



BAYMER SPRAY AL 1100

Version 3.0

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SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

BAYMER SPRAY AL 1100

1.2 Relevant identified uses of the substance or mixture and uses advised against

Use:

Polyol components for the production of polyurethanes

For details of the identified uses according to REACH-Regulation (EU) No. 1907/2006 refer to the annex of this safety data sheet.

Uses advised against:

Not suitable for use in homemaker (DIY) applications.

1.3 Details of the supplier of the safety data sheet

Covestro Deutschland AG
COV-CTO-HSEQ-PSRA-PSI
51365 Leverkusen

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1.4 Emergency telephone number

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SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Acute toxicity, Oral, Category 4 (H302)

Skin irritation, Category 2 (H315)

Serious eye damage, Category 1 (H318)

Sensitization of the skin, Category 1 (H317)

Reproductive toxicity, Category 1B (H360F)

Chronically hazardous to the aquatic environment, Category 3 (H412)

2.2 Label elements



Danger

Hazardous components which must be listed on the label

Tris(1-chloroisopropyl)phosphate

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated

Mannich base

dibutyltin dilaurate

Hazard statements:

H302 Harmful if swallowed.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H318 Causes serious eye damage.
H360F May damage fertility.
H412 Harmful to aquatic life with long lasting effects.

Precautionary statements:

P201 Obtain special instructions before use.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.

This product contains fluorinated hydrocarbons, which are subject to EU Regulation No. 517/2014, annex II.

2.3 Other hazards

Risk of absorption through the skin of Dibutyltin dilaurate.
Possible risk of absorption through the skin of 2,2'-iminodiethanol.

The following percentage of the mixture consists of ingredient(s) with unknown acute dermal toxicity: 14 %
The following percentage of the mixture consists of ingredient(s) with unknown acute inhalation toxicity: 4 %

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

Type of product: Mixture

3.2 Mixtures

Polyol mixture, contains blowing agent.

Hazardous components

Tris(1-chloroisopropyl)phosphate
Concentration [wt.-%]: ≥ 20 - < 25
REACH Registration Number: 01-2119486772-26
Classification (1272/2008/CE): Acute Tox. 4 Oral H302

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated
Concentration [wt.-%]: ≥ 10 - < 20
REACH Registration Number: 01-2119949346-29-0000
CAS-No.: 158885-21-3
Classification (1272/2008/CE): Skin Irrit. 2 H315 Eye Dam. 1 H318 Skin Sens. 1B H317

polyether based on aromatic amine
Concentration [wt.-%]: ≥ 10 - < 20
EC-No.: 614-144-2
REACH Registration Number: 01-2119462836-28-0001
CAS-No.: 67800-94-6
Classification (1272/2008/CE): Acute Tox. 4 Oral H302 Eye Irrit. 2 H319

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]
Concentration [wt.-%]: ≥ 10 - < 20
CAS-No.: 32472-85-8
Classification (1272/2008/CE): Eye Dam. 1 H318

2,2'-Iminodiethanol; Diethanolamine
Concentration [wt.-%]: $\geq 2,5$ - < 3
Index-No.: 603-071-00-1

EC-No.: 203-868-0
REACH Registration Number: 01-2119488930-28
CAS-No.: 111-42-2
Classification (1272/2008/CE): Acute Tox. 4 Oral H302 STOT RE 2 H373 Skin Irrit. 2 H315 Eye Dam. 1 H318 Aquatic Chronic 3 H412

2-dimethylaminoethanol
Concentration [wt.-%]: $\geq 1 - < 2,5$
Index-No.: 603-047-00-0
EC-No.: 203-542-8
REACH Registration Number: 01-2119492298-24
CAS-No.: 108-01-0
Classification (1272/2008/CE): Flam. Liq. 3 H226 Acute Tox. 3 Inhalative H331 Acute Tox. 4 Dermal H312 Acute Tox. 4 Oral H302 Skin Corr. 1B H314 Eye Dam. 1 H318 STOT SE 3 H335
Specific threshold concentration:
STOT SE 3 H335 $\geq 5 \%$

diethylene glycol
Concentration [wt.-%]: $\geq 1 - < 2,5$
Index-No.: 603-140-00-6
EC-No.: 203-872-2
REACH Registration Number: 01-2119457857-21
CAS-No.: 111-46-6
Classification (1272/2008/CE): Acute Tox. 4 Oral H302

N,N-dimethylcyclohexylamine
Concentration [wt.-%]: $\geq 0,3 - < 1$
EC-No.: 202-715-5
REACH Registration Number: 01-2119533030-60
CAS-No.: 98-94-2
Classification (1272/2008/CE): Flam. Liq. 3 H226 Acute Tox. 3 Dermal H311 Acute Tox. 3 Inhalative H331 Acute Tox. 3 Oral H301 Skin Corr. 1B H314 Eye Dam. 1 H318 Aquatic Chronic 2 H411

dibutyltin dilaurate
Concentration [wt.-%]: $\geq 0,1 - < 0,25$
Index-No.: 050-030-00-3
EC-No.: 201-039-8
REACH Registration Number: 01-2119496068-27
CAS-No.: 77-58-7
Classification (1272/2008/CE): Skin Corr. 1C H314 Eye Dam. 1 H318 Skin Sens. 1 H317 Muta. 2 H341 Repr. 1B H360FD STOT SE 1 H370 STOT RE 1 Oral H372 Aquatic Acute 1 H400 Aquatic Chronic 1 H410
M-factor (acute aquat. tox.): 1
M-factor (chron. aquat. tox.): 1

Mannich base
Concentration [wt.-%]: $\geq 3 - < 5$
REACH Registration Number: 01-2120119122-74-0000
Classification (1272/2008/CE): Skin Irrit. 2 H315 Eye Dam. 1 H318 Repr. 1B H360F STOT SE 3 H335 STOT RE 2 H373 Aquatic Chronic 3 H412

This contains:

2,2'-Iminodiethanol; Diethanolamine
Concentration [wt.-%]: $\geq 1 - < 2$
Index-No.: 603-071-00-1
EC-No.: 203-868-0
REACH Registration Number: 01-2119488930-28
CAS-No.: 111-42-2
Classification (1272/2008/CE): Acute Tox. 4 Oral H302 STOT RE 2 H373 Skin Irrit. 2 H315 Eye Dam. 1 H318 Aquatic Chronic 3 H412

2,2-Bis-(4-hydroxyphenyl)-propane (4,4'-Isopropylidenediphenol)
Concentration [wt.-%]: $\geq 0,25 - < 1$
REACH Registration Number: 01-2119457856-23-0000, 01-2119457856-23-0001, 01-2119457856-23-0002
CAS-No.: 80-05-7
Classification (1272/2008/CE): Repr. 1B H360F STOT SE 3 Inhalative H335 Eye Dam. 1 H318 Skin Sens. 1 H317 Aquatic Chronic 2 H411

No annex is required for the impurities of the substance according to article 3(1) of Regulation (EC) No 1907/2006 mentioned above.

Candidate List of Substances of Very High Concern for Authorisation

This product contains substances of very high concern (Regulation (EC) No 1907/2006 (REACH), Article 59).

2,2-Bis-(4-hydroxyphenyl)-propane (4,4'-Isopropylidenediphenol)
CAS-No.: 80-05-7

SECTION 4: First aid measures**4.1 Description of first aid measures**

General advice: Take off all contaminated clothing immediately.

If inhaled: Take the person into the fresh air and keep him warm, let him rest; if there is difficulty in breathing, medical advice is required.

In case of skin contact: In case of skin contact wash affected areas thoroughly with soap and plenty of water. Consult a doctor in the event of a skin reaction.

In case of eye contact: Hold the eyes open and rinse with preferably lukewarm water for a sufficiently long period of time (at least 10 minutes). Contact an ophthalmologist.

If swallowed: DO NOT induce the patient to vomit, medical advice is required.

4.2 Most important symptoms and effects, both acute and delayed

Notes to physician: Basic first aid, decontamination, symptomatic treatment.

4.3 Indication of any immediate medical attention and special treatment needed

Therapeutic measures: No information available.

SECTION 5: Firefighting measures**5.1 Extinguishing media**

Suitable extinguishing media: Carbon dioxide (CO₂), Foam, extinguishing powder, in cases of larger fires, water spray should be used.

Unsuitable extinguishing media: High volume water jet

5.2 Special hazards arising from the substance or mixture

Burning releases carbon monoxide, carbon dioxide, oxides of nitrogen and traces of hydrogen cyanide. In the event of fire and/or explosion do not breathe fumes.

Cool endangered vessels and containers with sprayed water. Heating raises pressure with consequent risk of bursting and explosion.

5.3 Advice for fire-fighters

During fire-fighting respirator with independent air-supply and airtight garment is required.

Make provision for product and fire-fighting water to be retained. Do not allow contaminated extinguishing water to enter the soil, ground-water or surface waters.

SECTION 6: Accidental release measures**6.1 Personal precautions, protective equipment and emergency procedures**

Put on protective equipment (see section 8). Keep away from sources of ignition. Ensure adequate ventilation/exhaust extraction. Keep unauthorized persons away.

6.2 Environment related measures

Do not allow to escape into waterways, wastewater or soil.

6.3 Methods and material for containment and cleaning up

Contain liquid and pump it away. Take up with absorbent for chemicals or, if necessary with dry sand and store in closed containers.

6.4 Reference to other sections

For further disposal measures see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

General conditions of use are further specified in the annex according to REACH-Regulation (EU) No. 1907/2006.

Ensure adequate ventilation and, if necessary, exhaust ventilation when handling or transferring the product. Keep away from fire, sparks and heated surfaces.

Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes.

In all workplaces or parts of the plant where high concentrations of aerosols and/or vapors may be generated (e.g. during pressure release, mold venting or when cleaning mixing heads with an air blast), appropriately located exhaust ventilation must be provided in such a way that the WEL is not exceeded.

The air should be drawn away from the personnel handling the product. The efficiency of the exhaust equipment should be periodically checked.

Precautions should generally be taken against electrostatic charges according to the equipment used and the way the product is handled and packaged.

Protection against fire and explosion: The vapors are heavier than air and may form explosive mixtures with air. Ensure proper ventilation and extraction, including at floor level.

Keep away from foodstuffs, drinks and tobacco. Wash hands before breaks and at the end of workday. Keep working clothes separately. Change contaminated or soaked clothing immediately.

7.2 Conditions for safe storage, including any incompatibilities

Keep containers tightly closed in a cool, well-ventilated place.

