



**Ministry of Environment  
of Denmark**  
Environmental  
Protection Agency

# **Control of Biocides 2020**

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Sources must be acknowledged

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# Preface

The planned analytical chemical control of biocides on the Danish market in 2020 was suspended due to the COVID-19 outbreak. The reason was that The Danish Environmental Protection Agency (EPA) together with The Danish Custom Service, observed a considerable increase in the import, production, and marketing of alleged hand and surface disinfection/sanitizer products after the outbreak of the COVID-19 pandemic. The Danish EPA also observed that these disinfection/sanitizer products were imported, produced, and put on the market by many new market actors who might lack knowledge about the rules and regulations on CLP (Classification, Labelling and Packaging), and rules and regulations on biocides. In consequence, the analytical effort focused on the ad hoc control of hand and surface disinfection/sanitizer products that were collected at the Danish border by the Danish Customs Agency and products that were collected on the Danish market by the Danish Chemical Inspection Service of The Danish EPA. The collected products were analysed to verify that the content of active substances was sufficient to ensure adequate efficacy and to identify problematic/prohibited substances.

The routine ad hoc control of rodenticides applied without permit was maintained.

# Sammenfatning og konklusion

Denne rapport beskriver den kemisk analytiske kontrol af biocidprodukter udført i 2020 af Kemikalieinspektionen i samarbejde med Toldstyrelsen (Ref.1,2).

Den planlagte kontrol af biocidprodukter på det danske marked i 2020 blev suspenderet efter udbruddet af COVID-19. I stedet blev den analytiske indsats rettet mod ad hoc-kontrol af desinfektionsmidler til hænder og overflader samt antikoagulante rodenticider.

I alt blev 69 produkter til desinfektion af enten hænder eller overflader indsamlet. I alt 42 produkter blev indsamlet ved den danske grænse af Toldstyrelsen, og 27 produkter blev indsamlet på det danske marked af Kemikalieinspektionen. Produkttyperne er opsummeret i den følgende tabel:

Produkt type	Anvendelse	
	Hænder	Overflade
Gel	46	0
Servietter	7	5
Væske	10	0
Aerosol	1	0
Total	69	

I alt blev følgende kvantitative analyser udført:

- 68 produkter blev analyseret for ethanol (EtOH) og isopropanol (IPA)
- tre produkter blev analyseret for methanol (MeOH)
- to produkter blev analyseret for 1-propanol
- fire produkter blev analyseret for didecyldimethylammonium chlorid (DDAC)
- to produkter blev analyseret for propylenglykol
- et produkt blev analyseret for citronsyre og chlorhexidin digluconat.

Desuden blev massefylden bestemt for 41 produkter og pH i 35 produkter.

Det totale alkoholindhold var >60 %w/w i 43 ud af 68 produkter. Ethanol blev påvist og kvantificeret i 66 ud af 68 analyserede produkter, med indhold i området 2,6-83 %w/w. Isopropanol blev påvist og kvantificeret i 16 ud af 68 analyserede produkter, med indhold i området 0,1-12 %w/w. Methanol blev påvist og kvantificeret i tre produkter med et indhold i området 0,2-10 %w/w. I to af de indsamlede produkter blev 1-propanol påvist og kvantificeret med et indhold på hhv. 42 og 0,5 %w/w.

DDAC blev detekteret og kvantificeret i to ud af fire produkter analyseret for dette aktivstof. To produkter blev analyseret for propylenglykol, og ingen af produkterne indeholdt propylenglykol >0,005 %w/w. I et produkt blev citronsyre og chlorhexidin digluconat detekteret og kvantificeret.

Desuden blev der indsamlet 16 ad hoc-prøver til analyse, hvor der var mistanke om uautoriseret anvendelse af antikoagulante rodenticider. Der blev påvist antikoagulante rodenticider i 14 ud af 16 ad hoc-prøver.

# Summary and conclusion

This report describes the analytical chemical control of biocide products carried out in 2020 by the Danish Chemical Inspection Service, in collaboration with the Danish Customs Agency (Ref. 1, 2).

The planned control of biocides on the Danish market in 2020 was suspended after the COVID-19 outbreak. Instead, the analytical effort focused on the ad hoc control of disinfection/sanitizer products (for hands and surfaces) and anticoagulant rodenticides.

A total of 69 disinfection/sanitizer products for hands or surfaces were collected. A total of 42 products were collected at the Danish border by the Danish Customs Agency, and 27 products were collected on the Danish market by the Danish Chemical Inspection Service. The product types are summarized in the following table.

Product type	Application	
	Hands	Surfaces
Gel	46	0
Wipes	7	5
Liquid	10	0
Aerosol	1	0
Total	69	

Total quantitative analyses:

- 68 products were analysed for ethanol (EtOH) and isopropanol (IPA)
- three products were analysed for methanol (MeOH)
- Two products were analysed for 1-propanol
- Four products were analysed for didecyldimethylammonium chloride (DDAC)
- Two products were analysed for propylene glycol
- One product was analysed for citric acid and chlorhexidine digluconate

Furthermore, density was determined for 41 products and pH was determined in 35 products.

