one**	**NA**	**NA**	
75490-39-0	**2,2,4-trimethyl-4-phenyl-butane-nitrile**	**NOEC (3h) = 100 mg/L**	**NA**	**REACH Registration data Key studies**
3508-98-3	**2-phenylhexanenitrile**	**NOEC (3h) ≥ 100 mg/L**	**10 mg/L**	**REACH Registration data Key studies**
10461-98-0	**2-cyclohexylidene-2-phenylacetonitrile**	**NA**	**NA**	
EC: 427-090-8	A mixture of: ethyl (2R,3R)-3-isopropylbicyclo[2.2.1]hept-5-ene-2-carboxylate; ethyl (2S,3S)-3-isopropylbicyclo[2.2.1]hept-5-ene-2-carboxylate	NOEC (3h) = 56 mg/L	5,600 µg/L	REACH Registration data Key studies
EC: 429-900-5	Muscenone Delta	NA	10 mg/L	REACH Registration data
151006-58-5	1-Dodecene dimer with 1-Decene, hydrogenated	NOEC (14d) = 23.5 mg/L	NA	REACH Registration data Key studies
8006-64-2	**Turpentine oil**	**EC10 (3h) = 66 mg/L**	**6.6 mg/L**	**REACH Registration data Key studies**

TABLE 4-3
TERRESTRIAL TOXICITY OF SELECTED PERFUME SUBSTANCES AND CALCULATED PNEC SOIL. SUBSTANCES HIGHLIGHTED IN BOLD ARE ALSO INCLUDED ON THE IFRA LIST OFFRAGRANCE MATERIALS.

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
52-51-7	Bronopol	Earthworm: EC50 (14d) > 500 mg/kg dw. soil and NOEC (14d) =12.8 mg/kg dw. soil	0.5 mg/kg soil dw.	REACH Registration data Key study
75-08-1	Ethanethiol	NA	NA	
78-78-4	2-methylbutane	NA	NA	
109-66-0	Pentane	NA	519 µg/kg ww.	EU Risk assessment Report, 2003
110-01-0	Tetrahydrothiophene	NA	0.132 mg/kg soil dw. (partition coefficient)	REACH Registration data
110-54-3	**n-hexane**	**NA**	**NA**	
120-51-4	**Benzyl benzoate**	**NA**	**NA**	
287-92-3	Cyclopentane	NA	NA	
540-84-1	2,2,4-trimethylpentane	NA	NA	
1222-05-5	**1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylindeno[5,6-c]pyran (HHCB)**	**Earthworm: NOEC (8wk) = 45 mg/kg soil dw** **Collembola: NOEC (4wk) = 45 mg/kg soil dw**	**0.31 mg/kg soil dw.**	**REACH Registration data Key study** **EU Risk Assessment Report, 2008**
1306-19-0	Cadmium oxide	Dendrobaena rubida: NOEC (110d) = 10 mg/kg soil dw Collembola: NOEC (4wk) =25 mg/kg soil dw (read across; CAS: 10108-64-2) Avena sativa: NOEC (10d) = 12.5 mg/kg soil dw (germination) = 3.12 mg/kg soil dw (biomass)	0.9 mg/kg soil dw.	REACH Registration data Key study
1306-23-6	Cadmium sulphide	Read across	0.9 mg/kg soil dw.	REACH Registration data
1314-13-2	**Zinc oxide**	**Lolium perenne: IC50 (12d) = 64 mg/L**	**35.6 mg/kg soil dw.**	**REACH Registration data**