Further specific information see our : "Technical Information"

Storage class (TRGS 510) : 6.1C: Combustible, acute toxic Cat.3 / toxic compounds or compounds which causing chronic effects

7.3 Specific end use(s)

For details of the identified uses according to REACH-Regulation (EU) No. 1907/2006 refer to the annex of this safety data sheet.

SECTION 8: Exposure controls/personal protection

Risk management measures are further specified in the annex according to REACH-Regulation (EU) No. 1907/2006.

8.1 Control parameters

Components with workplace control parameters

Substance	CAS-No.	Basis	Type	Value	Ceiling Limit Value	Remarks
2,2'-Iminodiethanol; Diethanolamine	111-42-2	OEL (BE)	TWA	0,1 ppm 1 mg/m ³		
2,2'-Iminodiethanol; Diethanolamine	111-42-2	OEL (BE)				Dermal absorption possible
glycerine	56-81-5	OEL (BE)	TWA	10 mg/m ³		
2,2-Bis-(4-hydroxyphenyl)-propane (4,4'-Isopropylidenediphenol)	80-05-7	OEL (BE)	TWA	2 mg/m ³		
2,2-Bis-(4-hydroxyphenyl)-propane (4,4'-Isopropylidenediphenol)	80-05-7	EU ELV	TWA	2 mg/m ³		Indicative
dibutyltin dilaurate	77-58-7	OEL (BE)	TWA	0,1 mg/m ³		, measured as Sn
dibutyltin dilaurate	77-58-7	OEL (BE)	STEL	0,2 mg/m ³		, measured as Sn
dibutyltin dilaurate	77-58-7	OEL (BE)				Dermal absorption possible, measured as Sn

For technical protective measures to limit exposure see also Section 7 "Handling and storage".

Derived No Effect Level (DNEL)**Tris(1-chloroisopropyl)phosphate**

Value type	Route of exposure	Health Effects	Value	Remarks
Workers	Inhalation	Long-term systemic effects	5,82 mg/m ³	
Workers	Inhalation	Acute systemic effects	22,4 mg/m ³	
Workers	Dermal	Long-term systemic effects	2,08 mg/kg bw/day	
Workers	Dermal	Acute systemic effects	8 mg/kg	
Consumers	Inhalation	Long-term systemic effects	1,46 mg/m ³	
Consumers	Inhalation	Acute systemic effects	11,2 mg/m ³	
Consumers	Dermal	Long-term systemic effects	1,04 mg/kg bw/day	
Consumers	Dermal	Acute systemic effects	4 mg/kg	
Consumers	Oral	Long-term systemic effects	0,52 mg/kg bw/day	

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated

Value type	Route of exposure	Health Effects	Value	Remarks
Workers	Inhalation	Long-term systemic effects		Hazard unknown (no further information necessary)
Workers	Inhalation	Acute systemic effects		No hazard identified
Workers	Inhalation	Long-term local		Medium hazard (no threshold derived) Most sensitive

		effects		endpoint: Irritation (respiratory tract)
Workers	Inhalation	Acute local effects		No hazard identified
Workers	Dermal	Long-term systemic effects		Hazard unknown (no further information necessary)
Workers	Dermal	Acute systemic effects		No hazard identified
Workers	Dermal	Long-term local effects		Medium hazard (no threshold derived) Most sensitive endpoint: Sensitisation (skin)
Workers	Dermal	Acute local effects		Medium hazard (no threshold derived) Most sensitive endpoint: Sensitisation (skin)
Workers	Eye contact	Local effects		Medium hazard (no threshold derived)
Consumers	Inhalation	Long-term systemic effects		Hazard unknown (no further information necessary)
Consumers	Inhalation	Acute systemic effects		No hazard identified
Consumers	Inhalation	Long-term local effects		Medium hazard (no threshold derived) Most sensitive endpoint: Irritation (respiratory tract)
Consumers	Inhalation	Acute local effects		No hazard identified
Consumers	Dermal	Long-term systemic effects		Hazard unknown (no further information necessary)
Consumers	Dermal	Acute systemic effects		No hazard identified
Consumers	Dermal	Long-term local effects		Medium hazard (no threshold derived) Most sensitive endpoint: Sensitisation (skin)
Consumers	Dermal	Acute local effects		Medium hazard (no threshold derived) Most sensitive endpoint: Sensitisation (skin)
Consumers	Oral	Long-term systemic effects	0,33 mg/kg bw/day	Most sensitive endpoint: Repeated dose toxicity oral
Consumers	Oral	Acute systemic effects		No hazard identified
Consumers	Eye contact	Local effects		Medium hazard (no threshold derived)

polyether based on aromatic amine

Value type	Route of exposure	Health Effects	Value	Remarks
Workers	Inhalation	Long-term systemic effects	3,9 mg/m3	Most sensitive endpoint: Repeated dose toxicity
Workers	Inhalation	Acute systemic effects		Not relevant
Workers	Inhalation	Long-term local effects		Not relevant
Workers	Inhalation	Acute local effects		Not relevant
Workers	Dermal	Long-term systemic effects	7,0 mg/kg bw/day	Most sensitive endpoint: Repeated dose toxicity
Workers	Dermal	Acute systemic effects		Not relevant
Workers	Dermal	Long-term local effects		Not relevant

Workers	Dermal	Acute local effects		Not relevant
Consumers	Inhalation	Long-term systemic effects	1,2 mg/m ³	Most sensitive endpoint: Repeated dose toxicity
Consumers	Inhalation	Acute systemic effects		Not relevant
Consumers	Inhalation	Long-term local effects		Not relevant
Consumers	Inhalation	Acute local effects		Not relevant
Consumers	Dermal	Long-term systemic effects	4,2 mg/kg bw/day	Most sensitive endpoint: Repeated dose toxicity
Consumers	Dermal	Acute systemic effects		Not relevant
Consumers	Dermal	Long-term local effects		Not relevant
Consumers	Dermal	Acute local effects		Not relevant
Consumers	Oral	Long-term systemic effects	0,33 mg/kg bw/day	Most sensitive endpoint: Repeated dose toxicity
Consumers	Oral	Acute systemic effects		Not relevant

2,2'-Iminodiethanol; Diethanolamine

Value type	Route of exposure	Health Effects	Value	Remarks
Workers	Inhalation	Long-term systemic effects	1 mg/m ³	
Workers	Dermal	Long-term systemic effects	0,13 mg/kg bw/day	
Consumers	Inhalation	Long-term systemic effects	0,25 mg/m ³	
Consumers	Dermal	Long-term systemic effects	0,07 mg/kg bw/day	
Consumers	Oral	Long-term systemic effects	0,06 mg/kg bw/day	

2-dimethylaminoethanol

Value type	Route of exposure	Health Effects	Value	Remarks
Workers	Inhalation	Long-term systemic effects	7,4 mg/m ³	
Workers	Dermal	Long-term systemic effects	1,04 mg/kg bw/day	

diethylene glycol

Value type	Route of exposure	Health Effects	Value	Remarks
Workers	Inhalation	Long-term systemic effects	44 mg/m ³	
Workers	Dermal	Long-term systemic effects	43 mg/kg	
Consumers	Inhalation	Long-term systemic effects	12 mg/m ³	
Consumers	Dermal	Long-term systemic effects	21 mg/kg	

N,N-dimethylcyclohexylamine

Value type	Route of exposure	Health Effects	Value	Remarks
Workers	Inhalation	Long-term local effects	35 mg/m ³	
Workers	Inhalation	Acute local effects	35 mg/m ³	

dibutyltin dilaurate

Value type	Route of exposure	Health Effects	Value	Remarks
Workers	Inhalation	Long-term systemic effects	0,01 mg/m ³	
Workers	Inhalation	Acute systemic effects	0,07 mg/m ³	
Workers	Dermal	Long-term systemic effects	0,2 mg/kg bw/day	
Workers	Dermal	Acute systemic effects	1 mg/kg bw/day	
Consumers	Inhalation	Long-term systemic effects	0,003 mg/m ³	
Consumers	Inhalation	Acute systemic effects	0,02 mg/m ³	
Consumers	Dermal	Long-term systemic effects	0,08 mg/kg bw/day	
Consumers	Dermal	Acute systemic effects	0,5 mg/kg bw/day	
Consumers	Oral	Long-term systemic effects	0,002 mg/kg bw/day	
Consumers	Oral	Acute systemic effects	0,01 mg/kg bw/day	

Mannich base

Value type	Route of exposure	Health Effects	Value	Remarks
Workers	Inhalation	Long-term systemic effects	1 mg/m ³	Most sensitive endpoint: Irritation (respiratory tract)
Workers	Inhalation	Acute systemic effects		No hazard identified
Workers	Inhalation	Long-term local effects	1 mg/m ³	Most sensitive endpoint: Irritation (respiratory tract)
Workers	Inhalation	Acute local effects		No hazard identified
Workers	Dermal	Long-term systemic effects	0,04 mg/kg bw/day	Most sensitive endpoint: Repeated dose toxicity oral
Workers	Dermal	Acute systemic effects		No hazard identified
Workers	Dermal	Long-term local effects		Medium hazard (no threshold derived) Most sensitive endpoint: skin irritation/corrosion
Workers	Dermal	Acute local effects		Medium hazard (no threshold derived) Most sensitive endpoint: skin irritation/corrosion
Workers	Eye contact	Local effects		Medium hazard (no threshold derived)
Consumers	Inhalation	Long-term systemic effects	0,5 mg/m ³	Most sensitive endpoint: Irritation (respiratory tract)

Consumers	Inhalation	Acute systemic effects		No hazard identified
Consumers	Inhalation	Long-term local effects	0,5 mg/m3	Most sensitive endpoint: Irritation (respiratory tract)
Consumers	Inhalation	Acute local effects		No hazard identified
Consumers	Dermal	Long-term systemic effects	3,3 µg/kg	Most sensitive endpoint: Repeated dose toxicity oral
Consumers	Dermal	Acute systemic effects		No hazard identified
Consumers	Dermal	Long-term local effects		Medium hazard (no threshold derived) Most sensitive endpoint: skin irritation/corrosion
Consumers	Dermal	Acute local effects		Medium hazard (no threshold derived) Most sensitive endpoint: skin irritation/corrosion
Consumers	Oral	Long-term systemic effects	4 µg/kg	Most sensitive endpoint: Repeated dose toxicity oral
Consumers	Oral	Acute systemic effects		No hazard identified
Consumers	Eye contact	Local effects		Medium hazard (no threshold derived)