The total alcohol content was >60%w/w in 43 out of 69 analysed products. Ethanol was detected and quantified in 66 out of 68 analysed products with concentrations ranging from 2.6-83%w/w. Isopropanol was detected and quantified in 16 out of 68 analysed products with concentrations ranging from 0.1-12%w/w. Methanol was detected and quantified in three products with concentrations ranging from 0.2–10%w/w. In two of the collected products, 1-propanol was detected and quantified, with one product containing 42%w/w and the other 0.5%w/w.

DDAC was detected and quantified in two out of four products analysed for this active substance (a.s.). Two products were analysed for propylene glycol, and neither contained propylene glycol >0.005%w/w. In one product, citric acid and chlorhexidine digluconate were detected and quantified.

Additionally, 16 ad hoc samples, suspected of being anticoagulant rodenticides used without authorization, were submitted for analysis. Anticoagulant rodenticides were identified in 14 out of 16 collected ad hoc samples.

# 1. Background

## 1.1 Strategy and biocide analysis

The planned analytical chemical control of biocides on the Danish market in 2020 was suspended due to the COVID-19 outbreak. The reason was that The Danish Environmental Protection Agency (EPA) together with The Danish Custom Service, observed a considerable increase in the import, production, and marketing of alleged hand and surface disinfection/sanitizer products after the outbreak of the COVID-19 pandemic. The Danish EPA also observed that these disinfection/sanitizer products were imported, produced, and put on the market by many new market actors who might lack knowledge about the rules and regulations on CLP (Classification, Labelling and Packaging), and rules and regulations on biocides. (Ref. 1). The routine ad hoc control of anticoagulant rodenticides applied without permit was maintained.

## 1.2 Collection of products and samples

### 1.2.1 Disinfection/sanitizer products

The analytical effort focused on the ad hoc control of hand and surface disinfection/sanitizer products collected at the Danish border by The Danish Customs Agency and on products collected on the Danish market by The Danish Chemical Inspection Service. The collected products were analysed to verify that the content of active substances was sufficient to ensure adequate efficacy (Ref. 3) and to identify problematic/prohibited substances.

### 1.2.2 Anticoagulant rodenticides

According to Statutory Order no. 1686 of 18/12/2018 (Ref. 4), the application of anticoagulant rodenticides is restricted to authorized exterminators only. Upon suspicion of unauthorized use of rodenticides, samples were collected, primarily by the municipalities, and submitted for analysis of anticoagulant rodenticides.

## 1.3 Analysis

The analyses of the products and samples were performed by Danish Technological Institute, Laboratory for Chemistry and Microbiology. DTI is a self-owned and not-for-profit Institute (Ref. 5). The Laboratory for Chemistry and Microbiology is accredited by DANAK (Danish Accreditation and Metrology Fund), registration no. 90, according to DS/EN ISO/IEC 17025:2017 (Ref. 6).

## 2. Ad hoc sanitizer products

### 2.1 Collected products and samples

A total of 69 sanitizers were collected. 42 products were collected by The Danish Customs Agency, and 27 products were collected by The Chemical Inspection Service of The Danish EPA.

Overall, four different types of sanitizers were collected. The intended application was either to disinfect/sanitize hands or surfaces. The product types collected are summarized in TABLE 1. The collected products are presented in TABLE 3 and TABLE 4.

**TABLE 1.** Product types collected

Product type	Application	
	Hands	Surfaces
Gel	46	0
Wipes	7	5
Liquid	10	0
Aerosol	1	0
Total	69	

### 2.2 Tolerances of active substances

Statens Serum Institut (SSI) recommend that alcohol-based hand sanitizer products should contain 70-85% alcohol on a volume-by-volume basis (V/V), corresponding to 63-80% alcohol on a weight-by-weight basis for sufficient efficacy (Ref. 3).

### 2.3 Analysis

Depending on the specific product, an analytical program was compounded. Paragraph 2.3.1-2.3.3 briefly summarizes the analytical methods applied.

#### 2.3.1 Determination of the active substances ethanol and isopropanol

An initial screening for nine specific solvents, including ethanol and isopropanol, was performed by gas chromatography with flame ionization detector (GC-FID) according to DTI's method OA-836 (TABLE 2). Ethanol and isopropanol were then quantified by GC-FID using external reference standards. The remaining compounds were reported either as being present (>0.1%w/w) or quantified on a case-by-case basis if present in significant amounts. Quantitative analyses were performed in triplicate.

**TABLE 2.** Compounds included in DTI's method OA-836

Compound	CAS no.
Ethanol	64-17-5
Isopropanol	67-63-0
Methanol	67-56-1
tert-Butanol	75-65-0
1-Propanol	71-23-8
2-Butanone	78-93-3



Compound	CAS no.
2-Methyl-1-propanol	78-83-1
2-Methyl-2-butanol	75-85-4
4-Methyl-2-pentanone	108-10-1

## 2.3.2 Other chemical analyses

### 2.3.2.1 Analysis of DDAC

Four products were analysed for didecyldimethylammonium chloride (DDAC, CAS no. 7173-51-5) by liquid chromatography with mass spectrometric detection (LC-MS) according to DTI's method OA-1204. The analysis was performed in triplicate.

### 2.3.2.2 Analysis of propylene glycol

One product was analysed for propylene glycol (CAS no. 57-55-6) by GC-FID according to DTI's method OA-838. The analysis was performed in triplicate.