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
4067-16-7	3,6,9,12-tetraazatetradecamethylenediamine	NA	0.18 mg/kg soil dw.	REACH Registration data
5989-27-5	**(R)-p-mentha-1,8-diene (d-limonene)**	**NA**	**0.262 mg/kg soil dw.** **(partition coefficient)**	**REACH Registration data**
5989-54-8	**(S)-p-mentha-1,8-diene (l-limonene)**	**NA**	**0.262 mg/kg soil dw. (partition coefficient)**	**REACH Registration data**
7646-85-7	Zinc chloride	Earthworm: NOEC (28d) = 100 mg/kg soil dw Enchytraeus albidus (annelid) EC10 (42d) = 35.7 mg/kg soil dw	35.6 mg/kg soil dw. (statistical extrapolation)	REACH Registration data Key study
7681-52-9	Sodium hypochlorite	NA	No exposure of soil expected	REACH Registration data Key study
7695-91-2	**3,4-dihydro-2,5,7,8-tetramethyl-2-(4,8,12-trimethyltridecyl)-2H-benzopyran-6-yl acetate**	**NA**	**74800 mg/kg soil dw.**	**REACH Registration data**
7733-02-0	Zinc sulphate	Earthworm: NOEC (21d) = 350 mg/kg soil dw. Zea mays: NOEC (6wk) = 83 mg/kg soil dw.	35.6 mg/kg soil dw.	REACH Registration data Key study
7761-88-8	Silver nitrate	Earthworm: NOEC (56d) = 11.2 mg/kg soil dw. Lactuca sativa: NOEC (17d) = 0.16 mg/kg soil dw. NOEC (28d) = 0.13 mg/kg soil dw. (nitrogen transf.)	0.794 mg/kg soil dw. (partition coefficient)	REACH Registration data Key study
7779-90-0	Trizinc bis(orthophosphate)	NA	35.6 mg/kg soil dw. (statistical extrapolation)	REACH Registration data
10108-64-2	Cadmium chloride	Eisenia andrei : NOEC (21d) = 10 mg/kg soil dw.	0.9 mg/kg soil dw. (statistical extrapolation)	REACH Registration data

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
				Key study
68131-73-7	Amines, polyethylenepoly-	Earthworm: NOEC (56d) = 1000 mg/kg soil dw	10 mg/kg soil dw.	REACH Registration data Key study
EC: 402-770-7	**2-methyl-4-phenylpentanol**	**NA**	**NA**	
103694-68-4	**3-(2,2-dimethyl-3-hydroxypropyl)toluene**	**NA**	**NA**	
97384-48-0	**2-benzyl-2-methyl-3-butenitrile**	**NA**	**NA**	
107898-54-4	**(+/-) trans-3,3-dimethyl-5-(2,2,3-trimethyl-cyclopent-3-en-1-yl)pent-4-en-2-ol**	**NA**	**NA**	
125109-85-5	**β-methyl-3-(1-methylethyl)benzenepropanal**	**NA**	**0.106 mg/kg soil dw.**	**REACH Registration data**
2511-00-4	**ethyl 2-cyclohexylpropionate**	**NA**	**NA**	
EC: 413-800-3	A mixture of: N,N-di(hydrogenated alkyl C14-C18)phthalamic acid; dihydrogenated alkyl (C14-C18)amine	NA	NA	
151006-61-0	A mixture of isomers of branched tetracosane	NA	NA	
72903-27-6	**Diethyl 1,4-cyclohexanedicarboxylate**	**NA**	**0.0289 mg/kg soil dw.**	**REACH Registration data**

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
426218-78-2	**A mixture of[9]:**	**NA**	**0.0571 mg/kg soil dw.**	**REACH Registration data**
74338-72-0	**2,4,4,7-tetramethyl-6-octen-3-one**	**NA**	**10.8 µg/kg soil dw.**	**REACH Registration data**
75490-39-0	**2,2,4-trimethyl-4-phenyl-butane-nitrile**	**NA**	**NA**	
3508-98-3	**2-phenylhexanenitrile**	**NA**	**0.0142 mg/kg soil dw.**	**REACH Registration data**
10461-98-0	**2-cyclohexylidene-2-phenylacetonitrile**	**NA**	**NA**	
EC: 427-090-8	A mixture of: ethyl (2R,3R)-3-isopropylbicyclo[2.2.1]hept-5-ene-2-carboxylate; ethyl (2S,3S)-3-isopropylbicyclo[2.2.1]hept-5-ene-2-carboxylate	NA	0.125 mg/kg soil dw.	REACH Registration data
EC: 429-900-5	Muscenone Delta	Earthworm: EC50(14d) = 250 mg/kg soil ww Earthworm: NOEC (14d) = 180 mg/kg soil ww Avena sativa: NOEC (25d) =117 mg/kg soil dw. NOEC (28d) = 1000 mg/kg soil dw (nitrate formation)	10 mg/kg soil dw.	REACH Registration data
151006-58-5	1-Dodecene dimer with 1-Decene, hydrogenated	NA	NA	