Predicted No Effect Concentration (PNEC)**Tris(1-chloroisopropyl)phosphate**

Compartment	Value	Remarks
Fresh water	0,64 mg/l	
Fresh water sediment	13,4 mg/kg	dry weight
Marine water	0,064 mg/l	
Marine sediment	1,34 mg/kg	dry weight
Sewage treatment plant	7,84 mg/l	
Soil	1,7 mg/kg	dry weight
Intermittent use/release	0,51 mg/l	

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated

Compartment	Value	Remarks
Fresh water		No hazard identified
Fresh water sediment		No hazard identified
Marine water		No hazard identified
Marine sediment		No hazard identified
Sewage treatment plant	10 mg/l	
Air		No hazard identified
Soil		No hazard identified
Oral		Not relevant Does not bioaccumulate.
Intermittent use/release		No hazard identified

polyether based on aromatic amine

Compartment	Value	Remarks
Fresh water	0,02 mg/l	

Fresh water sediment	0,02 mg/kg	dry weight
Marine water	0,002 mg/l	
Marine sediment	0,002 mg/kg	dry weight
Sewage treatment plant	100 mg/l	
Soil	0,00588 mg/kg	dry weight
Oral		Not relevant
Intermittent use/release	2,81 mg/l	

2,2'-Iminodiethanol; Diethanolamine

Compartment	Value	Remarks
Fresh water	0,0022 mg/l	
Fresh water sediment	0,019 mg/kg	
Marine water	0,00022 mg/l	
Marine sediment	0,0019 mg/kg	
Sewage treatment plant	100 mg/l	
Soil	0,00108 mg/kg	
Intermittent use/release	0,022 mg/l	

2-dimethylaminoethanol

Compartment	Value	Remarks
Fresh water	0,0661 mg/l	
Fresh water sediment	0,0529 mg/kg	
Marine water	0,00661 mg/l	
Marine sediment		Exposure of the sediment is not expected.
Sewage treatment plant	10 mg/l	
Soil	0,0177 mg/kg	
Oral		no data available
Intermittent use/release	0,0661 mg/l	

diethylene glycol

Compartment	Value	Remarks
Fresh water	10 mg/l	
Fresh water sediment	20,9 mg/kg	
Marine water	1 mg/l	
Marine sediment	2,09 mg/kg	
Sewage treatment plant	199,5 mg/l	
Soil	1,53 mg/kg	
Intermittent use/release	10 mg/l	

N,N-dimethylcyclohexylamine

Compartment	Value	Remarks
Fresh water	0,002 mg/l	
Fresh water sediment	0,0211 mg/kg	dry weight
Marine water	0,0002 mg/l	
Marine sediment	0,00211 mg/kg	dry weight
Sewage treatment plant	20,6 mg/l	

Soil	0,00305 mg/kg	dry weight
Oral		no data available
Intermittent use/release	0,02 mg/l	

dibutyltin dilaurate

Compartment	Value	Remarks
Fresh water	0,463 µg/l	
Fresh water sediment	0,05 mg/kg	
Marine water	0,0463 µg/l	
Marine sediment	0,005 mg/kg	
Sewage treatment plant	100 mg/l	
Soil	0,0407 mg/kg	
Intermittent use/release	0,00463 mg/l	

Mannich base

Compartment	Value	Remarks
Fresh water	0,02354 mg/l	
Fresh water sediment	0,2589 mg/kg	dry weight
Marine water	0,002354 mg/l	
Marine sediment	0,0259 mg/kg	dry weight
Sewage treatment plant	10 mg/l	
Air		No hazard identified
Soil	0,038 mg/kg	dry weight
Oral		Does not bioaccumulate.
Intermittent use/release	0,2354 mg/l	

8.2 Exposure controls**Respiratory protection**

Unless the product is entirely enclosed, do not handle it until you have studied the respiratory precautions issued by the appropriate authority or accident prevention association. At substantial vapor concentrations respirators must be used. Put on full-mask respirator with filter type ABEK.

If applicable, further recommendations regarding respiratory protection can be found in the annex.

Hand protection

Conditionally suitable materials for protective gloves; EN 374:

Nitrile rubber - NBR (≥ 0.35 mm)

Polyvinyl chloride - PVC (≥ 0.5 mm)

Polychloroprene - CR: thickness $\geq 0,5$ mm

Butyl rubber - IIR (≥ 0.5 mm)

Fluorinated rubber - FKM ($\geq 0,4$ mm)

Breakthrough time not tested; dispose of immediately after contamination.

Eye protection

Wear eye/face protection.

Skin and body protection

Wear suitable protective clothing.

Safety precautions for handling freshly molded polyurethane parts: see section 16

SECTION 9: Physical and chemical properties**9.1 Information on basic physical and chemical properties**

Appearance:	liquid	
Colour:	yellow to brownish	
Odour:	amine-like	
Odour Threshold:	not established	
pH:	10,9 at 10 % in water	calculated
Pour point:	-30 °C	calculated
Boiling point/boiling range:	64 °C at 1.013 hPa	calculated
Flash point:	> 80 °C	DIN EN ISO 3679
Evaporation rate:	not established	
Flammability (solid, gas):	not applicable	
Burning number:	not applicable	
Upper/lower flammability or explosive limits:		
2,2'-Iminodiethanol; Diethanolamine	upper: 10,6 %(V) / lower: 2,1 %(V)	
2-dimethylaminoethanol	upper: 12,2 %(V) / lower: 1,4 %(V)	
diethylene glycol	upper: 12,2 %(V) / lower: 1,6 %(V)	
N,N-dimethylcyclohexylamine	upper: 19,0 %(V) / lower: 3,6 %(V)	
Vapour pressure:	219 hPa at 20 °C	calculated
	655 hPa at 50 °C	calculated
	770 hPa at 55 °C	calculated
Vapour density:	not established	
Density:	1,18 g/cm ³ at 20 °C	calculated
Miscibility with water:	partly miscible at 15 °C	
Surface tension:	not established	
Partition coefficient (n-octanol/water):	not established	
Auto-ignition temperature:	not applicable	
Ignition temperature:	295 °C	calculated
Decomposition temperature:	not established	
Viscosity, dynamic:	262 mPa.s at 25 °C	calculated
Explosive properties:	not established	
Dust explosion class:	not applicable	
Oxidising properties:	Processing may lead to evolution of flammable volatiles. Vapours may form explosive mixtures with air.	

9.2 Other information

The indicated values do not necessarily correspond to the product specification. Please refer to the technical information sheet for specification data.

SECTION 10: Stability and reactivity

10.1 Reactivity

This information is not available.

10.2 Chemical stability

No thermal decomposition when stored and handled correctly.

10.3 Possibility of hazardous reactions

No hazardous reactions when used as directed.

10.4 Conditions to avoid

This information is not available.

10.5 Incompatible materials

This information is not available.

10.6 Hazardous decomposition products

No hazardous decomposition products when stored and handled correctly.

SECTION 11: Toxicological information

Toxicological studies on the product are not yet available.

Please find below the toxicological data available to us for the components (hazardous components).

11.1 Information on toxicological effects**Acute toxicity, oral**

ATEmix (oral): 1.780 mg/kg

Method: Calculation method

Tris(1-chloroisopropyl)phosphate

LD50 rat: 632 mg/kg

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated

LD50 rat, female: > 5.000 mg/kg

Method: OECD Test Guideline 423

polyether based on aromatic amine

LD50 rat, male/female: 1.400 mg/kg

Method: Directive 84/449/EEC, B.1

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]

LD50 rat, female: > 5.000 mg/kg

Method: OECD Test Guideline 423

Studies of a comparable product.

2,2'-Iminodiethanol; Diethanolamine

LD50 rat: ca. 1.600 mg/kg

2-dimethylaminoethanol

LD50 rat: 1.183 mg/kg

Method: OECD Test Guideline 401

diethylene glycol

LD50 rat: 16.500 mg/kg

Human experience:

Assessment: Harmful if swallowed.

Converted acute toxicity point estimate 500 mg/kg

Method: Expert judgement

N,N-dimethylcyclohexylamine

LD50 rat: 272 mg/kg

dibutyltin dilaurate

LD50 rat: 2.071 mg/kg

Method: OECD Test Guideline 401

Mannich base

LD50 rat, female: > 2.000 mg/kg

Method: OECD Test Guideline 423

Acute toxicity, dermal

ATEmix (dermal): > 2.000 mg/kg
Method: Calculation method

Tris(1-chloroisopropyl)phosphate
LD50 rat: > 2.000 mg/kg
Method: OECD Test Guideline 402

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated
LD50 rat, male/female: > 2.000 mg/kg
Method: OECD Test Guideline 402

polyether based on aromatic amine
LD50 rat, male/female: > 2.000 mg/kg
Method: OECD Test Guideline 402

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]
LD50 rat, male/female: > 2.000 mg/kg
Method: OECD Test Guideline 402
Studies of a comparable product.

2,2'-Iminodiethanol; Diethanolamine
LD50 rabbit: 12.970 mg/kg

2-dimethylaminoethanol
LD50 rabbit: 1.219 mg/kg
Method: OECD Test Guideline 402

diethylene glycol
LD50 rabbit: 13.300 mg/kg

N,N-dimethylcyclohexylamine
LD50 rat: 380 mg/kg
Method: OECD Test Guideline 402

dibutyltin dilaurate
LD50 rat, male/female: > 2.000 mg/kg
Method: OECD Test Guideline 402

Mannich base
Based on available data, the classification criteria are not met.

Acute toxicity, inhalation

ATEmix (inhal.): > 5 mg/l, 4 h
Test atmosphere: dust/mist
Method: Calculation method

Tris(1-chloroisopropyl)phosphate
LC50 rat: > 7 mg/l, 4 h
Test atmosphere: dust/mist
Method: OECD Test Guideline 403

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated
Not a relevant route of exposure

polyether based on aromatic amine
Not a relevant route of exposure

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]
Not a relevant route of exposure

2,2'-Iminodiethanol; Diethanolamine
Assessment: The substance or mixture has no acute inhalation toxicity
Inhalation risk test (IRT): No mortality after 8 h exposure in studies with rats.