### 2.3.2.3 Determination of citric acid

One product was analysed for citric acid (CAS no. 77-92-9) by liquid chromatography coupled with diode array detection (HPLC-DAD) according to DTI's method OA-711. The analysis was performed in duplicate.

### 2.3.2.4 Determination of chlorhexidine digluconate

One product was analysed for chlorhexidine digluconate (CAS no. 18472-51-0) by liquid chromatography coupled with diode array detection (HPLC-DAD) according to DTI's ad hoc method. The analysis was performed in duplicate.

## 2.3.3 Physical-chemical analysis

### 2.3.3.1 Determination of density

The density was determined for 41 products. The density of the liquid formulations was determined according to DTI's analysis method UA-202. The method is based on CIPAC MT 3.2 (Ref. 7), and the density of the product is determined by pycnometer. The analysis was performed in duplicate. Because the analysis is limited by the sample amount it was not performed for products where less than 100 mL liquid was supplied, incl. liquid associated with disinfection wipes. For products where the density was not determined, the measured active substance concentration was only reported as weight-by-weight percentage.

### 2.3.3.2 Determination of pH

pH was determined in 35 of the products. pH for undiluted samples of the products was determined by potentiometric measurement according to DTI's analysis method UA-310. The method is based on CIPAC MT 75.3 (Ref. 7). The analysis was performed in triplicate.

## 2.4 Results

The results for the products collected by The Danish Customs Agency are presented in TABLE 3. The results of products collected on the Danish market by The Chemical Inspection Service are presented in TABLE 4. Products where other components were detected by screening but not quantified are listed in Appendix 1.

**TABLE 3.** Products collected by the Danish Customs Agency

EPA no.	DTI no.	Product name	Type	Use	a.s. as stated on label <sup>1</sup>	Results							
						a.s.	Conc.	Conc	RSD	Total alcohol		Density	pH
							%w/w	%V/V	%	%w/w	%V/V	g/cm <sup>3</sup>	
2020-14227	925263-1	Biotol Hygenic Hand cleaning Gel	Gel	Hands	60% Ethanol	EtOH	55	n/a	1.2	56	n/a	n/a	n/a
						IPA	1.4	n/a	0.4				
2020 – 36375	938206-1	OPTI-SAFE Hånddesinfektion	Gel	Hands	75.69% Ethanol	EtOH	59	65	1.3	59	65	0.878	7.3
						IPA	<0.1	-	-				
2020-14802	928030-1	JASMINE HAND SANITIZER <sup>2</sup>	Gel	Hands	Not stated	EtOH	75	83	2.3	75	83	0.884	n/a
						IPA	<0.1	-	-				
2020-15042	928032-1	Pasion Instant Hand Sanitizer	Gel	Hands	Alcohol	EtOH	66	74	0.9	66	74	0.886	n/a
						IPA	<0.1	-	-				
2020-15996	928907-1	BLUE JIANS Hands-Free antibacterial hand sanitizer	Gel	Hands	70% Ethanol	EtOH	55	n/a	3.3	55	n/a	n/a	n/a
						IPA	<0.1	n/a	-				
2020-15996	928907-2	BLUE JIANS Hands-Free antibacterial hand sanitizer	Gel	Hands	70% Ethanol	EtOH	60	n/a	0.8	60	n/a	n/a	n/a
						IPA	<0.1	n/a	-				
2020-15996	928907-3	BLUE JIANS Hands-Free antibacterial hand sanitizer	Gel	Hands	70% Ethanol	EtOH	54	n/a	0.3	54	n/a	n/a	n/a
						IPA	<0.1	n/a	-				
2020-15996	928907-4	Hand sanitizer	Gel	Hands	75% Ethanol	EtOH	46	56	3.1	46	56	0.957	n/a
						IPA	<0.1	-	-				
2020-15996	928907-5	ALCOHOL WIPES	Wipes	Hands	75% Alcohol	EtOH	29	n/a	2.2	29	n/a	n/a	n/a

EPA no.	DTI no.	Product name	Type	Use	a.s. as stated on label <sup>1</sup>	Results							
						a.s.	Conc.	Conc	RSD	Total alcohol		Density	pH
							%w/w	%V/V	%	%w/w	%V/V	g/cm <sup>3</sup>	
2020-15996	928907-6	ALCOHOL WIPES	Wipes	Hands	75% Alcohol	IPA	<0.1	n/a	-				
						EtOH	28	n/a	1.0	28	n/a	n/a	n/a
2020-15999	927878-1	Rock Salt Shower gel	Gel	Hands	Not stated	IPA	<0.1	n/a	-				
						EtOH	<0.1	-	-	<0.1	-	1.036	n/a
2020-16698	928451-1	Misslife Hand Cleanser Gel	Gel	Hands	70% Alcohol	IPA	<0.1	-	-				
						EtOH	48	56	0.8	58	67	0.910	n/a
						MeOH	10	12	1.0				
2020-17594	929336-1	Instant Hand sanitizer	Gel	Hands	62% Ethanol	IPA	12	14	3.0				
						EtOH	38	44	2.5	50	57	0.913	n/a
2020-19133	930849-1	See-Cardt Håndspritgel 75%, 500 mL	Gel	Hands	66.6%w/w Ethanol	IPA	<0.1	-	-				
						EtOH	67	77	0.6	67	77	0.902	7.0
2020-19133	930849-2	See-Cardt Håndspritgel 75%, 100 mL	Gel	Hands	66.6%w/w Ethanol	IPA	<0.1	-	-				
						EtOH	66	75	3.1	66	75	0.895	7.1
2020-19763	931861-1	Basixx	Gel	Hands	70-75%w/w Ethanol	IPA	<0.1	-	-				
						EtOH	52	60	4.1	52	60	0.909	n/a
2020-21560	933564-1	Carebeau Instant Hand Sanitizer	Gel	Hands	70%V/V Alcohol	IPA	0.5	0.6	1.4				
						EtOH	67	75	2.1	67	75	0.883	n/a

