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Product name	DANAFLOAT™ 507E	June 2021
Safety data sheet according to EU Reg. 1907/2006 as amended		Supersedes January 2016

SAFETY DATA SHEET

DANAFLOAT™ 507E

Revision: Sections containing a revision or new information are marked with a ♣.

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

- 1.1. **Product identifier** **Danafloat™ 507E**
Contains sodium O,O-diisobutyl phosphorodithioate, O-isopropyl ethylthiocarbamate and sodium hydroxide
- 1.2. **Relevant identified uses of the substance or mixture and uses advised against** Can be used as flotation reagent (flotation collector) only.
- 1.3. **Details of the supplier of the safety data sheet** **FMC Agricultural Solutions A/S**
Thyborønvej 78
DK-7673 Harboøre
Denmark
SDS.Ronland@fmc.com
- 1.4. **Emergency telephone number** ... For leak, fire, spill or accident emergencies, call:
Denmark: 45-69918573 (CHEMTREC)
- For medical emergency, call:
Denmark: +45 82 12 12 12

♣ SECTION 2: HAZARDS IDENTIFICATION

- 2.1. **Classification of the substance or mixture** Acute oral toxicity: Category 4 (H302)
Skin corrosion: Category 1C (H314)
Hazards to the aquatic environment, chronic: Category 2 (H411)
- Health hazards The product may have adverse effects on fertility. See section 11. It can have severe irritating effects on skin, eyes, upper digestive tract and respiratory tract. It is harmful by ingestion.
- Environmental hazards The product may be hazardous in the aquatic environment.
- 2.2. **Label elements**
According to EU Reg. 1272/2008 as amended
Product identifier Danafloat™ 507E
Contains sodium O,O-diisobutyl phosphorodithioate, O-isopropyl ethylthiocarbamate and sodium hydroxide

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Hazard pictograms (GHS07, GHS05, GHS09)



Signal word

Danger

Hazard statements

H302

Harmful if swallowed.

H314

Causes severe skin burns and eye damage.

H411

Toxic to aquatic life with long lasting effects.

Precautionary statements

P280

Wear protective gloves, protective clothing and eye/face protection.

P301+P330+P331

IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P303+P361+P353

IF ON SKIN (or hair): Remove/Take off immediately all

contaminated clothing. Rinse skin with water/shower.

P305+P351+P338

IF IN EYES: Rinse cautiously with water for several minutes.

Remove contact lenses, if present and easy to do. Continue rinsing.

P310

Immediately call a POISON CENTER or doctor/physician.

P501

Dispose of contents/container as hazardous waste.

2.3. **Other hazards**

None of the ingredients in the product meets the criteria for being PBT or vPvB.

♣ SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. **Substances**

The product is a mixture, not a substance.

3.2. **Mixtures**

See section 16 for full text of hazard statements.

Active ingredients

i-Butyl-dtp-Na

Content: 32 - 35% by weight

CAS name

Phosphorodithioic acid, O,O-bis(2-methylpropyl) ester, sodium salt

CAS no.

53378-51-1

IUPAC name/EU name

Sodium O,O-diisobutyl phosphorodithioate

Other name(s)

Sodium-O,O-diisobutyldithiophosphate

i-Butyl-dtp-Na

EC no. (EINECS no.)

258-508-5

EU index no.

None

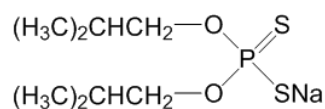
Reg. no.

01-2119982402-38-0000

Classification of the ingredient

Skin corrosion: Category 1C (H314)

Structural formula



Thionocarbamate

Content: 28 - 31% by weight

CAS name

Carbamothioic acid, ethyl-, O-(1-methylethyl) ester

CAS no.

141-98-0

EU name

O-Isopropyl ethylthiocarbamate

Other name(s)

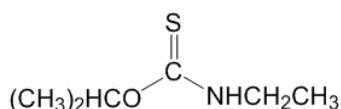
Isopropyl ethyl thionocarbamate

O-Isopropyl N-ethyl thiocarbamate

O-Isopropyl ethylcarbamothioate

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	Thionocarbamate
	IPETC
EC no. (EINECS no.)	205-517-7
EU index no.	None
Reg. no.	01-2119980723-30-0000
Classification of the ingredient	Acute oral toxicity: Category 4 (H302)
	Skin irritation: Category 2 (H315)
	Hazards to the aquatic environment, chronic: Category 3 (H412)
Structural formula	



<u>Other reportable ingredients</u>	Content (% w/w)	CAS no.	EC no. (EINECS no.)	Classification
Tristyryl phenol-polyethylene glycol-phosphoric acid	2.5	114535-82-9	None	Eye Irrit. 2 (H319)
Sodium hydroxide Reg. nr. 01-2119457892-27	max. 2	1310-73-2	215-185-5	Skin Corr. 1A (H314)
Isobutanol Reg. no. 01-2119484609-23	1	78-83-1	201-148-0	Flam. Liq. 3 (H226) STOT SE 3 (H335) Skin Irrit. 2 (H315) Eye Dam. 1 (H318) STOT SE 3 (H336)