2-dimethylaminoethanol
LC50 rat: 6,1 mg/l, 4 h
Test atmosphere: vapour
Method: OECD Test Guideline 403

diethylene glycol
LC50 rat: > 4,6 mg/l, 4 h
Test atmosphere: dust/mist
Assessment: The substance or mixture has no acute inhalation toxicity

N,N-dimethylcyclohexylamine
LC50 rat: > 1,7 - 5,8 mg/l, 6 h
Test atmosphere: vapour
Assessment: Toxic if inhaled.

dibutyltin dilaurate
Assessment: no data available

Mannich base
LC50 rat, male/female: > 4,263 mg/l, 4 h
Test atmosphere: dust/mist
Assessment: The substance or mixture has no acute inhalation toxicity
Method: OECD Test Guideline 403

Primary skin irritation

Tris(1-chloroisopropyl)phosphate
Species: rabbit
Result: slight irritant
Classification: No skin irritation
Method: OECD Test Guideline 404

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated
Species: In vitro test system
Result: Not corrosive
Method: OECD Test Guideline 431

Species: In vitro test system
Result: irritating
Classification: Causes skin irritation.
Method: OECD Test Guideline 439

polyether based on aromatic amine
Species: rabbit
Result: non-irritant
Classification: No skin irritation
Method: OECD Test Guideline 404

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]
Species: rabbit
Result: slight irritant
Classification: No skin irritation
Method: OECD Test Guideline 404
Studies of a comparable product.

2,2'-Iminodiethanol; Diethanolamine
Species: rabbit
Result: irritating
Classification: Causes skin irritation.

2-dimethylaminoethanol
Species: rabbit
Result: Corrosive
Classification: Causes severe skin burns and eye damage (Skin Corr. 1B).
Method: OECD Test Guideline 404

diethylene glycol
Species: rabbit
Result: slight irritant
Classification: No skin irritation

N,N-dimethylcyclohexylamine
Species: rabbit
Result: Corrosive
Classification: Causes severe skin burns and eye damage (Skin Corr. 1B).

dibutyltin dilaurate
Species: rabbit
Result: Corrosive
Classification: Causes severe skin burns and eye damage (Skin Corr. 1C).

Mannich base
Classification: Causes skin irritation.

Species: In vitro test system
Result: Not corrosive
Method: OECD Test Guideline 431

Species: In vitro test system
Result: irritating
Method: OECD Test Guideline 439

Primary mucosae irritation

Tris(1-chloroisopropyl)phosphate
Species: rabbit
Result: non-irritant
Classification: No eye irritation
Method: OECD Test Guideline 405

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated
Species: In vitro test system
Result: severe irritant
Classification: Causes serious eye damage.
Method: HET-CAM test

polyether based on aromatic amine
Species: rabbit
Result: irritating
Classification: Causes serious eye irritation.
Method: OECD Test Guideline 405

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]
Species: In vitro test system
Result: severe irritant
Classification: Causes serious eye damage.
Method: HET-CAM test
Studies of a comparable product.

2,2'-Iminodiethanol; Diethanolamine
Species: rabbit
Result: severe irritant
Classification: Causes serious eye damage.

2-dimethylaminoethanol
Since this substance is already classified "corrosive", the risk of serious damage to the eyes is implicit.

diethylene glycol
Species: rabbit
Result: slight irritant
Classification: No eye irritation

N,N-dimethylcyclohexylamine

Since this substance is already classified "corrosive", the risk of serious damage to the eyes is implicit.

dibutyltin dilaurate

Since this substance is already classified "corrosive", the risk of serious damage to the eyes is implicit.

Mannich base

Classification: Causes serious eye damage.

Species: In vitro test system

Result: positive

Method: HET-CAM test

Species: In vitro test system

Result: positive

Method: in vitro eye irritation test (HCE test)

Species: In vitro test system

Result: negative

Method: OECD Test Guideline 437

Sensitisation

Tris(1-chloroisopropyl)phosphate

Skin sensitization (local lymph node assay (LLNA)):

Species: Mouse

Result: negative

Classification: Does not cause skin sensitization.

Method: OECD Test Guideline 429

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated

Skin sensitization (local lymph node assay (LLNA)):

Species: Mouse

Result: positive

Classification: May cause sensitization by skin contact (Sub cat. 1B)

Method: OECD Test Guideline 429

Respiratory sensitization

No data available.

polyether based on aromatic amine

Skin sensitisation according to Magnusson/Kligmann (maximizing test):

Species: Guinea pig

Result: negative

Classification: Does not cause skin sensitization.

Method: OECD Test Guideline 406

Respiratory sensitization

No data available.

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]

Skin sensitization (local lymph node assay (LLNA)):

Species: Mouse

Result: negative

Classification: Does not cause skin sensitization.

Method: OECD Test Guideline 429

Studies of a comparable product.

Respiratory sensitization

No data available.

2,2'-Iminodiethanol; Diethanolamine
Skin sensitisation according to Magnusson/Kligmann (maximizing test):
Species: Guinea pig
Result: negative
Classification: Does not cause skin sensitization.
Method: OECD Test Guideline 406

2-dimethylaminoethanol
Skin sensitisation according to Buehler (epicutaneous test):
Species: Guinea pig
Result: negative
Classification: Does not cause skin sensitization.
Method: OECD Test Guideline 406

diethylene glycol
Skin sensitisation:
Species: Guinea pig
Result: negative
Classification: Does not cause skin sensitization.

N,N-dimethylcyclohexylamine
Skin sensitisation:
Species: Guinea pig
Result: negative
Classification: Does not cause skin sensitization.

dibutyltin dilaurate
Skin sensitisation according to Magnusson/Kligmann (maximizing test):
Species: Guinea pig
Result: positive
Classification: May cause sensitization by skin contact.
Studies of a comparable product.

Mannich base
Skin sensitization (local lymph node assay (LLNA)):
Species: Mouse
Result: negative
Classification: Does not cause skin sensitization.
Method: OECD Test Guideline 429

Respiratory sensitization

Classification: No classification according to EC Directives 2006/121/EC or 1999/45/EC as respiratory sensitizer.

Subacute, subchronic and prolonged toxicity

Tris(1-chloroisopropyl)phosphate
NOAEL: 100 mg/kg
Application Route: Oral
Species: rat
Exposure duration: 28 d

NOAEL: 171 mg/kg
Application Route: Oral
Species: rat
Exposure duration: 90 d

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated
NOAEL: 500 mg/kg
Application Route: Oral
Species: rat, male/female
Dose Levels: 0 - 100 - 500 - 1000 mg/kg
Exposure duration: 29 d
Frequency of treatment: daily
Method: OECD Test Guideline 407

polyether based on aromatic amine
NOAEL: 40 mg/kg
Application Route: Oral
Species: rat, male/female
Dose Levels: 0 - 40 - 160 - 640 mg/kg
Exposure duration: 4 w
Frequency of treatment: daily
Method: OECD Test Guideline 407
Studies of a comparable product.

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]
NOAEL: 1.000 mg/kg
Application Route: Oral
Species: rat, male/female
Dose Levels: 0 - 100 - 300 - 1000 mg/kg
Exposure duration: 29 d
Method: OECD Test Guideline 407
Studies of a comparable product.

2,2'-Iminodiethanol; Diethanolamine
LOAEL (Lowest observable adverse effect level): 14 mg/kg
Application Route: Oral
Species: rat, male/female
Exposure duration: 90 d
Target Organs: Blood, Kidney
Method: OECD Test Guideline 408

2-dimethylaminoethanol
NOAEL: > 240 mg/kg
Application Route: Oral
Species: rat
Method: OECD Test Guideline 408

diethylene glycol
NOAEL: ca. 100 mg/kg
Application Route: Subchronic oral toxicity
Species: rat
Dose Levels: 64 - 100 - 300 -1500 mg/kg/day

N,N-dimethylcyclohexylamine
NOAEL: 85 mg/kg
Application Route: Oral
Species: rat
Method: OECD Test Guideline 422

dibutyltin dilaurate
LOAEL (Lowest observable adverse effect level): 50 ppm
Application Route: Oral
Species: rat
Dose Levels: 50 - 150 ppm
Exposure duration: 14 d
Frequency of treatment: daily
Target Organs: Thymus
Studies of a comparable product.

Mannich base
NOAEL: 630 ppm
Application Route: Oral
Species: rat, male/female
Dose Levels: 0; 320 - 5000 ppm
Exposure duration: 90 d
Frequency of treatment: daily
Target Organs: Kidney
Studies of a comparable product.

NOAEL: 50 mg/kg
LOAEL (Lowest observable adverse effect level): 8960 µg/kg
Application Route: Oral

Species: Mouse, male/female
Dose Levels: 0; 0,018 - 600 mg/kg
Frequency of treatment: daily
Target Organs: Kidney, Liver
Method: OECD Test Guideline 416
Studies of a comparable product.

NOAEL: 1,5 mg/m³ air
Application Route: Inhalative
Species: rat, male/female
Dose Levels: 0 - 1,5 - 3 - 8 mg/m³
Exposure duration: 13 w
Frequency of treatment: (6 hours a day, 5 days a week)
Target Organs: Upper respiratory tract
Method: OECD Test Guideline 413
Studies of a comparable product.

Carcinogenicity

Tris(1-chloroisopropyl)phosphate
No data available.

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated
No data available.

polyether based on aromatic amine
No data available.

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]
No data available.

2,2'-Iminodiethanol; Diethanolamine
NOAEL (Toxicity): 32 mg/kg body weight/day
Species: rat, female
Application Route: Dermal
Dose Levels: 8 - 16 - 32 mg/kg body weight/day
Exposure duration: 2 year(s)
Frequency of treatment: 5 times/week

NOAEL (Toxicity): 64 mg/kg body weight/day
Species: rat, male
Application Route: Dermal
Dose Levels: 16 - 32 - 64 mg/kg body weight/day
Exposure duration: 2 year(s)
Frequency of treatment: 5 times/week

2-dimethylaminoethanol
Species: Mouse, female
Application Route: Oral
Animal testing did not show any carcinogenic effects.

diethylene glycol
NOAEL (Toxicity): 1.160 mg/kg body weight/day
Species: rat, male/female
Application Route: Oral
Dose Levels: 0 - 1160 - 2250 mg/kg body weight/day
Exposure duration: 108 week(s)
Frequency of treatment: daily
Animal testing did not show any carcinogenic effects.

N,N-dimethylcyclohexylamine
No data available.

dibutyltin dilaurate
Species: rat
Application Route: Oral
Exposure duration: 2 a
Animal testing did not show any carcinogenic effects.

Studies of a comparable product.

Mannich base

Species: rat, male/female

Application Route: Oral

Dose Levels: 0 - 1000 - 2000 ppm

Exposure duration: 2 a

Frequency of treatment: Daily at 103 weeks

No increase in the incidence of tumors.