EPA no.	DTI no.	Product name	Type	Use	a.s. as stated on label <sup>1</sup>	Results							
						a.s.	Conc.	Conc	RSD	Total alcohol		Density	pH
							%w/w	%V/V	%	%w/w	%V/V	g/cm <sup>3</sup>	
2020-21560	933564-2	Carebeau Spray Alcohol	Liquid	Hands	75%V/V Alcohol	EtOH	68	75	3.6	68	75	0.868	n/a
						IPA	0.2	0.2	3.5				
2020-25545	935884-1	Hand sanitizer	Gel	Hands	70%V/V Ethanol	EtOH	65	72	2.0	65	72	0.882	6.6
						IPA	<0.1	-	-				
2020-40405	939733-1	Drop it No Perfume 75% Hand Sanitizer	Gel	Hands	75%V/V Ethanol	EtOH	67	75	3.4	67	75	0.879	6.7
						IPA	<0.1	-	-				
2020-40405	939736-1	- <sup>3</sup>	Gel	Hands	75%V/V Ethanol	EtOH	70	78	5.0	70	78	0.879	6.8
						IPA	<0.1	-	-				
2020-44251	941746-1	Norlis.Care. Alkohol Servietter	Wipes	Hands	75%w/w Ethanol	EtOH	78	n/a	2.3	78	n/a	n/a	n/a
						IPA	<0.1	n/a	-				
2020-44999	943117-1	Stay safe choose ACV-CSC Hand cleansing gel	Gel	Hands	Alcohol denat.	EtOH	74	81	2.8	74	81	0.868	7.6
						IPA	<0.1	-	-				
2020-45709	943415-1	Mermaid Cleansing Hand Spray	Liquid	Hands	Alcohol denat.	EtOH	62	70	0.8	62	70	0.889	6.4
						IPA	<0.1	-	-				
2020-45858	943607-1	Maratem Alcohol Based Hand disinfectant M105, 250 mL	Liquid	Hands	67.2% Ethanol	EtOH	66	73	1.8	66	73	0.879	8.1
						IPA	<0.1	-	-				
2020-45858	943607-2	Maratem Alcohol Based Hand disinfectant M105, 5L	Liquid	Hands	67.2% Ethanol	EtOH	65	72	3.2	65	72	0.878	8.1
						IPA	<0.1	-	-				

EPA no.	DTI no.	Product name	Type	Use	a.s. as stated on label <sup>1</sup>	Results							
						a.s.	Conc.	Conc	RSD	Total alcohol		Density	pH
							%w/w	%V/V	%	%w/w	%V/V	g/cm <sup>3</sup>	
2020-53680	946193-1	Belgin 80° Limon Kolonyasi, 400 mL	Liquid	Hands	Ethanol	EtOH	73	80	1.6	73	80	0.864	9.0
						IPA	<0.1	-	-				
2020-53680	946201-1	Belgin 80° Limon Kolonyas, 100 mL	Liquid	Hands	Ethanol	EtOH	73	80	1.0	73	80	0.865	9.0
						IPA	<0.1	-	-				
2020-57268	948846-1	Sani-Wipes Hands <sup>4</sup>	Wipes	Hands	52%w/w Ethanol	EtOH	36	n/a	0.9	45	n/a	n/a	5.6
						IPA	7.0	n/a	1.7				
						MeOH	1.7	n/a	1.0				
2020-57469	949199-1	Desinfektion +	Wipes	Hands	75%w/w Ethanol	EtOH	73	n/a	1.3	73	n/a	n/a	n/a
						IPA	<0.1	-	-				
2020-58062	949414-1	Clean Hands Hand Sanitizer with Glycerin	Gel	Hands	75%V/V Ethanol	EtOH	69	77	0.4	69	77	0.875	7.0
						IPA	<0.1	-	-				
2020-58265	949557-1	Instant Hand Sanitizer	Gel	Hands	70% Ethanol	EtOH	65	73	1.8	65	73	0.885	7.1
						IPA	<0.1	-	-				
2020-62027	951883-1	CLEAN HANDS, Hand Sanitizer with glycerin	Gel	Hands	75%V/V Ethanol	EtOH	68	75	0.8	68	75	0.871	7.1
						IPA	<0.1	-	-				
2020-62412	953191-1	LOMAX Hjælp til forebyggelse	Wipes	Hands	75%w/w Ethanol	EtOH	76	n/a	0.1	76	n/a	n/a	n/a
						IPA	<0.1	n/a	-				
2020-62921	953900-1	EB vådservietten, Surface disinfection 85%	Wipes	Surface	85%w/w Ethanol	EtOH	69	n/a	2.7	69	n/a	n/a	n/a
						IPA	<0.1	n/a	-				