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures	In case of exposure, do not wait for symptoms to develop. Immediately start the recommended procedures below.
Inhalation	If experiencing any discomfort, immediately remove from exposure. Light cases: Keep person under surveillance. Get medical attention immediately if symptoms develop. Serious cases: Get medical attention immediately or call for an ambulance.
Skin contact	Immediately remove contaminated clothing and footwear. Flush skin with much water. Wash with water and soap. See physician immediately if irritation develops.
Eye contact	Immediately rinse eyes with much water or eyewash solution, occasionally opening eyelids. Remove contact lenses after a few minutes and rinse again. See physician immediately. Continue rinsing under way to physician, also if initial pain has subsided.
Ingestion	Let the exposed person rinse mouth and drink several glasses of water or milk. Inducing vomiting is not recommended. If vomiting does occur, let him/her rinse mouth and drink fluids again. Never give anything by mouth to an unconscious person. Make the exposed person lie down and keep quiet. Get medical attention immediately.
4.2. Most important symptoms and effects, both acute and delayed	Causes severe irritation/burns.

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4.3. Indication of any immediate medical attention and special treatment needed

In case of eye contact or ingestion call a physician, poison centre or hospital immediately. Describe the type and extent of exposure and the victim's condition.

It may be helpful to show this safety data sheet to physician.

Note to physician

Irritated skin should be treated as usual against effects of bases (alkali lye) or basic mists. In case lungs are affected watch for pulmonary oedema. Probable mucosal damage may contraindicate the use of gastric lavage.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Dry chemical or carbon dioxide for small fires, water spray or foam for large fires. Avoid heavy hose streams.

5.2. Special hazards arising from the substance or mixture

The essential breakdown products are volatile, toxic, malodorous, irritant and inflammable compounds such as hydrogen sulphide, isobutyl mercaptan, diisobutyl sulphide, sulphur dioxide, nitrogen oxides, phosphorous pentoxide, carbon monoxide and carbon dioxide.

5.3. Advice for firefighters

Use water spray to keep fire-exposed containers cool. Approach fire from upwind to avoid hazardous vapours and toxic decomposition products. Fight fire from protected location or maximum possible distance. Dike area to prevent water runoff. Firemen should wear self-contained breathing apparatus and protective clothing.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

It is recommended to have a predetermined plan for the handling of spills. Empty, sealable vessels for the collection of spills should be available.

In case of large spill (involving 10 tonnes of the product or more):

1. Use personal protection equipment; see section 8
2. Call emergency telephone no.; see section 1
3. Alert authorities.

Observe all safety precautions when cleaning up spills. Use personal protection equipment. Depending on the magnitude of the spill this may mean wearing respirator, face mask or eye protection, chemical resistant clothing, gloves and boots.

Stop the source of the spill immediately if safe to do so. Keep unprotected persons away from the spill area. Avoid and reduce mist formation as much as possible. Personal exposure by splashing must be avoided.

6.2. Environmental precautions

Contain the spill to prevent any further contamination of surface, soil or water. Wash waters must be prevented from entering surface water drains. Uncontrolled discharge into water courses must be alerted to the appropriate regulatory body.

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6.3. Methods and materials for containment and cleaning up

It is recommended to consider possibilities to prevent damaging effects of spills, such as bunding or capping. See GHS (Annex 4, Section 6).

If appropriate, surface water drains should be covered. Minor spills on the floor or other impervious surface should be absorbed onto an absorptive material such as universal binder, bentonite, Fuller's earth or other absorbent clays. Collect the contaminated absorbent in suitable containers. Clean area with detergent and water. Absorb wash liquid with absorbent and transfer to suitable containers. The used containers should be properly closed and labelled.

Large spills which soak into the ground should be dug up and transferred to suitable containers.

Spills in water should be contained as much as possible by isolation of the contaminated water. The contaminated water must be collected and removed for treatment or disposal.

6.4. Reference to other sections

See subsection 8.2. for personal protection.
See section 13 for disposal.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

In an industrial environment it is recommended to avoid all personal contact with the product, if possible by using closed systems with remote system control. The material should always be handled by mechanical means as much as possible. Adequate ventilation or local exhaust ventilation is required. The exhaust gases should be filtered or treated otherwise. For personal protection in this situation, see section 8.

Remove contaminated clothing immediately. Wash thoroughly after handling. Before removing gloves, wash them with water and soap. After work, take off all work clothes and footwear. Take a shower, using water and soap. Wear only clean clothes when leaving job. Wash protective clothing and protective equipment with water and soap after each use.

Do not discharge to the environment. Collect all waste material and remains from cleaning equipment, etc., and dispose of as hazardous waste. See section 13 for disposal.

7.2. Conditions for safe storage, including any incompatibilities

The product is stable under normal conditions of warehouse storage. To avoid freezing, store wherever possible above 0°C.

Store in labelled, tightly closed plastic drums or coated steel drums. The storage room should be constructed of incombustible material, closed, dry, ventilated and with impermeable floor, without access of unauthorised persons or children. The room should exclusively be used for storage of chemicals. Food, drinks, feed or seed should not be present. A hand wash station should be available.

7.3. Specific end use(s)

Can be used as flotation reagent (flotation collector) only.