Studies of a comparable product.

Species: Mouse, male

Application Route: Oral

Dose Levels: 0 - 1000 - 5000 ppm

Exposure duration: 2 a

Frequency of treatment: Daily at 103 weeks

No increase in the incidence of tumors.

Studies of a comparable product.

Species: Mouse, female

Application Route: Oral

Dose Levels: 0 - 5000 - 10000 ppm

Exposure duration: 2 a

Frequency of treatment: Daily at 103 weeks

No increase in the incidence of tumors.

Studies of a comparable product.

Species: rat, male

Application Route: Dermal

Dose Levels: 0 - 16 - 32 - 64 mg/kg

Exposure duration: 2 a

Frequency of treatment: Daily at 103 weeks

Method: OECD Test Guideline 451

No increase in the incidence of tumors.

Studies of a comparable product.

Species: rat, female

Application Route: Dermal

Dose Levels: 0 - 8 - 16 - 32 mg/kg

Exposure duration: 2 a

Frequency of treatment: Daily at 103 weeks

Method: OECD Test Guideline 451

No increase in the incidence of tumors.

Studies of a comparable product.

LOAEL (Toxicity): 40 mg/kg body weight/day

Species: Mouse, male/female

Application Route: Dermal

Dose Levels: 0 - 40 - 80 - 160 mg/kg

Exposure duration: 2 a

Frequency of treatment: Daily at 103 weeks

Method: OECD Test Guideline 451

Increase in the incidence of tumors.

Studies of a comparable product.

NOAEL (Toxicity): 20 mg/kg

Species: Mouse, female

Application Route: Dermal

Dose Levels: 0 - 5 - 10 - 20 mg/kg

Exposure duration: 20 w

Frequency of treatment: 5 times/week

No increase in the incidence of tumors.

Studies of a comparable product.

Reproductive toxicity/Fertility

Tris(1-chloroisopropyl)phosphate

NOAEL (parents, generally toxicity): 85 mg/kg

NOAEL (parents, fertility): 99 mg/kg

Test type: Two-generation study
Species: rat, male/female
Application Route: (feeding study) oral
Frequency of treatment: daily
Method: OECD Test Guideline 416

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated
No data available.

polyether based on aromatic amine
NOAEL (parents, generally toxicity): 10 mg/kg
NOAEL (parents, fertility): 160 mg/kg
NOAEL (offspring): 160 mg/kg
Species: rat, male/female
Application Route: Oral
Dose Levels: 0 - 10 - 40 - 160 mg/kg
Exposure duration: males: 28 days, females: 58 days
Frequency of treatment: daily
Exposure time before mating - Male: 14 d
Exposure time before mating - Female: 14 d
Method: OECD Test Guideline 421
Fertility and developmental toxicity tests did not reveal any effect on reproduction.
Studies of a comparable product.

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]
NOAEL (parents, generally toxicity): 1000 mg/kg
Species: rat, male/female
Application Route: Oral
Dose Levels: 0 - 100 - 300 - 1.000 mg/kg
Method: OECD Test Guideline 407
Studies of a comparable product.

2,2'-Iminodiethanol; Diethanolamine
NOAEL - Parents: 300 mg/kg
NOAEL - F1: 1.000 mg/kg
NOAEL - F2: 1.000 mg/kg
Test type: Two-generation study
Species: rat, male/female
Application Route: (feeding study) oral
Method: OECD Test Guideline 416

2-dimethylaminoethanol
Test type: Fertility Screening
Species: rat
Application Route: Oral
Dose Levels: 300 - 600 mg/kg
Method: OECD Test Guideline 421
The result were inconsistent.

diethylene glycol
Species: Mouse, male/female
Application Route: Oral
Available data show no indications for reproductive toxicity.

N,N-dimethylcyclohexylamine
NOAEL - Parents: 85 mg/kg
NOAEL (parents, fertility): 85 mg/kg
Test type: Combined Repeated Dose Toxicity Study with the Reproduction/Developmental Toxicity Screening Test
Species: rat, male/female
Application Route: Oral
Method: OECD Test Guideline 422
Available data show no indications for reproductive toxicity.

dibutyltin dilaurate
NOAEL (parents, generally toxicity): 0,3 mg/kg
NOAEL (parents, fertility): 1,7 mg/kg

Test type: Fertility Screening
Species: rat, male/female
Application Route: (feeding study) oral
Method: OECD Test Guideline 421
Experiments have shown reproductive toxicity effects on laboratory animals.
Studies of a comparable product.

Mannich base
NOAEL - Parents: 50 mg/kg (750 ppm)
NOAEL – F1: 50 mg/kg (750 ppm)
NOAEL – F2: 50 mg/kg (750 ppm)
Species: rat, male/female
Application Route: Oral
Dose Levels: 0 - 7500 ppm
Exposure duration: males: 15 weeks, females: 18 weeks
Frequency of treatment: daily
Studies of a comparable product.

Reproductive toxicity/Teratogenicity

Tris(1-chloroisopropyl)phosphate
NOAEL (maternal): 85 mg/kg
LOAEL (developmental toxicity): 99 mg/kg bw/day
Species: rat, female
Application Route: Oral

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated
No data available.

polyether based on aromatic amine
NOAEL (maternal): 10 mg/kg
NOAEL (developmental toxicity): 160 mg/kg
Species: rat, female
Application Route: Oral
Dose Levels: 0 - 10 - 40 - 160 mg/kg
Exposure duration: 58 d
Method: OECD Test Guideline 421
Fertility and developmental toxicity tests did not reveal any effect on development.
Studies of a comparable product.

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]
No data available.

2,2'-Iminodiethanol; Diethanolamine
NOAEL (teratogenicity): > 1.500 mg/kg
Species: rat, female
Application Route: Dermal
Dose Levels: 150 - 380 - 1500 mg/kg/day
Method: OECD Test Guideline 414

2-dimethylaminoethanol
NOAEL (teratogenicity): > 100 ppm
NOAEL (maternal): 10 ppm
Species: rat
Application Route: Inhalative
Dose Levels: 10 - 30 - 100 ppm

diethylene glycol
NOAEL (maternal): 1.000 mg/kg
NOAEL (developmental toxicity): 1000 mg/kg
Species: rabbit, female
Application Route: Oral
Method: OECD Test Guideline 414
Did not show teratogenic effects in animal experiments.

N,N-dimethylcyclohexylamine
NOAEL (teratogenicity): 85 mg/kg
NOAEL (maternal): 85 mg/kg

Species: rat, male and female
Application Route: Oral
Did not show teratogenic effects in animal experiments.

dibutyltin dilaurate
NOAEL (teratogenicity): 5 mg/kg
NOAEL (maternal): 1 mg/kg
Species: rat, female
Application Route: Oral
Method: OECD Test Guideline 414
Damage to fetus possible
Studies of a comparable product.

Mannich base
NOAEL (teratogenicity): 50 mg/kg
NOAEL (maternal): 50 mg/kg
NOAEL (developmental toxicity): 50 mg/kg
Species: rat, female
Application Route: Oral
Dose Levels: 0 - 300 mg/kg
Frequency of treatment: daily
Did not show teratogenic effects in animal experiments.
Studies of a comparable product.

Genotoxicity in vitro

Tris(1-chloroisopropyl)phosphate
Test type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with/without
Result: negative
Method: OECD Test Guideline 471

Test type: DNA damage and repair (SCE test)
Result: negative
Method: OECD Test Guideline 482

Test type: In vitro mammalian cell gene mutation test
Test system: Mouse lymphoma cells
Metabolic activation: with
Result: positive
Method: OECD Test Guideline 476

Test type: In vitro mammalian cell gene mutation test
Test system: Mouse lymphoma cells
Metabolic activation: without
Result: negative
Method: OECD Test Guideline 476

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated

Test type: Salmonella/microsome test (Ames test)
Test system: Salmonella typhimurium
Metabolic activation: with/without
Result: negative
Method: OECD Test Guideline 471

Test type: Point mutation in mammalian cells (HPRT test)
Test system: Chinese hamster V79 cell line
Metabolic activation: with/without
Result: negative
Method: OECD Test Guideline 476

Test type: Micronucleus test
Test system: Chinese hamster V79 cell line
Metabolic activation: with/without
Result: negative
Method: OECD Test Guideline 487

polyether based on aromatic amine
Test type: Salmonella/microsome test (Ames test)
Metabolic activation: with/without
Result: No indication of mutagenic effects.
Method: OECD Test Guideline 471

Test type: In vitro mammalian cell gene mutation test
Test system: Chinese hamster V79 cell line
Metabolic activation: with/without
Result: negative
Method: OECD Test Guideline 476

Test type: Chromosome aberration test in vitro
Test system: Chinese hamster V79 cell line
Metabolic activation: with/without
Result: negative
Method: OECD Test Guideline 473

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]
Test type: Salmonella/microsome test (Ames test)
Metabolic activation: with/without
Result: negative
Method: OECD Test Guideline 471
Studies of a comparable product.

Test type: Point mutation in mammalian cells (HPRT test)
Test system: Chinese hamster V79 cell line
Metabolic activation: with/without
Result: negative
Method: OECD Test Guideline 476
Studies of a comparable product.

Test type: Micronucleus test
Test system: Chinese hamster V79 cell line
Metabolic activation: with/without
Result: negative
Method: OECD Test Guideline 487
Studies of a comparable product.

2,2'-Iminodiethanol; Diethanolamine
Test type: Ames test
Metabolic activation: with/without
Result: negative
Method: OECD Test Guideline 471

Test type: Chromosome aberration test in vitro
Metabolic activation: with/without
Result: negative

Test type: In vitro mammalian cell gene mutation test
Metabolic activation: with/without
Result: negative
Method: OECD Test Guideline 476

2-dimethylaminoethanol
Test type: Ames test
Metabolic activation: with/without
Result: negative
Method: OECD Test Guideline 471

Test type: In vitro mammalian cell gene mutation test
Metabolic activation: with/without
Result: negative
Method: OECD Test Guideline 476

diethylene glycol

Test type: Ames test

Metabolic activation: with/without

Result: negative

Method: OECD Test Guideline 471

N,N-dimethylcyclohexylamine

Test type: Salmonella/microsome test (Ames test)

Metabolic activation: with/without

Result: No indication of mutagenic effects.