EPA no.	DTI no.	Product name	Type	Use	a.s. as stated on label <sup>1</sup>	Results							
						a.s.	Conc.	Conc	RSD	Total alcohol		Density	pH
							%w/w	%V/V	%	%w/w	%V/V	g/cm <sup>3</sup>	
2020-63200	954958-1	Hand sanitizing Alcohol wipes	Wipes	Hands	75%V/V Alcohol	EtOH	70	n/a	0.3	70	n/a	n/a	7.1
						IPA	<0.1	n/a	-				
2020-63927	954699-1	Drop it hand sanitizer <sup>5</sup>	Gel	Hands	75%V/V Ethanol	EtOH	70	78	1.0	70	78	0.870	7.0
						IPA	<0.1	-	-				
2020-63927	954700-1	Himmerland Hand Sanitizer	Gel	Hands	75%V/V Ethanol	EtOH	71	78	1.9	71	78	0.869	7.1
						IPA	<0.1	-	-				
2020-64881	956150-1	Norlis. Care. Alkohol servietter Desinfektion til overflader	Wipes	Surface	67.8%w/w Ethanol	EtOH	72	n/a	0.6	72	n/a	n/a	7.6
						IPA	<0.1	n/a	-				
2020-65889	956566-1	Animalforestseries, 75% alcohol hand sanitizers	Gel	Hands	75% Alcohol	EtOH	67	74	2.7	67	74	0.870	6.0
						IPA	<0.1	-	-				
2020-67660	957726-1	Bactitox Desinfektions Wipes 80% til overflader	Wipes	Surface	80%V/V Ethanol	EtOH	72	n/a	1.3	72	n/a	n/a	8.5
						IPA	<0.1	n/a	-				
						MeOH	0.2	n/a	0.7				
2020-69657	960255-1	Antibacterial Wet Wipe	Wipes	Surface	85% Ethanol	EtOH	69	n/a	1.0	69	n/a	n/a	n/a
						IPA	<0.1	n/a	-				

a.s.: active substance, RSD: relative standard deviation, EtOH: ethanol, IPA: isopropanol, MeOH: methanol, '-': not relevant, n/a: not available because not measured.

<sup>1</sup> Concentrations given in g/kg or g/100 g have been converted to %w/w.

<sup>2</sup> No product name stated on the label. The name has been supplied by the EPA.

<sup>3</sup> No product name stated on the label.

<sup>4</sup> An additional copy of the product was collected from the manufacturer. The same results were obtained for this product.

<sup>5</sup> Multiple 30 mL products with different labels but with the same lot number.

**TABLE 4.** Products collected by the Chemical Inspection Services

EPA no.	DTI no.	Product name	Type	Use	a.s. as stated on label <sup>1</sup>	Results							
						a.s.	Conc.	Conc	RSD	Total alcohol		Density	pH
							%w/w	%V/V	%	%w/w	%V/V	g/cm <sup>3</sup>	
2020-11708	924601-1	Eco Care Alcohol Free hand sanitizer	Liquid	Hands	0.36%w/w DDAC, 0.39%w/w Citric acid & 0.14%w/w Chlorhexidine digluconoate	DDAC	0.39	n/a	1.6	n/a	n/a	n/a	5.2
						Citric acid	0.39	n/a	1.0				
						Chlorhexidine digluconoate	0.11	n/a	0.2				
2020-13441	924908-1	MTM händdesinfektion 85%	Liquid	Hands	76%w/w Ethanol	EtOH	<0.1	n/a	-	6.5	n/a	n/a	n/a
						IPA	6.5	n/a	1.6				
						DDAC	0.13	n/a	2.7				
2020-16168	928455-1	Dettol Universal Cleaning Wipes	Wipes	Surface	2.5%w/w Lactic acid & Disinfectant	EtOH	2.6	n/a	0.9	2.8	n/a	n/a	n/a
						IPA	0.2	n/a	0.3				
2020-16168	928455-2	LA ROCHE-POSAY PURIFYING HAND GEL	Gel	Hands	65%w/w Ethanol	EtOH	64	n/a	0.1	64	n/a	n/a	n/a
						IPA	<0.1	n/a	-				
2020-16168	928455-3	O'LYSEE Hand Hygiene Spray	Aerosol	Hands	Alcohol denat.	EtOH	58	n/a	0.9	58	n/a	n/a	n/a
						IPA	<0.1	n/a	-				
2020-16168	928455-4	Clean Hands	Gel	Hands	68% Ethanol	EtOH	51	n/a	3.6	51	n/a	n/a	n/a
						IPA	<0.1	n/a	-				