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♣ SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Personal exposure limits To our knowledge, no personal exposure limits have been established for the active ingredients in this product.

		Year	
Sodium hydroxide	ACGIH (USA) TLV	2015	CEILING 2 mg/m ³
	OSHA (USA) PEL	2015	8-hr TWA 2 mg/m ³
	EU, 2000/39/EC as amended	2009	Not established
	Germany, MAK	2014	Cannot be established at present
	HSE (UK) WEL	2011	STEL 2 mg/m ³ , 15 minutes reference period
Isobutanol	ACGIH (USA) TLV	2015	TWA 50 ppm (152 mg/m ³)
	OSHA (USA) PEL	2015	TWA 100 ppm (300 mg/m ³)
	EU, 2000/39/EC as amended	2009	Not established
	Germany, MAK	2014	TWA 100 ppm (310 mg/m ³), 15 min. average value Peak limitation 100 ppm (310 mg/m ³)
	HSE (UK) WEL	2011	8-hr TWA 50 ppm (154 mg/m ³) STEL 75 ppm (231 mg/m ³), 15 min. reference period

However, other personal exposure limits defined by local regulations may exist and must be observed.

i-Butyl-dtp-Na

DNEL, dermal	0.66 mg/kg bw/day
DNEL, inhalation	2.35 mg/m ³
PNEC, aquatic environment	No hazard identified

O-Isopropyl ethylthiocarbamate

DNEL, dermal	33.33 µg/kg bw/day
DNEL, inhalation	118 µg/m ³
PNEC, freshwater	0.02 mg/l
PNEC, marine water	0.002 mg/l

8.2. Exposure controls

When used in a closed system, personal protection equipment will not be required. The following is meant for other situations, when the use of a closed system is not possible, or when it is necessary to open the system. Consider the need to render equipment or piping systems non-hazardous before opening.



Respiratory protection

In the event of an accidental discharge of the material which produces a vapour or mist, workers must put on officially approved respiratory protection equipment with a universal filter type including particle filter.



Protective gloves

Wear chemical resistant gloves, such as barrier laminate, butyl rubber or nitrile rubber. The breakthrough times of these materials for the product are unknown. Generally, however, the use of protective gloves will give only partial protection against dermal exposure. Small tears in the gloves and cross-contamination can easily occur. It is recommended to shift the gloves frequently and to

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limit the work to be done manually. Used gloves should be thrown out and not be reused.



Eye protection

Preferably wear a face shield, rather than goggles or safety glasses. It is recommended to have an eye wash fountain immediately available in the workplace.



Other skin protection

Wear appropriate chemical resistant clothing to prevent skin contact depending on the extent of exposure. During most normal work situations where exposure to the material cannot be avoided for a limited time span, waterproof pants and apron of chemical resistant material or coveralls of polyethylene (PE) will be sufficient. Coveralls of PE must be discarded after use if contaminated. In cases of appreciable or prolonged exposure, coveralls of barrier laminate may be required.

♣ SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on physical and chemical properties

Appearance	Light brown liquid (solution in water)
Odour	Characteristic odour of sulphur compounds
Odour threshold	Not determined
pH	10 to 13
Melting point/freezing point	-8 to -6°C
Initial boiling point and boiling range	101.5°C
Flash point	> 90°C (Pensky-Martens closed cup test)
Evaporation rate	Not determined
Flammability (solid/gas)	Not applicable (liquid)
Upper/lower flammability or explosive limits	Not determined
Vapour pressure	Not determined
Vapour density	Not determined
Relative density	Not determined
	Density: 1.06 - 1.10 g/ml at 20°C
Solubility(ies)	Not determined
Partition coefficient n-octanol/water	Thionocarbamate : log K_{ow} = 2.3 at 30°C
Autoignition temperature	Not determined
Decomposition temperature	Not determined
Viscosity	Not determined
Explosive properties.....	Not explosive
Oxidising properties	Not oxidising

9.2. Other information

Miscibility	The product is miscible with water.
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SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity	To our knowledge, the product has no special reactivities.
10.2. Chemical stability	Stable at ambient temperatures
10.3. Possibility of hazardous reactions	An acid-base neutralisation reaction can be hazardous because of heat release.

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- 10.4. **Conditions to avoid** Heating of the product will produce harmful and irritant vapours.
- 10.5. **Incompatible materials** Acids
- 10.6. **Hazardous decomposition products** See subsection 5.2.

♣ SECTION 11: TOXICOLOGICAL INFORMATION

- 11.1. **Information on toxicological effects** * = Based on available data, the classification criteria are not met.