Method: OECD Test Guideline 471

Test type: Chromosome aberration test in vitro

Metabolic activation: with/without

Result: negative

Method: OECD Test Guideline 473

dibutyltin dilaurate

Test type: Ames test

Metabolic activation: with/without

Result: negative

Test type: Chromosome aberration test in vitro

Metabolic activation: with/without

Result: positive

Method: OECD Test Guideline 473

Studies of a comparable product.

Test type: In vitro mammalian cell gene mutation test

Metabolic activation: without

Result: positive

Studies of a comparable product.

Mannich base

Test type: Ames test

Test system: Salmonella typhimurium

Metabolic activation: with/without

Result: negative

Method: OECD Test Guideline 471

Test type: In vitro mammalian cell gene mutation test

Test system: Chinese hamster V79 cell line

Metabolic activation: with/without

Result: negative

Method: OECD Test Guideline 476

Test type: Micronucleus test

Test system: Human lymphocytes

Metabolic activation: with/without

Result: negative

Method: OECD Test Guideline 487

Genotoxicity in vivo

Tris(1-chloroisopropyl)phosphate

Test type: Micronucleus test

Species: Mouse, male/female

Application Route: intraperitoneal

Result: negative

Method: OECD Test Guideline 474

Test type: comet assay

Species: rat, male

Application Route: Oral

Result: negative

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated
No data available.

polyether based on aromatic amine
No data available.

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]
No data available.

2,2'-Iminodiethanol; Diethanolamine
Test type: In vivo micronucleus test
Species: Mouse, male/female
negative

2-dimethylaminoethanol
Test type: In vivo micronucleus test
Species: Mouse
Application Route: intraperitoneal
Result: negative
Method: OECD Test Guideline 474

diethylene glycol
Test type: In vivo micronucleus test
Species: Mouse
Application Route: intraperitoneal
Method: OECD Test Guideline 474
negative

N,N-dimethylcyclohexylamine
Test type: In vivo micronucleus test
Species: rat, male and female
Result: negative
Method: OECD Test Guideline 474

dibutyltin dilaurate
Test type: In vivo micronucleus test
Species: Mouse
Application Route: Oral
Result: positive
Method: OECD Test Guideline 474
Studies of a comparable product.

Mannich base
No data available.

STOT evaluation – one-time exposure

Tris(1-chloroisopropyl)phosphate
Based on available data, the classification criteria are not met.

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated
Based on available data, the classification criteria are not met.

polyether based on aromatic amine
Based on available data, the classification criteria are not met.

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]
Based on available data, the classification criteria are not met.

2,2'-Iminodiethanol; Diethanolamine
Based on available data, the classification criteria are not met.

2-dimethylaminoethanol
May cause respiratory irritation.

diethylene glycol

Based on available data, the classification criteria are not met.

N,N-dimethylcyclohexylamine

Based on available data, the classification criteria are not met.

dibutyltin dilaurate

Target Organs: Thymus

Causes damage to organs.

Mannich base

Route of exposure: Inhalation

Target Organs: Respiratory organs

May cause respiratory irritation.

STOT evaluation – repeated exposure

Tris(1-chloroisopropyl)phosphate

Based on available data, the classification criteria are not met.

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated

Based on available data, the classification criteria are not met.

polyether based on aromatic amine

Based on available data, the classification criteria are not met.

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]

Based on available data, the classification criteria are not met.

2,2'-Iminodiethanol; Diethanolamine

Target Organs: Liver, Kidney, Blood

May cause damage to organs through prolonged or repeated exposure.

2-dimethylaminoethanol

Based on available data, the classification criteria are not met.

diethylene glycol

Based on available data, the classification criteria are not met.

N,N-dimethylcyclohexylamine

Based on available data, the classification criteria are not met.

dibutyltin dilaurate

Target Organs: Thymus

Causes damage to organs through prolonged or repeated exposure.

Mannich base

Target Organs: Liver, Kidney

May cause damage to organs through prolonged or repeated exposure.

Aspiration toxicity

Tris(1-chloroisopropyl)phosphate

Based on available data, the classification criteria are not met.

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated

Based on available data, the classification criteria are not met.

polyether based on aromatic amine

Based on available data, the classification criteria are not met.

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]

No data available.

2,2'-Iminodiethanol; Diethanolamine

Based on available data, the classification criteria are not met.

2-dimethylaminoethanol

Based on available data, the classification criteria are not met.

diethylene glycol

No data available.

N,N-dimethylcyclohexylamine

No data available.

dibutyltin dilaurate

No data available.

Mannich base

Based on available data, the classification criteria are not met.

CMR Assessment

Tris(1-chloroisopropyl)phosphate

Carcinogenicity: No data available.

Mutagenicity: Based on available data, the classification criteria are not met.

Teratogenicity: Based on available data, the classification criteria are not met.

Reproductive toxicity/Fertility: Based on available data, the classification criteria are not met.

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated

Carcinogenicity: Based on available data, the classification criteria are not met.

Mutagenicity: In vitro tests did not show mutagenic effects Based on available data, the classification criteria are not met.

Teratogenicity: Based on available data, the classification criteria are not met.

Reproductive toxicity/Fertility: Based on available data, the classification criteria are not met.

polyether based on aromatic amine

Carcinogenicity: Based on available data, the classification criteria are not met.

Mutagenicity: In vitro tests did not show mutagenic effects Based on available data, the classification criteria are not met.

Teratogenicity: Based on available data, the classification criteria are not met.

Reproductive toxicity/Fertility: Based on available data, the classification criteria are not met.

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]

Carcinogenicity: Based on available data, the classification criteria are not met.

Mutagenicity: In vitro tests did not show mutagenic effects On the basis of this data, the substance is not classified as mutagenic.

Teratogenicity: Based on available data, the classification criteria are not met.

Reproductive toxicity/Fertility: Based on available data, the classification criteria are not met.

2,2'-Iminodiethanol; Diethanolamine

Carcinogenicity: Based on available data, the classification criteria are not met.

Mutagenicity: Based on available data, the classification criteria are not met.

Teratogenicity: Based on available data, the classification criteria are not met.

Reproductive toxicity/Fertility: Based on available data, the classification criteria are not met.

2-dimethylaminoethanol

Carcinogenicity: Based on available data, the classification criteria are not met.

Mutagenicity: In vitro and in vivo tests did not show mutagenic effects. Based on available data, the classification criteria are not met.

Teratogenicity: Based on available data, the classification criteria are not met.

Reproductive toxicity/Fertility: No valid data available.

diethylene glycol

Carcinogenicity: Based on available data, the classification criteria are not met.

Mutagenicity: Based on available data, the classification criteria are not met.

Teratogenicity: Based on available data, the classification criteria are not met.

Reproductive toxicity/Fertility: Based on available data, the classification criteria are not met.

N,N-dimethylcyclohexylamine

Carcinogenicity: Based on available data, the classification criteria are not met.

Mutagenicity: Based on available data, the classification criteria are not met.

Teratogenicity: Based on available data, the classification criteria are not met.

Reproductive toxicity/Fertility: Based on available data, the classification criteria are not met.

dibutyltin dilaurate

Carcinogenicity: Based on available data, the classification criteria are not met.

Mutagenicity: Suspected of causing genetic defects (Muta. 2).

Teratogenicity: May damage the unborn child (Repr. 1B).

Reproductive toxicity/Fertility: May damage fertility (Repr. 1B).

Mannich base

Carcinogenicity: Based on available data, the classification criteria are not met.

Mutagenicity: Based on available data, the classification criteria are not met.

Teratogenicity: Based on available data, the classification criteria are not met.

Reproductive toxicity/Fertility: May damage fertility (Repr. 1B).

Toxicology Assessment

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated

Acute effects: Causes skin irritation. Causes serious eye damage.

Sensitization: May cause an allergic skin reaction.

Repeated dose toxicity: Based on available data, the classification criteria are not met.

polyether based on aromatic amine

Acute effects: Harmful if swallowed. May irritate eyes.

Sensitization: Based on available data, the classification criteria are not met.

Repeated dose toxicity: Based on available data, the classification criteria are not met.

Mannich base

Acute effects: Causes skin irritation. Causes serious eye damage.

Sensitization: Based on available data, the classification criteria are not met.

Additional information

2,2'-Iminodiethanol; Diethanolamine

Risk of cutaneous absorption.

diethylene glycol

The substance is virtually non-toxic when swallowed, inhaled or absorbed through the skin during animal experiments. Owing to experiences with regard to humans, it has been agreed to label the substance as harmful when swallowed.

SECTION 12: Ecological information

Ecotoxicological studies of the product are not available.

Do not allow to escape into waterways, wastewater or soil.

Please find below the ecotoxicological data available to us for the components.

12.1 Toxicity**Acute Fish toxicity**

Tris(1-chloroisopropyl)phosphate

LC50 51 mg/l

Species: Brachydanio rerio (zebrafish)

Exposure duration: 96 h

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated

LC50 > 100 mg/l

Species: Danio rerio (zebra fish)

Exposure duration: 96 h

Method: OECD Test Guideline 203

polyether based on aromatic amine

LC50 > 100 mg/l

Species: Danio rerio (zebra fish)

Exposure duration: 96 h

Method: OECD Test Guideline 203

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]

LC50 > 100 mg/l

Species: Brachydanio rerio (Zebra barbel)

Exposure duration: 96 h

Method: Directive 67/548/EEC, Annex V, C.1.

Studies of a comparable product.

2,2'-Iminodiethanol; Diethanolamine

LC50 1.460 mg/l

Species: Pimephales promelas (fathead minnow)

Exposure duration: 96 h

2-dimethylaminoethanol

LC50 146,6 mg/l

Test type: static test

Species: Leuciscus idus (Golden orfe)

Exposure duration: 96 h

Method: DIN 38412

diethylene glycol

LC50 75.200 mg/l

Species: Pimephales promelas (fathead minnow)

Exposure duration: 96 h

N,N-dimethylcyclohexylamine

LC50 31,6 mg/l

Species: Leuciscus idus (Golden orfe)

Exposure duration: 96 h

Method: DIN 38412

dibutyltin dilaurate

LC50 > 1,5 mg/l

Species: Danio rerio (zebra fish)

Exposure duration: 96 h

Method: OECD Test Guideline 203

Mannich base

LC50 60,1 mg/l

Test type: Acute Fish toxicity

Species: Danio rerio (zebra fish)

Exposure duration: 96 h

Method: OECD Test Guideline 203

Chronic Fish toxicity

Tris(1-chloroisopropyl)phosphate

No data available.