[9] **4-(2,2,3-trimethylcyclopent-3-en-1-yl)-1-methyl-2-oxabicyclo[2.2.2]octane; 1-(2,2,3-trimethylcyclopent-3-en-1-yl)-5-methyl-6-oxabicyclo[3.2.1]octane; spiro[cyclohex-3-en-1-yl-[(4,5,6,6a-tetrahydro-3,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]furan]; spiro[cyclohex-3-en-1-yl-[4,5,6,6a-tetrahydro-4,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]]furan]**

CAS No.	Substance name	Result on toxicity	Resulting PNEC	Reference
8006-64-2	Turpentine oil	NA	0.45 mg/kg soil dw.	REACH Registration data

TABLE 4-4
INFORMATION ON AEROB BIODEGRADATION OF SELECTED PERFUME SUBSTANCES. SUBSTANCES HIGHLIGHTED IN BOLD ARE ALSO INCLUDED ON THE IFRA LIST OFFRAGRANCE MATERIALS

CAS No.	Substance name	Biodegradation	Reference
52-51-7	Bronopol	Ready biodegradable	REACH Registration data Key study
75-08-1	Ethanethiol	Not ready biodegradable	REACH Registration data Key study
78-78-4	2-methylbutane	Ready biodegradable	REACH Registration data Key study
109-66-0	Pentane	Ready biodegradable, fulfilling the 10-day window	REACH Registration data Key study EU Risk assessment Report, 2003
110-01-0	Tetrahydrothiophene	Not ready biodegradable	REACH Registration data Key study
110-54-3	**n-hexane**	**Ready biodegradable (QSAR)**	**REACH Registration data**
120-51-4	**Benzyl benzoate**	**Ready biodegradable**	**REACH Registration data**
287-92-3	Cyclopentane	Not ready biodegradable	REACH Registration data Key study
540-84-1	2,2,4-trimethylpentane	Inherently biodegradable (Read across, test substance not specified)	REACH Registration data Key study
1222-05-5	**1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylindeno[5,6-c]pyran (HHCB)**	**Not ready biodegradable**	**REACH Registration data Key study**
1306-19-0	Cadmium oxide	Not applicable inorganic chemical-Cadmium is an element and therefore persistent in the environment	
1306-23-6	Cadmium sulphide	Not applicable inorganic chemical-Cadmium is an element and therefore persistent in the environment	
1314-13-2	**Zinc oxide**	**Not applicable inorganic chemical-Zinc is an element and therefore persistent in the environment**	
4067-16-7	3,6,9,12-	Not ready biodegradable	REACH Registration data