Product

Acute toxicity	The toxicity of the product is not known. Based on measurements on the active ingredients it may be harmful by ingestion, but it is not expected to be harmful by skin contact or inhalation.
Route(s) of entry	
- ingestion	LD ₅₀ , oral, rat: 1000 - 2000 mg/kg (estimated)
- skin	LD ₅₀ , dermal, rat: not available
- inhalation	LC ₅₀ , inhalation, rat: not available
Skin corrosion/irritation	Causes severe irritation/burns to skin.
Serious eye damage/irritation	Expected to be severely irritating to eyes with the potential to cause permanent eye damage.
Respiratory or skin sensitisation ...	Not expected to cause hypersensitivity. *
Germ cell mutagenicity	The product contains no ingredients known to be mutagenic. *
Carcinogenicity	The product contains no ingredients known to be carcinogenic. *
Reproductive toxicity	In a screening study on O-isopropyl ethylthiocarbamate (method OECD 422), decreased fertility was observed at dose level 30 mg/kg bw/day.
STOT – single exposure	To our knowledge, no specific effects have been observed after single exposure. *
STOT – repeated exposure	The effects of chronic exposure are unknown, but must be expected to be severe.
Aspiration hazard	The product contains no ingredients known to present an aspiration pneumonia hazard. *
Symptoms and effects, acute and delayed	Severe irritation.

Sodium O,O-diisobutyl phosphorodithioate

Acute toxicity	The substance is not expected to be harmful by single exposure. * The acute toxicity is estimated as:
Route(s) of entry	
- ingestion	LD ₅₀ , oral, rat: > 2000 mg/kg
- skin	LD ₅₀ , dermal, rat: > 2000 mg/kg
- inhalation	LC ₅₀ , inhalation, rat: not available
Skin corrosion/irritation	Causes severe irritation/burns.

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Serious eye damage/irritation Causes severe eye damage.

Respiratory or skin sensitisation ... Not expected to cause hypersensitivity. *

O-Isopropyl ethylthiocarbamate

Acute toxicity The substance is harmful by ingestion. The acute toxicity is measured as:

Route(s) of entry - ingestion LD₅₀, oral, rat: 568 mg/kg (method OECD 425)

- skin LD₅₀, dermal, rat: not available

- inhalation LC₅₀, inhalation, rat: not available

Skin corrosion/irritation Irritating to skin (method OECD 431).

Serious eye damage/irritation Not irritating to eyes (method OECD 405). *

Respiratory or skin sensitisation ... Not a skin sensitizer (method OECD 429). *

Reproductive toxicity In a screening study (method OECD 422), decreased fertility was observed at dose level 30 mg/kg bw/day.

Tristyryl phenol-polyethylene glycol-phosphoric acid

Acute toxicity The substance is not considered as harmful by inhalation, ingestion or skin contact. * The acute toxicity is measured as:

Route(s) of entry - ingestion LD₅₀, oral, rat: > 2000 mg/kg (method OECD 401)

- skin LD₅₀, dermal, rat: not determined

- inhalation LC₅₀, inhalation, rat: not determined

Skin corrosion/irritation Not irritating to skin (method OECD 404). *

Serious eye damage/irritation Irritating to eyes (method OECD 405).

Respiratory or skin sensitisation ... Not determined.

Sodium hydroxide

Toxicokinetics, metabolism and distribution Both sodium and hydroxide ions are normal body constituents and regulated between narrow ranges. These ranges will not be exceeded, except locally in unusual situations such as accidents.

Acute toxicity No valid studies are available. However, the existing animal and human data on acute toxicity show that sodium hydroxide has a local effect and that systemic effects are not to be expected. *

Skin corrosion/irritation Severely irritating to skin.

Serious eye damage/irritation Severely irritating to eyes with the possibility to cause permanent eye damage.

Respiratory or skin sensitisation ... To our knowledge, no indications of allergenic properties have been recorded. *

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Isobutanol

Toxicokinetics, metabolism and distribution

Isobutanol is rapidly absorbed following oral administration or inhalation exposure. Isobutanol is metabolised to isobutyraldehyde and isobutyric acid.

Acute toxicity

Isobutanol is not considered as harmful. * The acute toxicity is measured as:

Route(s) of entry - ingestion

LD₅₀, oral, rat (male): > 2830 mg/kg (method OECD 401)

LD₅₀, oral, rat (female): 3350 mg/kg (method OECD 401)

- skin

LD₅₀, dermal, rabbit: > 2000 mg/kg (method OECD 402)

- inhalation

LC₅₀, inhalation, rat: > 18.12 mg/l/4 h (method 40 CFR 798.1150)

Skin corrosion/irritation

Not irritating to rabbit skin (method OECD 404).

Serious eye damage/irritation

Severely irritating to eyes (method OECD 405).

Respiratory or skin sensitisation ...

Not sensitising to guinea pigs (method OECD 406). To our knowledge, no indications of allergenic properties have been recorded. *

♣ SECTION 12: ECOLOGICAL INFORMATION

12.1. **Toxicity** The product is toxic to aquatic organisms.

The following has been measured on thionocarbamate:

- Fish Rainbow trout (*Oncorhynchus mykiss*) 96-h LC₅₀: 1.5 mg/l

- Invertebrates Daphnids (*Daphnia magna*) 48-h EC₅₀: 60 mg/l

- Algae Green algae (*Pseudokirchneriella subcapitata*) 72-h E_rC₅₀: 20.7 mg/l
72-h NOEC: 1.0 mg/l

12.2. **Persistence and degradability** The product is biodegradable, but does not meet the criteria for being readily biodegradable. It undergoes degradation in the environment and in waste water treatment plants. No adverse effects are observed at concentrations up to 100 mg/l in waste water treatment plants.