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated

No data available.

polyether based on aromatic amine

No data available.

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]
No data available.

2,2'-Iminodiethanol; Diethanolamine
No data available.

2-dimethylaminoethanol
No data available.

diethylene glycol
NOEC 15.380 mg/l
Species: Pimephales promelas (fathead minnow)
Studies of a comparable product.

N,N-dimethylcyclohexylamine
No data available.

dibutyltin dilaurate
No data available.

Mannich base
Study scientifically not justified.

Acute toxicity for daphnia

Tris(1-chloroisopropyl)phosphate
EC50 131 mg/l
Species: Daphnia magna (Water flea)
Exposure duration: 48 h

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated
EC50 > 100 mg/l
Species: Daphnia magna (Water flea)
Exposure duration: 48 h
Method: OECD Test Guideline 202

polyether based on aromatic amine
EC50 > 100 mg/l
Test type: Immobilization
Species: Daphnia magna (Water flea)
Exposure duration: 48 h
Method: OECD Test Guideline 202

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]
EC50 > 100 mg/l
Species: Daphnia magna (Water flea)
Exposure duration: 48 h
Method: OECD Test Guideline 202
Studies of a comparable product.

2,2'-Iminodiethanol; Diethanolamine
EC50 55 mg/l
Species: Daphnia magna (Water flea)
Exposure duration: 48 h

2-dimethylaminoethanol
EC50 98,4 mg/l
Species: Daphnia magna (Water flea)
Exposure duration: 48 h

diethylene glycol
EC50 > 10.000 mg/l
Species: Daphnia magna (Water flea)
Exposure duration: 24 h

N,N-dimethylcyclohexylamine
EC50 75 mg/l
Species: Daphnia magna (Water flea)
Exposure duration: 48 h

dibutyltin dilaurate
EC50 <1 mg/l
Species: Daphnia magna (Water flea)
Exposure duration: 48 h
Method: OECD Test Guideline 202

Mannich base
EC50 36,1 mg/l
Test type: Acute toxicity for daphnia
Species: Daphnia magna Straus
Exposure duration: 48 h
Method: OECD Test Guideline 202

Chronic toxicity to daphnia

Tris(1-chloroisopropyl)phosphate
NOEC 32 mg/l
Test type: Fresh water study
Species: Daphnia magna (Water flea)
Exposure duration: 21 d
Method: OECD Test Guideline 202

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated
No data available.

polyether based on aromatic amine
EC10 (Reproduction) 2,5 mg/l
Species: Daphnia magna (Water flea)
Exposure duration: 21 d
Method: OECD Test Guideline 211
Studies of a comparable product.

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]
No data available.

2,2'-Iminodiethanol; Diethanolamine
NOEC 0,78 mg/l
Species: Daphnia magna (Water flea)
Exposure duration: 21 d
Method: OECD Test Guideline 202

2-dimethylaminoethanol
No data available.

diethylene glycol
NOEC (Reproduction) > 15.000 mg/l
Species: Daphnia magna (Water flea)
Exposure duration: 21 d
Studies of a comparable product.

N,N-dimethylcyclohexylamine
No data available.

dibutyltin dilaurate
Test type: no data available

Mannich base
Study scientifically not justified.

Acute toxicity for algae

Tris(1-chloroisopropyl)phosphate
EC50 82 mg/l
Species: Pseudokirchneriella subcapitata (green algae)

Exposure duration: 72 h
Method: OECD Test Guideline 201

NOEC 13 mg/l
Species: Pseudokirchneriella subcapitata (green algae)
Exposure duration: 72 h
Method: OECD Test Guideline 201

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated
ErC50 > 100 mg/l
Species: Desmodesmus subspicatus (Green algae)
Exposure duration: 72 h
Method: OECD Test Guideline 201

NOEC 31,25 mg/l
Species: Desmodesmus subspicatus (Green algae)
Exposure duration: 72 h
Method: OECD Test Guideline 201

polyether based on aromatic amine
ErC50 208,9 mg/l
Test type: Growth inhibition
Species: Desmodesmus subspicatus (Green algae)
Exposure duration: 72 h
Method: OECD Test Guideline 201

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]
ErC50 157 mg/l
Species: Desmodesmus subspicatus (Green algae)
Exposure duration: 72 h
Method: OECD Test Guideline 201

2,2'-Iminodiethanol; Diethanolamine
EC50 2,2 mg/l
Species: Pseudokirchneriella subcapitata (green algae)
Exposure duration: 96 h

2-dimethylaminoethanol
EC50 66,1 mg/l
Species: scenedesmus subspicatus
Exposure duration: 72 h

EC10 25,5 mg/l
Species: scenedesmus subspicatus
Exposure duration: 72 h

diethylene glycol
EC50 9.362 mg/l
Species: algae
Exposure duration: 96 h

N,N-dimethylcyclohexylamine
EC50 > 2 mg/l
endpoint: Growth inhibition
Species: scenedesmus subspicatus
Exposure duration: 72 h
Method: OECD Test Guideline 201

NOEC 0,06 mg/l
endpoint: Growth inhibition
Species: scenedesmus subspicatus
Exposure duration: 72 h
Method: OECD Test Guideline 201

dibutyltin dilaurate
EC50 > 1 mg/l
Species: scenedesmus subspicatus

Exposure duration: 72 h
Method: OECD Test Guideline 201

Mannich base
ErC50 23,54 mg/l
Test type: Growth inhibition
Species: *Desmodesmus subspicatus* (Green algae)
Exposure duration: 72 h
Method: OECD Test Guideline 201

EC10 1,76 mg/l
Test type: Growth inhibition
Species: *Desmodesmus subspicatus* (Green algae)
Exposure duration: 72 h
Method: OECD Test Guideline 201

Acute bacterial toxicity

Tris(1-chloroisopropyl)phosphate
EC50 784 mg/l
Species: activated sludge
Exposure duration: 3 h
Method: OECD Test Guideline 209

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated
EC50 > 1.000 mg/l
Species: activated sludge
Exposure duration: 3 h
Method: OECD Test Guideline 209

polyether based on aromatic amine
EC10 ca. 1.800 mg/l
Test type: Respiration inhibition
Species: activated sludge
Exposure duration: 3 h
Method: Directive 67/548/EEC, Annex V, C.11.
Studies of a comparable product.

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]
EC50 > 1.000 mg/l
Test type: Respiration inhibition
Species: activated sludge
Exposure duration: 3 h
Method: OECD Test Guideline 209
Studies of a comparable product.

2,2'-Iminodiethanol; Diethanolamine
EC20 > 1.000 mg/l
Species: activated sludge
Exposure duration: 30 h
Method: OECD Test Guideline 209

2-dimethylaminoethanol
EC20 > 1.000 mg/l
Species: activated sludge
Exposure duration: 30 min
Method: OECD Test Guideline 209

diethylene glycol
EC20 > 1.995 mg/l
Species: activated sludge
Exposure duration: 30 min

N,N-dimethylcyclohexylamine
EC50 206 mg/l
Species: *Pseudomonas putida*
Exposure duration: 17 h

dibutyltin dilaurate
EC50 > 1.000 mg/l
Species: activated sludge
Exposure duration: 3 h
Method: OECD Test Guideline 209

Mannich base
EC50 > 100 mg/l
Test type: Respiration inhibition
Species: activated sludge
Exposure duration: 3 h
Method: OECD Test Guideline 209

Sediment Toxicity

polyether based on aromatic amine
Due to the low n-octanol-water partition coefficient, an adsorption on the sediment is not to be expected.

Ecotoxicology Assessment

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated

Acute aquatic toxicity: Based on available data, the classification criteria are not met.

Chronic aquatic toxicity: Based on available data, the classification criteria are not met.

Impact on Sewage Treatment: Because of the low bacterial toxicity, there is no risk of an adverse effect on the performance of biological waste water treatment plants.

polyether based on aromatic amine
Acute aquatic toxicity: Based on available data, the classification criteria are not met.
Chronic aquatic toxicity: Based on available data, the classification criteria are not met.
Toxicity Data on Soil: Adsorbs on soil.
Impact on Sewage Treatment: Because of the low bacterial toxicity, there is no risk of an adverse effect on the performance of biological waste water treatment plants.

2,2'-Iminodiethanol; Diethanolamine
Chronic aquatic toxicity: Harmful to aquatic life with long lasting effects.
Impact on Sewage Treatment: Neutralization is normally necessary before waste water is discharged into water treatment plants.

2-dimethylaminoethanol
Impact on Sewage Treatment: Neutralization is normally necessary before waste water is discharged into water treatment plants.

Mannich base
Acute aquatic toxicity: Harmful to aquatic life.
Chronic aquatic toxicity: Harmful to aquatic life with long lasting effects.
Toxicity Data on Soil: Not expected to adsorb on soil.
Impact on Sewage Treatment: Because of the low bacterial toxicity, there is no risk of an adverse effect on the performance of biological waste water treatment plants.

M-Factor

dibutyltin dilaurate
M-factor (acute aquat. tox.): 1
M-factor (chron. aquat. tox.): 1

12.2 Persistence and degradability

Biodegradability

Tris(1-chloroisopropyl)phosphate
Test type: aerobic
Inoculum: activated sludge
Biodegradation: 13 %, 28 d, i.e. not readily degradable

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated

Test type: aerobic
Inoculum: activated sludge
Biodegradation: 9 %, 28 d, i.e. not readily degradable
Method: OECD Test Guideline 301 F

Test type: aerobic
Inoculum: activated sludge
Biodegradation: 15 %, 28 d, i.e. not inherently degradable
Method: OECD Test Guideline 302 C

polyether based on aromatic amine
Test type: aerobic
Inoculum: activated sludge
Biodegradation: 27 %, 28 d, i.e. not readily degradable
Method: OECD Test Guideline 301 F

Test type: Zahn-Wellens Test
Inoculum: activated sludge
Biodegradation: 42 %, 27 d, i.e. not inherently degradable
Method: OECD Test Guideline 302 C

1,3-Isobenzofurandione, polymer with 2,2'-oxybis[ethanol]
Inoculum: activated sludge
Biodegradation: 60 %, 28 d, i.e. not readily degradable
Method: Directive 67/548/EEC Annex V, C.4.D.
Studies of a comparable product.

Inoculum: activated sludge
Biodegradation: 68 %, 28 d, i.e. not inherently degradable
Method: OECD Test Guideline 302 C
Studies of a comparable product.