CAS No.	Substance name	Biodegradation	Reference
	tetraazatetradecamethylenediamine		Key study
5989-27-5	**(R)-p-mentha-1,8-diene (d-limonene)**	**Readily biodegradable**	**REACH Registration data**
5989-54-8	**(S)-p-mentha-1,8-diene (l-limonene)**	**Readily biodegradable**	**REACH Registration data**
7646-85-7	Zinc chloride	Not applicable inorganic chemical- Zinc is an element and therefore persistent in the environment	
7681-52-9	Sodium hypochlorite	Not applicable inorganic chemical- Study technically not feasible	
7695-91-2	**3,4-dihydro-2,5,7,8-tetramethyl-2-(4,8,12-trimethyltridecyl)-2H-benzopyran-6-yl acetate**	**Not ready biodegradable**	**REACH Registration data**
7733-02-0	Zinc sulphate	Not applicable inorganic chemical- Zinc is an element and therefore persistent in the environment	
7761-88-8	Silver nitrate	Not applicable inorganic chemical- Silver is an element and therefore persistent in the environment	
7779-90-0	Trizinc bis(orthophosphate)	Not applicable inorganic chemical- Zinc is an element and therefore persistent in the environment	
10108-64-2	Cadmium chloride	Not applicable inorganic chemical- Cadmium is an element and therefore persistent in the environment	
68131-73-7	Amines, polyethylenepoly-	Not ready biodegradable	REACH Registration data Key study
EC: 402-770-7	**2-methyl-4-phenylpentanol**	**Not ready biodegradable**	**REACH Registration data Key study**
103694-68-4	**3-(2,2-dimethyl-3-hydroxypropyl)toluene**	**Not ready biodegradable**	**REACH Registration data Key study**
97384-48-0	**2-benzyl-2-methyl-3-butenitrile**	**Not ready biodegradable**	**REACH Registration data Key study**
107898-54-4	**(+/-) trans-3,3-dimethyl-5-(2,2,3-trimethyl-cyclopent-3-en-1-yl)pent-**	**Not ready biodegradable**	**REACH Registration data Key study**

CAS No.	Substance name	Biodegradation	Reference
	4-en-2-ol		
125109-85-5	**β-methyl-3-(1-methylethyl)benzenepropanal**	**Inherently biodegradable**	**REACH Registration data Key study**
2511-00-4	**ethyl 2-cyclohexylpropionate**	**Not ready biodegradable**	**REACH Registration data Key study**
EC: 413-800-3	A mixture of: N,N-di(hydrogenated alkyl C14-C18)phthalamic acid; dihydrogenated alkyl (C14-C18)amine	Inherently biodegradable	REACH Registration data Key study
151006-61-0	A mixture of isomers of branched tetracosane	Not ready biodegradable	REACH Registration data Key study
72903-27-6	**Diethyl 1,4-cyclohexanedicarboxylate**	**Readily biodegradable**	**REACH Registration data**
426218-78-2	**A mixture of[10]:**	**Not ready biodegradable**	**REACH Registration data Key study**
74338-72-0	**2,4,4,7-tetramethyl-6-octen-3-one**	**NA**	
75490-39-0	**2,2,4-trimethyl-4-phenyl-butane-nitrile**	**Not ready biodegradable**	**REACH Registration data Key study**
3508-98-3	**2-phenylhexanenitrile**	**Not ready biodegradable**	**REACH Registration data Key study**
10461-98-0	**2-cyclohexylidene-2-phenylacetonitrile**	**Not ready biodegradable**	**REACH Registration data Key study**
EC: 427-090-8	A mixture of: ethyl (2R,3R)-3-isopropylbicyclo[2.2.1]hept-5-ene-2-carboxylate; ethyl (2S,3S)-3-isopropylbicyclo[2.2.1]hept-5-ene-2-carboxylate	Not ready biodegradable	REACH Registration data Key study
EC: 429-900-5	Muscenone Delta	Readily biodegradable	REACH Registration data Key study

[10] **4-(2,2,3-trimethylcyclopent-3-en-1-yl)-1-methyl-2-oxabicyclo[2.2.2]octane; 1-(2,2,3-trimethylcyclopent-3-en-1-yl)-5-methyl-6-oxabicyclo[3.2.1]octane; spiro[cyclohex-3-en-1-yl-[(4,5,6,6a-tetrahydro-3,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]furan]; spiro[cyclohex-3-en-1-yl-[4,5,6,6a-tetrahydro-4,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]]furan]**

CAS No.	Substance name	Biodegradation	Reference
151006-58-5	1-Dodecene dimer with 1-Decene, hydrogenated	Readily biodegradable, but failing 10-day window	REACH Registration data Key study
8006-64-2	Turpentine oil	Readily biodegradable, but failing 10-day window	REACH Registration data Key study

TABLE 4-5
SUMMARY ON PBT PROPERTIES OF SELECTED PERFUME SUBSANCES. SUBSTANCES HIGHLIGHTED IN **BOLD** ARE ALSO INCLUDED ON THE IFRA LIST OFFRAGRANCE MATERIALS.