12.3. **Bioaccumulative potential** See section 9 for octanol-water partition coefficient.

Bioaccumulation is not expected.

12.4. **Mobility in soil** In the environment the product is expected to be moderately mobile.

12.5. **Results of PBT and vPvB assessment** None of the ingredients meets the criteria for being PBT or vPvB.

12.6. **Other adverse effects** Other relevant hazardous effects in the environment are not known.

♣ SECTION 13: DISPOSAL CONSIDERATIONS

13.1. **Waste treatment methods** Remaining quantities of the material and empty but unclean packaging should be regarded as hazardous waste.

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Disposal of product Disposal of waste and packagings must always be in accordance with all applicable local regulations. According to the Waste Framework Directive (2008/98/EC), possibilities for reuse or reprocessing should first be considered. If this is not feasible, the material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing.

Disposal of packaging Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

Disposal of packaging It is recommended to consider possible ways of disposal in the following order:
1. Reuse or recycling should first be considered. If offered for recycling, containers must be emptied and triply rinsed (or equivalent). Do not discharge rinsing water to sewer systems.
2. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.
3. Delivery of the packaging to a licensed service for disposal of hazardous waste.
4. Disposal in a landfill or burning in open air should only occur as a last resort. For disposal in a landfill containers should be emptied completely, rinsed and punctured to make them unusable for other purposes. If burned, stay out of smoke.

SECTION 14: TRANSPORT INFORMATION

ADR/RID/IMDG/IATA/ICAO classification

- | | | |
|-------|---|---|
| 14.1. | UN number | 1719 |
| 14.2. | UN proper shipping name | Caustic alkali liquid, n.o.s. (sodium hydroxide, sodium-O,O-diisobutylthiophosphate and O-isopropyl ethylthiocarbamate) |
| 14.3. | Transport hazard class(es) | 8 |
| 14.4. | Packing group | III |
| 14.5. | Environmental hazards | Marine pollutant |
| 14.6. | Special precautions for user | Do not discharge to the environment. |
| 14.7. | Transport in bulk according to Annex II of MARPOL 73/78 and the IBC code | The product should not be transported in bulk by ship. |

♣ SECTION 15: REGULATORY INFORMATION

- | | | |
|-------|---|--|
| 15.1. | Safety, health and environmental regulations/legislation specific for the substance or mixture | Seveso category (Dir. 2012/18/EU): dangerous for the environment

Young people under the age of 18 are not allowed to work with this product.

All ingredients are covered by EU chemical legislation. |
|-------|---|--|

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- 15.2. **Chemical safety assessment** The conclusions of a chemical safety assessment have been attached.

♣ SECTION 16: OTHER INFORMATION

Relevant changes in the safety data sheet	The safety data sheet is extended with the conclusions of a chemical safety assessment.	
List of abbreviations	ACGIH	American Conference of Governmental Industrial Hygienists
	CAS	Chemical Abstracts Service
	CFR	Code of Federal Regulations
	Dir.	Directive
	DNEL	Derived No Effect Level
	EC ₅₀	50% Effect Concentration
	E _r C ₅₀	50% Effect Concentration based on growth
	EINECS	European INventory of Existing Commercial Chemical Substances
	GHS	Globally Harmonized classification and labelling System of chemicals, Fifth revised edition 201#
	HSE	Health & Safety Executive, UK
	IBC	International Bulk Chemical code
	IUPAC	International Union of Pure and Applied Chemistry
	LC ₅₀	50% Lethal Concentration
	LD ₅₀	50% Lethal Dose
	MAK	Maximale Arbeitspaltz-Konzentration
	MARPOL	Set of rules from the International Maritime Organisation (IMO) for prevention of sea pollution
	NOEC	No Observed Effect Concentration
	N.o.s.	Not otherwise specified
	OECD	Organisation for Economic Cooperation and Development
	OSHA	Occupational Safety and Health Administration
	PBT	Persistent, Bioaccumulative, Toxic
	PEL	Personal Exposure Limit
	PNEC	Predicted No Effect Concentration
	Reg.	Regulation
	STEL	Short-Term Exposure Limit
	STOT	Specific Target Organ Toxicity
	TLV	Threshold Limit Value
	TWA	Time Weighed Average
	vPvB	very Persistent, very Bioaccumulative
	WEL	Workplace Exposure Limit
References	Data on ingredients are available from published literature and can be found several places.	
Method for classification	Calculation method	
Used hazard statements	H226	Flammable liquid and vapour.
	H302	Harmful if swallowed.
	H314	Causes severe skin burns and eye damage.
	H315	Causes skin irritation.
	H318	Causes serious eye damage.
	H319	Causes serious eye irritation.
	H335	May cause respiratory irritation.

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H336 May cause drowsiness or dizziness.
H411 Toxic to aquatic life with long lasting effects.
H412 Harmful to aquatic life with long lasting effects.

Advice on training This material should only be used by persons who are made aware of its hazardous properties and have been instructed in the required safety precautions.

The information provided in this safety data sheet is believed to be accurate and reliable, but uses of the product vary and situations unforeseen by Cheminova A/S may exist. The user has to check the validity of the information under local circumstances.