EPA no.	DTI no.	Product name	Type	Use	a.s. as stated on label <sup>1</sup>	Results							
						a.s.	Conc.	Conc	RSD	Total alcohol		Density	pH
							%w/w	%V/V	%	%w/w	%V/V	g/cm <sup>3</sup>	
2020-16168	928455-5	DISINFECTANT hand sanitizer gel	Gel	Hands	80%V/V Alcohol	EtOH	71	78	2.8	72	79	0.864	n/a
						IPA	0.8	0.9	1.0				
2020-16168	928455-6	Cien med Hygienic hand gel	Gel	Hands	Alcohol denat.	EtOH	46	n/a	4.4	46	n/a	n/a	n/a
						IPA	<0.1	n/a	-				
2020-16168	928455-7	COOL hand sanitizer	Gel	Hands	68% Ethanol	EtOH	52	n/a	2.1	52	n/a	n/a	n/a
						IPA	<0.1	n/a	-				
2020-16168	928455-8	HOPE hand sanitizer	Gel	Hands	68% Ethanol	EtOH	57	n/a	1.0	57	n/a	n/a	n/a
						IPA	<0.1	n/a	-				
2020-16168	928455-9	HAPPY hand sanitizer	Gel	Hands	68% Ethanol	EtOH	56	n/a	0.9	56	n/a	n/a	n/a
						IPA	<0.1	n/a	-				
2020-16168	928455-10	Drop It Hello Summer hand sanitizer	Gel	Hands	68% Ethanol	EtOH	55	n/a	1.2	55	n/a	n/a	n/a
						IPA	<0.1	n/a	-				
2020-16168	928455-11	FUN hand sanitizer	Gel	Hands	68% Ethanol	EtOH	56	n/a	0.4	56	n/a	n/a	n/a
						IPA	<0.1	n/a	-				
2020-16168	928455-12	Drop It Hand Sanitizer NO PERFUME	Gel	Hands	68% Ethanol	EtOH	49	n/a	3.9	49	n/a	n/a	n/a
						IPA	<0.1	n/a	-				
2020-16168	932507-2	Dex Hand Sanitizer	Gel	Hands	Ethanol	EtOH	54	63	1.3	54	63	0.910	6.8
						IPA	<0.1	-	-				
2020-16168	932507-3	CLEOXEPT Cleansing Hand wash gel	Gel	Hands	76% Alcohol denat.	EtOH	72	78	1.5	73	79	0.856	8.0
						IPA	1.0	1.1	0.2				



EPA no.	DTI no.	Product name	Type	Use	a.s. as stated on label <sup>1</sup>	Results							
						a.s.	Conc.	Conc	RSD	Total alcohol		Density	pH
							%w/w	%V/V	%	%w/w	%V/V	g/cm <sup>3</sup>	
2020-16168	932507-4	Pudderdåserne.dk Håndspritgel 70%	Gel	Hands	70% Alcohol denat	EtOH	61	69	0.7	62	70	0.888	6.8
						IPA	0.7	0.8	1.1				
2020-16168	932507-5	Rene hænder No. 1	Gel	Hands	60% Ethanol & 6% IPA	EtOH	66	74	3.0	66	74	0.882	7.0
						IPA	<0.1	-	-				
2020-16168	932507-6	Nicosan Håndgel	Gel	Hands	71%V/V Ethanol	EtOH	61	68	1.2	62	69	0.883	6.4
						IPA	0.6	0.7	1.4				
2020-16168	934372-1	Håndsprit gel	Gel	Hands	70%w/w Ethanol & 2.3%w/w IPA	EtOH	69	75	1.2	69	75	0.861	4.3
						IPA	<0.1	-	-				
2020-16196	929376-1	Håndsprit	Gel	Hands	Not stated	EtOH	57	64	2.0	63	71	0.883	n/a
						IPA	5.9	6.6	2.8				
2020-55766	950228-1	Hånddesinfektion 85%	Gel	Hands	Alcohol denat.	EtOH	14	16	1.3	55	62	0.900	7.3
						IPA	0.5	0.6	0.4				
						1-propanol	41	46	0.9				
						DDAC	<0.001	-	-				
						Propylene glycol	<0.005	-	-				
2020-55766	958939-1	Hånddesinfektion 85%	Liquid	Hands	Alcohol denat.	EtOH	66	73	0.6	68	76	0.876	7.0
						IPA	2.0	2.3	1.8				
						1-propanol	0.5	0.5	0.1				
						DDAC	<0.001	-	-				
						Propylene glycol	<0.005	-	-				

EPA no.	DTI no.	Product name	Type	Use	a.s. as stated on label <sup>1</sup>	Results							
						a.s.	Conc.	Conc	RSD	Total alcohol		Density	pH
							%w/w	%V/V	%	%w/w	%V/V	g/cm <sup>3</sup>	
2020-64179	959306-1	Borup Håndsprit	Liquid	Hands	85%V/V Ethanol	EtOH	83	89	3.8	83	89	0.847	8.7
						IPA	0.1	0.1	2.9				
2020-64179	959306-2	Nilens Jord Disinfection Hand Gel	Gel	Hands	75.8%w/w Ethanol & IPA 4.6%w/w	EtOH	79	85	4.3	85	90	0.843	6.6
						IPA	5.1	5.5	1.9				
2020-64179	959306-3	B.Clean Antibacterial Hand Sanitizer	Gel	Hands	70%w/w Ethanol	EtOH	60	68	3.7	60	68	0.888	7.2
						IPA	<0.1	-	-				
2020-64179	959306-4	Håndsprit Gel 80%	Gel	Hands	70%w/w Ethanol & IPA 2.3%w/w	EtOH	73	80	2.8	73	80	0.866	4.4
						IPA	<0.1	-	-				

a.s.: active substance, RSD: relative standard deviation, EtOH: ethanol, IPA: isopropanol, MeOH: methanol, DDAC: didecyldimethylammonium chloride, '-': not relevant, n/a: not available because not measured

<sup>1</sup>Concentrations given in g/kg or g/100 g have been converted to %w/w.