CAS No.	Substance name	PBT assessment	Reference
52-51-7	Bronopol	Not PBT	REACH Registration data
75-08-1	Ethanethiol		NA
78-78-4	2-methylbutane	Not PBT	REACH Registration data
109-66-0	Pentane	Not PBT	REACH Registration data
110-01-0	Tetrahydrothiophene	Not PBT	NA
110-54-3	**n-hexane**	**Not PBT**	**NA**
120-51-4	**Benzyl benzoate**	**Not PBT**	**REACH Registration data**
287-92-3	Cyclopentane	Not PBT	REACH Registration data
540-84-1	2,2,4-trimethylpentane		NA
1222-05-5	**1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylindeno[5,6-c]pyran (HHCB)**	**Not PBT**	**REACH Registration data EU Risk Assessment Report, 2008**
1306-19-0	Cadmium oxide	Not applicable, Inorganic substance	
1306-23-6	Cadmium sulphide	Not applicable, Inorganic substance	
1314-13-2	**Zinc oxide**	**Not applicable, Inorganic substance**	
4067-16-7	3,6,9,12-tetraazatetradecamethylenediamine	Not PBT	REACH Registration data
5989-27-5	**(R)-p-mentha-1,8-diene (d-limonene)**	**Not PBT**	**REACH Registration data**
5989-54-8	**(S)-p-mentha-1,8-diene (l-limonene)**	**Not PBT**	**REACH Registration data**

CAS No.	Substance name	PBT assessment	Reference
7646-85-7	Zinc chloride	Not applicable, Inorganic substance	
7646-85-7	Zinc chloride	Not applicable, Inorganic substance	
7681-52-9	Sodium hypochlorite	Not applicable, Inorganic substance	
7695-91-2	**3,4-dihydro-2,5,7,8-tetramethyl-2-(4,8,12-trimethyltridecyl)-2H-benzopyran-6-yl acetate**	**Not PBT**	**REACH Registration data**
7733-02-0	Zinc sulphate	Not applicable, Inorganic substance	
7761-88-8	Silver nitrate	Not applicable, Inorganic substance	
7779-90-0	Trizinc bis(orthophosphate)	Not applicable, Inorganic substance	
10108-64-2	Cadmium chloride	Not applicable, Inorganic substance	
68131-73-7	Amines, polyethylenepoly-	Not PBT	REACH Registration data
EC: 402-770-7	**2-methyl-4-phenylpentanol**		**NA**
103694-68-4	**3-(2,2-dimethyl-3-hydroxypropyl)toluene**		**NA**
97384-48-0	**2-benzyl-2-methyl-3-butenitrile**		**NA**
107898-54-4	**(+/-) trans-3,3-dimethyl-5-(2,2,3-trimethyl-cyclopent-3-en-1-yl)pent-4-en-2-ol**		**NA**
125109-85-5	**β-methyl-3-(1-methylethyl)benzenepropanal**		**NA**
2511-00-4	**ethyl 2-cyclohexylpropionate**		**NA**
EC: 413-800-3	A mixture of: N,N-di(hydrogenated alkyl C14-		NA

CAS No.	Substance name	PBT assessment	Reference
	C18)phthalamic acid; dihydrogenated alkyl (C14-C18)amine		
151006-61-0	A mixture of isomers of branched tetracosane	Not PBT	REACH Registration data
72903-27-6	**Diethyl 1,4-cyclohexanedicarboxylate**	**Not PBT**	**REACH Registration data**
426218-78-2	**A mixture of [11]:**	**Not PBT**	**REACH Registration data**
74338-72-0	**2,4,4,7-tetramethyl-6-octen-3-one**	**Not PBT**	**REACH Registration data**
75490-39-0	**2,2,4-trimethyl-4-phenyl-butane-nitrile**		**NA**
3508-98-3	**2-phenylhexanenitrile**	**Not PBT**	**REACH Registration data**
10461-98-0	**2-cyclohexylidene-2-phenylacetonitrile**		**NA**
EC: 427-090-8	A mixture of: ethyl (2R,3R)-3-isopropylbicyclo[2.2.1]hept-5-ene-2-carboxylate; ethyl (2S,3S)-3-isopropylbicyclo[2.2.1]hept-5-ene-2-carboxylate		NA
EC: 429-900-5	Muscenone Delta	Not PBT	REACH Registration data
151006-58-5	1-Dodecene dimer with 1-Decene, hydrogenated	Not PBT	REACH Registration data
8006-64-2	**Turpentine oil**	**Not PBT**	**REACH Registration data**