Prepared by: Cheminova A/S / GHB / JFC

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ANNEX: Exposure assessment and related risk characterisation

1. Introduction

1.1. Overview of uses and Exposure Scenarios

The following table lists all the exposure scenarios (ES).

Table 1. Overview of exposure scenarios and contributing scenarios

Identifiers	Titles of exposure scenarios and the related contributing scenarios	Tonnage (tonnes per year)
ES – IW	Use at industrial site - Use at industrial site - Use at industrial site (ERC 6b) - Worker. Flotation batch process with exposure possible (PROC 5) - Worker transfer of substance to flotation process, outdoors, with respiratoric protection (PROC 8b) - Worker transfer of substance to flotation process, outdoors, with no respiratoric protection, but measured exposure values (PROC 8b) - Worker. Laboratory analytical work on floatation process (PROC 15)	999.0
IW: Industrial end use at site		

1.2. Introduction to the assessment

1.2.1. Environment

Scope and type of assessment

The scope of exposure assessment and type of risk characterisation required for the environment are described in the following table based on the hazard conclusions presented in the CSR.

Table 2. Type of risk characterisation required for the environment

Protection target	Type of risk characterisation	Hazard conclusion
Freshwater	Quantitative	PNEC aqua (freshwater) = 0.02 mg/L
Sediment (freshwater)	Qualitative	No exposure of sediment expected
Marine water	Quantitative	PNEC aqua (marine water) = 0.002 mg/L
Sediment (marine water)	Qualitative	No exposure of sediment expected
Sewage treatment plant	Qualitative	No emission to STP expected
Air	Not needed	No hazard identified
Agricultural soil	Qualitative	No exposure of soil expected
Predator	Not needed	No potential for bioaccumulation

Comments on assessment approach:

The regional concentrations are reported in the CSR in section 10.2.1.2 (see Table 54, “Predicted regional exposure concentrations (Regional PEC)”). The local Predicted Exposure Concentrations (PECs) reported for each contributing scenario correspond to the sum of the local concentrations (C_{local}) and the regional concentrations (PEC regional).

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1.2.2. Man via environment

Scope and type of assessment

The scope of exposure assessment and type of risk characterisation required for man via the environment are described in the following table based on the hazard conclusions reported and justified in the CSR.

Table 1. Type of risk characterisation required for man via the environment

Route of exposure and type of effects	Type of risk characterisation	Hazard conclusion (see section 5.11)
Inhalation: Systemic Long Term	Quantitative	DNEL = 29.99 µg/m ³
Oral: Systemic Long Term	Quantitative	DNEL = 17 µg/kg bw/day

1.2.3. Workers

Scope and type of assessment

The scope of exposure assessment and type of risk characterisation required for workers are described in the following table based on the hazard conclusions presented in the CSR.

Table 4. Type of risk characterisation required for workers

Route	Type of effect	Type of risk characterisation	Hazard conclusion
Inhalation	Systemic Long Term	Quantitative	DNEL = 118 µg/m ³
	Systemic Acute	Quantitative	DNEL = 7.05 mg/m ³
	Local Long Term	Qualitative	Low hazard (no threshold derived)
	Local Acute	Qualitative	Low hazard (no threshold derived)
Dermal	Systemic Long Term	Quantitative	DNEL = 33.33 µg/kg bw/day
	Systemic Acute	Quantitative	DNEL = 2 mg/kg bw/day
	Local Long Term	Qualitative	Low hazard (no threshold derived)
	Local Acute	Qualitative	Low hazard (no threshold derived)

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2. Exposure scenario: Use at industrial site

Sector of use:

SU 2a, Mining, (without offshore industries)

Environment contributing scenario(s):	
Use at industrial site	ERC 6b
Worker contributing scenario(s):	
Worker Flotation batch process with exposure possible	PROC 5
Worker transfer of substance to flotation process, outdoors, with respiratoric protection	PROC 8b
Worker transfer of substance to flotation process, outdoors, with no respiratoric protection, but measured exposure values	PROC 8b
Worker Laboratory analytical work on flotation process	PROC 15

2.1. Environmental contributing scenario 1: Use at industrial site

2.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily use at site: <= 10 tonnes/day
• Annual use at a site: <= 999 tonnes/year
• Percentage of tonnage used at regional scale: = 100 %
Conditions and measures related to sewage treatment plant
• Municipal STP: No [Effectiveness water: 0%] <i>No discharge to sewage treatment plant, all waste are either incinerated or led to holding ponds.</i>
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Discharge rate of effluent: >= 0 m ³ /d
• Receiving surface water flow rate: >= 0 m ³ /d

2.1.2. Releases

The local releases to the environment are reported in the following table.