## 2.5 Conclusion

In total, 68 products were analysed for total alcohol content of ethanol and isopropanol. The total alcohol content was >60%w/w in 43 out of 68 analysed products.

Ethanol was detected in 66 out of 68 analysed products. In products where ethanol was detected, the concentration ranged from 2.6-83%w/w, with one product containing ethanol <10%w/w, 23 products containing ethanol in the range from 10-60%w/w, and 42 products containing ethanol in the range from 60-83%w/w.

Isopropanol was detected in 16 out of 68 analysed products. The concentration ranged from 0.1-12%w/w. Isopropanol was specifically declared on the label of four products. Isopropanol was only detected (>0.1%w/w) in one of these products.

Following the screening, additional quantitative analyses were performed on six products. In three of the collected products, methanol was detected and quantified. The concentration ranged from 0.2–10%w/w. In two of the collected products, 1-propanol was detected and quantified, with one product containing 42%w/w and the other 0.5%w/w.

For seven products, additional analysis was performed depending on the specific product. DDAC was detected and quantified in two out of four products that were analysed for this active substance. Only one product was labelled as containing DDAC. Two products were analysed for propylene glycol, and neither contained propylene glycol >0.005 %w/w. In one product, citric acid and chlorhexidine digluconate were detected and quantified.

# 3. Ad hoc rodenticide samples

## 3.1 Collected samples

A total of 16 samples were submitted for analysis of anticoagulant rodenticides. The physical condition of the samples varied from pristine to heavily weathered, and the samples were in some cases mixed with other debris, e.g., soil or plant material. The collected samples are listed in TABLE 6.

## 3.2 Analysis

The samples were analysed for eight anticoagulant rodenticides according to DTI's method OA-1108 (TABLE 5). The method relies on screening by liquid chromatography with mass spectrometric detection (LC-MS) to establish the identity of the active substance. That was followed by reversed phase liquid chromatography with diode array detection (HPLC-DAD) to verify the identity of the active substance and to quantify the content. The HPLC method is modified from CIPAC method 370 brodifacoum (Ref. 7). The quantitative analysis was performed as a double determination when possible, and single determination when sample material was limited.

**TABLE 5.** Anticoagulant rodenticides included in DTI's method OA-1108

Active substance	CAS no.
Bromadiolone	28772-56-7
Difenacoum	56073-07-5
Difethialone	104653-34-1
Brodifacoum	56073-10-0
Flocoumafen	90035-08-8
Chlorophacinone	3691-35-8
Coumatetralyl	5836-29-3
Warfarin	81-81-2

## 3.3 Results

The results of the analyses are listed in TABLE 6. RSD% is the percentage relative reproducibility of the determinations of the product.

**TABLE 6.** Analysis results of anticoagulant rodenticides in ad hoc samples

EPA no.	DTI no.	Sample type	Identified a.s.	Analysis result g/kg	RSD%
2020-7928	917592-1	Red* grain (possibly mixed with paste)	Brodifacoum	0.006	-
			Difethialone	0.014	-
	917592-2	Red* paste	Brodifacoum	0.023	-
2020-19598	931063-1	Red grain	Bromadiolone	0.025	7.9
2020-25267	935856-1	Blue powder	-	<0.005**	-
2020-43958	941700-1	Red grain	Difethialone	0.022	3.5
	941700-2	Green powder	-	<0.005**	-

EPA no.	DTI no.	Sample type	Identified a.s.	Analysis result g/kg	RSD%
2020-52349	946234-1	Red grain	Difenacoum	0.081	27
	946234-2	Green block	Flocoumafen	0.034	0.9
	946234-3	Green grain	Difenacoum	0.042	10
	946234-4	Green grain	Difenacoum	0.025	9.8
	946234-5	Green grain	Difenacoum	0.039	6.0
	946234-6	Green grain	Bromadiolone	0.024	4.8
	946234-7	Green grain	Difenacoum	0.042	3.9
	946234-8	Green grain	Difenacoum	0.042	5.8
2020-59361	950716-1	Red blocks	Bromadiolone	0.057	0.1
2020-64260	954795-1	Blue pellets	Flocoumafen	0.027	0.6

a.s.: active substance. RSD: relative standard deviation.

\*The samples are heavily weathered, and the original color of the sample is hard to discern.

\*\* Limit of quantification.

### 3.4 Conclusion

Anticoagulant rodenticides were identified in 14 out of 16 collected ad hoc samples.