[11] 4-(2,2,3-trimethylcyclopent-3-en-1-yl)-1-methyl-2-oxabicyclo[2.2.2]octane; 1-(2,2,3-trimethylcyclopent-3-en-1-yl)-5-methyl-6-oxabicyclo[3.2.1]octane; spiro[cyclohex-3-en-1-yl-[(4,5,6,6a-tetrahydro-3,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]furan]; spiro[cyclohex-3-en-1-yl-[4,5,6,6a-tetrahydro-4,6',6',6'a-tetramethyl)-1,3'(3'aH)-[2H]cyclopenta[b]]furan]

Appendix 5: CMR properties

The CMR properties for the 827 registered substances within REACH were explored by their harmonise classifications. Substances not included in the 38 substances collected by the criteria in this project are shown here. None of these substances are included in the IFRA list of used fragrances, but registered in the product category PC28 “Perfumes/fragrance” Thus, may be used as intermediates in the production of perfume, but not contained in the final product. For reasons/possible explanations why there is a discrepancy between REACH registration in PC28 and the IFRA list see chapter 1.

Toxicity to reproduction
Out of the investigated 827 fragrance substances registered under REACH, 1 substance (cadmium chloride) is appointed a classification as repr 1B; H360FD (may damage fertility. may damage the unborn child). This substance is not included in the IFRA list of used fragrances.

Out of the investigated 827 fragrance substances registered under REACH, 3 substances (N,N-dimethylformamide, cadmium oxide, cadmium sulphide) are appointed a classification as repr 2; H361 (suspected of damaging fertility or the unborn child).

Mutagenicity
Out of the investigated 827 fragrance substances registered under REACH, 3 substance (methyloxirane , butane (due to content of butadiene),and cadmium chloride) is appointed a classification as Muta 1B; H340 (may cause genetic defects).

Carcinogenicity
Out of the investigated 827 fragrance substances registered under REACH, 1 substance (butane) is appointed a classification as Carc 1A; H350 (may cause cancer) due to content of 1,2-butadiene.

Out of the investigated 827 fragrance substances registered under REACH, 13 substances (cadmium sulphide, cadmium chloride, cadmium oxide, methyloxirane, epoxyethyl benzene, lubricating oils, petrolatrum, petrolatrum; oxidized, petrolatrum; hydrotreated, petrolatrum; clay treated, slack wax, slack wax; clay treated, slack wax; hydrotreated) is appointed a classification as Carc 1B; H350 (may cause cancer).

Of the 827 fragrance substances registered under REACH two substances (dichloromethane, trisodium nitrilotriacetate have a harmonised classification as Carc2; H351 (suspected of causing cancer).

Survey of fragrance substances

This survey is part of the Danish EPA's review of the substances on the List of Undesirable Substances (LOUS). The survey concerns fragrance substances. These substances were included in the LOUS list in 2009. The report presents information on uses and existing regulation as well as known health effects of fragrance substances, primarily allergy.

Denne kortlægning er et led i Miljøstyrelsens kortlægninger af stofferne på Listen Over Uønskede Stoffer (LOUS). Kortlægningen omhandler parfumestoffer, som blev optaget på listen i 2009. Rapporten indeholder blandt andet en beskrivelse af anvendelser og eksisterende regulering samt en beskrivelse af velkendte sundhedseffekter, særligt allergi.

Danish Ministry of the Environment
Environmental Protection Agency

Strandgade 29
1401 Copenhagen K, Denmark
Tel.: (+45) 72 54 40 00

www.mst.dk