Table 5. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	ERC based	Initial release factor: 5% Final release factor: 5% Local release rate: 500 kg/day
Air	ERC based	Initial release factor: 0.1% Final release factor: 0.1% Local release rate: 10 kg/day
Soil	ERC based	Final release factor: 0.025%

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2.1.3. Exposure and risks for the environment and man via the environment

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 6. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	Local PEC: 2.321E-4 mg/L	RCR = 0.012
Sediment (freshwater)		Qualitative risk characterisation (see below)
Marine water	Local PEC: 1.987E-5 mg/L	RCR < 0.01
Sediment (marine water)		Qualitative risk characterisation (see below)
Sewage treatment plant		Qualitative risk characterisation (see below)
Agricultural soil		Qualitative risk characterisation (see below)
Man via environment - Inhalation	Local PEC: 7.759E-4 mg/m ³	RCR = 0.026
Man via environment - Oral	Exposure via food consumption:	
Man via environment - combined routes		RCR = 0.026

Table 7. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	3.13E-5 mg/kg bw/day	0.001 mg/L
Fish		
Leaf crops	2.765E-6 mg/kg bw/day	1.613E-4 mg/kg ww
Root crops	1.873E-5 mg/kg bw/day	0.003 mg/kg ww
Meat	3.608E-9 mg/kg bw/day	8.39E-7 mg/kg ww
Milk	1.066E-8 mg/kg bw/day	1.33E-6 mg/kg ww

Conclusion on risk characterisation

There is no exposure to sediment (fresh- and marine water), sewage treatment plant or agricultural soil. Use, transfer and laboratory work does not produce any waste intended to be released into the environment.

2.2. Worker contributing scenario 1: Worker Flotation batch process with exposure possible (PROC 5)

2.2.1. Conditions of use

	Method
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours (Avoid carrying out activities involving exposure for more than 8 hours.)	External Tool (easyTRA)

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	Method
<ul style="list-style-type: none"> Concentration of substance in a mixture: < 0.01 % w/w <i>Covers substance in the mixture below 0.01 %.</i> 	External Tool (easyTRA)
Conditions and measures related to personal protection, hygiene and health evaluation	
<ul style="list-style-type: none"> Dermal protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%] 	External Tool (easyTRA)
Other conditions affecting workers exposure	
<ul style="list-style-type: none"> Place of use: Outdoor 	External Tool (easyTRA)

2.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 8. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.064 mg/m³ (External Tool (easyTRA))	RCR = 0.546
Inhalation, systemic, acute	0.086 mg/m³ (External Tool (easyTRA))	RCR = 0.012
Inhalation, local, long-term		Qualitative (see below)
Inhalation, local, acute		Qualitative (see below)
Dermal, systemic, long-term	2.06E-4 mg/kg bw/day (External Tool (easyTRA))	RCR < 0.01
Dermal, systemic, acute	2.06E-4 mg/kg bw/day (External Tool (easyTRA))	RCR < 0.01
Dermal, local, long-term		Qualitative (see below)
Dermal, local, acute		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.552
Combined routes, systemic, acute		RCR = 0.012

Conclusion on risk characterisation

The available data material suggests that the dominating local effect upon exposure to the substance, both long- and short term, will be irritation. Dermal irritation is prevented by workers wearing gloves at all times when working with the substance. Inhalative irritation is prevented by either working under effective local area ventilation systems or, when this is not available, by wearing air supplied respiratory protection or when not available, a universal filtering respiratory protective system, when significant chance for exposure arises. The relative low vapor pressure of the substance further lowers any inhalative exposure below a level, which could give local inhalative irritation. The risk management measures mentioned above (gloves and LEV/respiratory protection) are primarily implemented to eliminate the more severe systemic effect of exposure, but also effectively eliminates local effects. Therefore any long- or short-term risks for local effects upon exposure the substance are controlled.

2.3. Worker contributing scenario 2: Worker transfer of substance to flotation process, outdoors, with respiratoric protection (PROC 8b)

2.3.1. Conditions of use

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	Method
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 10 minutes	External Tool (easyTRA v.3.5.0)
• Concentration of substance in a mixture: < 95 % w/w	External Tool (easyTRA v.3.5.0)
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes [Effectiveness inhal: 99%]	External Tool (easyTRA v.3.5.0)
• Dermal protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness dermal: 95%]	External Tool (easyTRA v.3.5.0)
Other conditions affecting workers exposure	
• Place of use: Outdoor	External Tool (easyTRA v.3.5.0)

2.3.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.042 mg/m³ (External Tool (easyTRA v.3.5.0))	RCR = 0.36
Inhalation, systemic, acute	4.08 mg/m³ (External Tool (easyTRA v.3.5.0))	RCR = 0.579
Inhalation, local, long-term		Qualitative (see below)
Inhalation, local, acute		Qualitative (see below)
Dermal, systemic, long-term	0.014 mg/kg bw/day (External Tool (easyTRA v.3.5.0))	RCR = 0.407
Dermal, systemic, acute	0.027 mg/kg bw/day (External Tool (easyTRA v.3.5.0))	RCR = 0.014
Dermal, local, long-term		Qualitative (see below)
Dermal, local, acute		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.767
Combined routes, systemic, acute		RCR = 0.592

Conclusion on risk characterisation

The available data material suggests that the dominating local effect upon exposure to the substance, both long- and short term, will be irritation. Dermal irritation is prevented by workers wearing gloves at all times when working with the substance. Inhalative irritation is prevented by either working under effective local area ventilation systems or, when this is not available, by wearing air supplied respiratory protection or when not available, a universal filtering respiratory protective system, when significant chance for exposure arises. The relative low vapor pressure of the substance further lowers any inhalative exposure below a level, which could give local inhalative irritation. The risk management measures mentioned above (gloves and LEV/respiratory protection) are primarily implemented to eliminate the more severe systemic effect of exposure, but also effectively eliminates local effects. Therefore any

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long- or short-term risks for local effects upon exposure the substance are controlled.