## 4. References

1. The Danish Environmental Agency, [www.mst.dk](http://www.mst.dk), <https://mst.dk/kemi/biocider/> (in Danish) or <https://eng.mst.dk/chemicals/biocides/>
2. The Danish Customs Agency, [www.toldst.dk](http://www.toldst.dk) (in Danish), <https://www.toldst.dk/english/>
3. Statens Serum Institut, SSI, [www.ssi.dk](http://www.ssi.dk), <https://covid19.ssi.dk/hygiejne/borgere> (Last edited 2020.10.27, in Danish)
4. Statutory Order no. 1686 of 18/12/2018 Bekendtgørelse om forebyggelse og bekæmpelse af rotter (*Statutory Order on prevention and control of rodents*)
5. Danish Technological Institute, Kongsvang Allé 29, DK-8000 Aarhus C, Denmark, [www.teknologisk.dk](http://www.teknologisk.dk) (in Danish), <http://www.dti.dk/>
6. The Danish Accreditation and Metrology Fund – DANAK, [www.danak.dk](http://www.danak.dk) (in Danish), <http://english.danak.dk/>
7. CIPAC method no. MT 3.2, MT 75.3 and 370 Brodifacoum, [www.cipac.org](http://www.cipac.org)

# 5. Appendix 1

**TABLE 7.** Products with other components detected >0.1 %w/w

EPA no.	DTI no.	Product name	Type	Use	a.s. as stated on label <sup>1</sup>	Results				
						a.s.	Conc. %w/w	RSD %	Total alcohol %w/w	Other components >0.1%
2020-16168	928455-5	DISINFECTANT hand sanitizer gel	Gel	Hands	80%V/V Alcohol	EtOH	71	2.8	72	2-butanone
						IPA	0.8	1.0		
2020-16168	932507-3	Cleansing hand wash gel	Gel	Hands	76% Alcohol denat.	EtOH	72	1.5	73	2-butanone
						IPA	1.0	0.2		
2020-16168	932507-4	Pudderdåserne.dk Håndspritgel 70 %	Gel	Hands	70% Alcohol denat.	EtOH	61	0.7	62	2-butanone
						IPA	0.7	1.1		
2020-16168	932507-6	Håndgel	Gel	Hands	71%V/V Ethanol	EtOH	61	1.2	62	2-butanone
						IPA	0.6	1.4		
2020-16168	934372-1	Håndsprit gel	Gel	Hands	70%w/w Ethanol & 2.3%w/w IPA	EtOH	69	1.2	69	1-propanol & 2-butanone
						IPA	<0.1	-		
2020-57268	948846-1	Sani-Wipes Hands	Wipes	Hands	52%w/w Ethanol	EtOH	36	0.9	43	2-butanone
						IPA	7.0	1.7		
						MeOH	1.7	1.0		
2020-64179	959306-1	Borup Håndsprit	Liquid	Hands	85%V/V Ethanol	EtOH	83	3.8	83	2-butanone
						IPA	0.1	2.9		
2020-64179	959306-4	Håndsprit Gel 80 %	Gel	Hands	70%w/w Ethanol & 2.3%w/w IPA	EtOH	73	2.8	73	2-butanone
						IPA	<0.1	-		

a.s.: active substance, RSD: relative standard deviation, EtOH: ethanol, IPA: isopropanol, MeOH: methanol, '-': not relevant, <sup>1</sup>Concentrations given in g/kg or g/100 g have been converted to %w/w.

## **Control of Biocides 2020**

### **English**

The planned analytical chemical control of biocides on the Danish market in 2020 was suspended due to the COVID-19 outbreak. The reason was that the Danish Environmental Protection Agency (EPA) observed a considerable increase in the import, production, and marketing of alleged hand and surface disinfection/sanitizer products after the outbreak of the COVID-19 pandemic. In consequence, the analytical effort focused on the ad hoc control of these hand and surface disinfection/sanitizer products collected at the Danish border by the Danish Customs Agency products collected on the Danish market by the Danish Chemical Inspection Service. The collected products were analysed to verify that the content of active substances was sufficient to ensure adequate efficacy and to identify problematic/prohibited substances.

The total alcohol content was >60%w/w in 43 out of 68 analysed products.

The routine ad hoc control of rodenticides applied without permit was maintained.

Anticoagulant rodenticides were identified in 14 out of 16 collected ad hoc samples.

### **Danish**

Den planlagte kemisk analytiske kontrol af biocider på det danske marked i 2020 blev indstillet på grund af udbrud af COVID-19, da den danske miljøstyrelse (MST) så en kraftig stigning i import, produktion og markedsføring af påståede desinfektionsmidler efter udbruddet af COVID-19-pandemien. Derfor blev den kemiske analytiske indsats rettet mod ad hoc-kontrollen af hånd- og overfladedesinfektionsmidler indsamlet ved den danske grænse af Toldstyrelsen, og indsamlet på det danske marked af Kemikalieinspektionen. De indsamlede produkter blev analyseret for at bekræfte, at indholdet af biocid aktivstof var højt nok til at sikre tilstrækkelig effekt.

Det totale alkoholindhold var >60%w/w i 43 ud af 68 analyserede produkter.

Den rutinemæssige ad hoc-kontrol af rottemidler udlagt uden tilladelse blev bibeholdt.

Der blev fundet antikoagulante rodenticider i 14 ud af 16 indsamlede prøver.



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