2.4. Worker contributing scenario 3: Worker transfer of substance to flotation process, outdoors, with no respiratoric protection, but measured exposure values (PROC 8b)

2.4.1. Conditions of use

	Method
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 10 minutes <i>This work process must not exceed 10 minutes per workday.</i>	External Tool (easyTRA v.3.5.0)
• Concentration of substance in a mixture: < 95 % w/w	External Tool (easyTRA v.3.5.0)
Technical and organisational conditions and measures	
• Measured inhalation data: = 0.05 mg/m ³ <i>This exposure scenario is based on measured worker inhalation data. If such data is not available for a similar work situation, then respiratory protection must be used, see exposure scenario number 11</i>	External Tool (easyTRA v.3.5.0)
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	External Tool (easyTRA v.3.5.0)
Other conditions affecting workers exposure	
• Place of use: Outdoor	External Tool (easyTRA v.3.5.0)

2.4.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 10. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.05 mg/m³ (External Tool (easyTRA v.3.5.0))	RCR = 0.424
Inhalation, systemic, acute	0.05 mg/m³ (External Tool (easyTRA v.3.5.0))	RCR < 0.01
Inhalation, local, long-term		Qualitative (see below)
Inhalation, local, acute		Qualitative (see below)
Dermal, systemic, long-term	0.014 mg/kg bw/day (External Tool (easyTRA v.3.5.0))	RCR = 0.407
Dermal, systemic, acute	0.027 mg/kg bw/day (External Tool (easyTRA v.3.5.0))	RCR = 0.014
Dermal, local, long-term		Qualitative (see below)
Dermal, local, acute		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.831

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Route of exposure and type of effects	Exposure concentration	Risk characterisation
Combined routes, systemic, acute		RCR = 0.021

Conclusion on risk characterisation

The available data material suggests that the dominating local effect upon exposure to the substance, both long- and short term, will be irritation. Dermal irritation is prevented by workers wearing gloves at all times when working with the substance. Inhalative irritation is prevented by either working under effective local area ventilation systems or, when this is not available, by wearing air supplied respiratory protection or when not available, a universal filtering respiratory protective system, when significant chance for exposure arises. The relative low vapor pressure of the substance further lowers any inhalative exposure below a level, which could give local inhalative irritation. The risk management measures mentioned above (gloves and LEV/respiratory protection) are primarily implemented to eliminate the more severe systemic effect of exposure, but also effectively eliminates local effects. Therefore any long- or short-term risks for local effects upon exposure the substance are controlled.

2.5. Worker contributing scenario 4: Worker Laboratory analytical work on floatation process (PROC 15)

2.5.1. Conditions of use

	Method
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 24 hours <i>This work process must not exceed 24 hours per workday.</i>	External Tool (easyTRA v.3.5.0)
• Concentration of substance in a mixture: < 0.01 % w/w	External Tool (easyTRA v.3.5.0)
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness dermal: 95%]	External Tool (easyTRA v.3.5.0)
Other conditions affecting workers exposure	
• Place of use: Indoor	External Tool (easyTRA v.3.5.0)

2.5.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 11. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	5.52E-4 mg/m³ (External Tool (easyTRA v.3.5.0))	RCR < 0.01
Inhalation, systemic, acute	7.36E-4 mg/m³ (External Tool (easyTRA v.3.5.0))	RCR < 0.01
Inhalation, local, long-term		Qualitative (see below)
Inhalation, local, acute		Qualitative (see below)

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Route of exposure and type of effects	Exposure concentration	Risk characterisation
Dermal, systemic, long-term	5.14E-6 mg/kg bw/day (External Tool (easyTRA v.3.5.0))	RCR < 0.01
Dermal, systemic, acute	5.14E-6 mg/kg bw/day (External Tool (easyTRA v.3.5.0))	RCR < 0.01
Dermal, local, long-term		Qualitative (see below)
Dermal, local, acute		Qualitative (see below)
Combined routes, systemic, long-term		RCR < 0.01
Combined routes, systemic, acute		RCR < 0.01

Conclusion on risk characterisation

The available data material suggests that the dominating local effect upon exposure to the substance, both long- and short term, will be irritation. Dermal irritation is prevented by workers wearing gloves at all times when working with the substance. Inhalative irritation is prevented by either working under effective local area ventilation systems or, when this is not available, by wearing air supplied respiratory protection or when not available, a universal filtering respiratory protective system, when significant chance for exposure arises. The relative low vapor pressure of the substance further lowers any inhalative exposure below a level, which could give local inhalative irritation. The risk management measures mentioned above (gloves and LEV/respiratory protection) are primarily implemented to eliminate the more severe systemic effect of exposure, but also effectively eliminates local effects. Therefore any long- or short-term risks for local effects upon exposure the substance are controlled.