2,2'-Iminodiethanol; Diethanolamine
Biodegradation: 93 %, 28 d, i.e. readily biodegradable
Method: OECD Test Guideline 301 F

2-dimethylaminoethanol
Biodegradation: 60,5 %, 14 d, i.e. readily biodegradable
Method: OECD Test Guideline 301 C

diethylene glycol
Biodegradation: > 70 %, 28 d, i.e. readily biodegradable
Method: OECD Test Guideline 301 B

N,N-dimethylcyclohexylamine
Biodegradation: 90 - 100 %, 18 d, i.e. readily biodegradable
Method: OECD Test Guideline 301 A

dibutyltin dilaurate
Biodegradation: 23 %, 39 d, i.e. not readily degradable
Method: OECD Test Guideline 301 F

Mannich base
Test type: aerobic
Inoculum: activated sludge
Biodegradation: 45 %, 28 d, i.e. not readily degradable
Method: OECD Test Guideline 301 F

Stability in water

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated

Test type: Hydrolysis
(pH: 4)
Hydrolytic temperature: 50 °C
Hydrolytic degree: 0 %

Method: OECD Test Guideline 111
The substance is hydrolytically stable.

Test type: Hydrolysis
(pH: 7)
Hydrolytic temperature: 50 °C
Hydrolytic degree: 0 %
Method: OECD Test Guideline 111

The substance is hydrolytically stable.

Test type: Hydrolysis

(pH: 9)

Hydrolytic temperature: 50 °C

Hydrolytic degree: < 10 %

Method: OECD Test Guideline 111

The substance is hydrolytically stable.

polyether based on aromatic amine

Test type: Hydrolysis

(pH: 4)

Hydrolytic temperature: 50 °C

Hydrolytic degree: < 10 %

Hydrolysis duration: 120 h

Method: OECD Test Guideline 111

The substance is hydrolytically stable.

Test type: Hydrolysis

(pH: 7)

Hydrolytic temperature: 50 °C

Hydrolytic degree: < 10 %

Hydrolysis duration: 120 h

Method: OECD Test Guideline 111

The substance is hydrolytically stable.

Test type: Hydrolysis

(pH: 9)

Hydrolytic temperature: 50 °C

Hydrolytic degree: < 10 %

Hydrolysis duration: 120 h

Method: OECD Test Guideline 111

The substance is hydrolytically stable.

Mannich base

Test type: Hydrolysis

at 50 °C (pH: 4)

Hydrolysis duration: 5 d

Method: OECD Test Guideline 111

The substance is hydrolytically stable.

Test type: Hydrolysis

Half life: 976 h at 25 °C (pH: 7)

Method: OECD Test Guideline 111

The substance is hydrolytically stable.

Test type: Hydrolysis

Half life: 117,9 h at 25 °C (pH: 9)

Method: OECD Test Guideline 111

Hydrolyses slowly on contact with water.

Photodegradation

polyether based on aromatic amine

Test type: Phototransformation in air

sensitizer: OH-radicals

Concentration sensibilisator: 500.000 1/cm³

Half-life indirect photolysis: 0,042 - 0,075 d

Method: SRC - AOP (calculation)

After evaporation or exposure to the air, the product will be rapidly degraded by photochemical processes.

Biochemical Oxygen Demand (BOD)

2,2'-Iminodiethanol; Diethanolamine

BOD - Value: 885 mg/g

Incubation term: 5 d

2-dimethylaminoethanol

BOD - Value: 1.050 mg/g

Chemical Oxygen Demand (COD)

2,2'-Iminodiethanol; Diethanolamine
COD-Value: 1.352 mg/g

Proportions BOD/ThOD

2-dimethylaminoethanol
BOD/ThBOD value: 60 %

12.3 Bioaccumulative potential**Bioaccumulation**

Tris(1-chloroisopropyl)phosphate
Bioconcentration factor (BCF): 0,8 - 2,8
Species: Cyprinus carpio (Carp)
Exposure duration: 42 d
Concentration: 0,2 mg/l
Method: OECD Test Guideline 305 C

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated
Due to the low n-octanol-water partition coefficient, an accumulation in organisms is not to be expected.

polyether based on aromatic amine
Due to the low n-octanol-water partition coefficient, an accumulation in organisms is not to be expected.

2,2'-Iminodiethanol; Diethanolamine
Bioaccumulation is unlikely.

2-dimethylaminoethanol
Due to the distribution coefficient n-octanol/water, accumulation in organisms is not expected.

diethylene glycol
Bioconcentration factor (BCF): 100
Species: Leuciscus idus (Golden orfe)
Exposure duration: 3 d

dibutyltin dilaurate
Bioconcentration factor (BCF): 2,91
Species: Fish

Mannich base
Due to the low n-octanol-water partition coefficient, an accumulation in organisms is not to be expected.

Partition coefficient (n-octanol/water)

Tris(1-chloroisopropyl)phosphate

log Pow: 2,59
2,2'-Iminodiethanol; Diethanolamine

log Pow: -2,18 at: 25 °C
Method: OECD Test Guideline 107

dibutyltin dilaurate
cannot be determined, hydrolyses

Mannich base

log Pow: 0,325 at: 25 °C
Method: OECD Test Guideline 117

12.4 Mobility in soil

Distribution among environmental compartments

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated

Adsorption

Medium: Soil

log Koc value: 2,5 - 4,4

Method: OECD Test Guideline 121

polyether based on aromatic amine

Adsorption

Medium: Soil

Koc value: 10 - 491

log Koc value: 1 - 2,7

Method: calculated

Moderately mobile in soils

Mannich base

Adsorption

Medium: Soil

Koc value: 74

log Koc value: 1,869

Method: calculated

Mobile in soils

Surface tension

Mannich base

55,8 mN/m at 20 °C

Method: OECD Test Guideline 115

12.5 Results of PBT and vPvB assessment

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects

dibutyltin dilaurate

Very toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

Dispose in accordance with applicable international, national and local laws, ordinances and statutes.

For disposal within the EC, the appropriate code according to the European Waste Catalogue (EWC) should be used.

13.1 Waste treatment methods

After containers have been emptied as thoroughly as possible (e.g. by pouring, scraping or draining until "drip-dry"), they can be sent to an appropriate collection point set up within the framework of the existing take-back scheme of the chemical industry. Containers must be recycled in compliance with national legislation and environmental regulations.

None disposal into waste water.

SECTION 14: Transport information**ADR/RID**

14.1 UN number	:	Not dangerous goods
14.2 UN proper shipping name	:	Not dangerous goods
14.3 Transport hazard class(es)	:	Not dangerous goods
14.4 Packing group	:	Not dangerous goods
14.5 Environmental hazards	:	Not dangerous goods

ADN

14.1 UN number : Not dangerous goods
14.2 UN proper shipping name : Not dangerous goods
14.3 Transport hazard class(es) : Not dangerous goods
14.4 Packing group : Not dangerous goods
14.5 Environmental hazards : Not dangerous goods

IATA

14.1 UN number : Not dangerous goods
14.2 UN proper shipping name : Not dangerous goods
14.3 Transport hazard class(es) : Not dangerous goods
14.4 Packing group : Not dangerous goods
14.5 Environmental hazards : Not dangerous goods

IMDG

14.1 UN number : Not dangerous goods
14.2 UN proper shipping name : Not dangerous goods
14.3 Transport hazard class(es) : Not dangerous goods
14.4 Packing group : Not dangerous goods
14.5 Marine pollutant : Not dangerous goods

14.6 Special precautions for user

See section 6 - 8.

Additional information : Not dangerous cargo.
Keep dry. Avoid heat above +50 °C.
Keep separated from foodstuffs.

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Not applicable.

SECTION 15: Regulatory information**15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**

Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances.
not applicable

REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, preparations and articles (Annex XVII)

Conditions of restriction for the following entries should be considered: 20, 3, 66

This product contains substances subject to EU Regulation 1907/2006 (REACH), Annex XVII.

2,2-Bis-(4-hydroxyphenyl)-propane (4,4'-Isopropylidenediphenol)

CAS-No.: 80-05-7

Subject to REACH Annex XVII, No. 66

dibutyltin dilaurate

CAS-No.: 77-58-7, EC-No.: 201-039-8

Subject to REACH Annex XVII, No. 20

Regulation (EU) No 649/2012 concerning the export and import of hazardous chemicals

This product is subject to Regulation (EU) No 649/2012. It contains:

dibutyltin dilaurate

CAS-No.: 77-58-7, EC-No.: 201-039-8

Water contaminating class (Germany)

2 significantly water endangering

Classification according to AwSV, Annex 1 (5.2)

Any national regulations for the handling of hazardous substances must be observed.

15.2 Chemical Safety Assessment**A Chemical Safety Assessment has been carried out for:**

Tris(1-chloroisopropyl)phosphate
 (Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated polyether based on aromatic amine
 2,2'-Iminodiethanol; Diethanolamine
 2-dimethylaminoethanol
 diethylene glycol
 N,N-dimethylcyclohexylamine
 dibutyltin dilaurate
 Mannich base

SECTION 16: Other information**Full text of the hazard statements of the CLP classification (1272/2008/CE) referred to under sections 2, 3 and 10.**

H226	Flammable liquid and vapour.
H301	Toxic if swallowed.
H302	Harmful if swallowed.
H311	Toxic in contact with skin.
H312	Harmful in contact with skin.
H314	Causes severe skin burns and eye damage.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H318	Causes serious eye damage.
H319	Causes serious eye irritation.
H331	Toxic if inhaled.
H335	May cause respiratory irritation.
H341	Suspected of causing genetic defects.
H360F	May damage fertility.
H360FD	May damage fertility. May damage the unborn child.
H370	Causes damage to organs.
H372	Causes damage to organs through prolonged or repeated exposure if swallowed.
H373	May cause damage to organs through prolonged or repeated exposure.
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.

Safety precautions for handling freshly molded polyurethane parts:

Depending on the production parameters, any uncovered surfaces of freshly molded polyurethane parts using this raw material may contain traces of substances (e. g. starting and reaction products, catalysts, release agents) with hazardous characteristics. Skin contact with traces of these substances must be avoided. Therefore, during demolding or other handling of fresh molded parts, protective gloves tested according to DIN-EN 374 (e.g. nitrile rubber $\geq 0,35$ mm thick, breakthrough time ≥ 480 min, or according to recommendations from glove makers thinner gloves that need to be changed in compliance with breakthrough times more frequently) must be used. Depending on formulation and processing conditions, the requirements may be different from handling of the pure substances. Closed protective clothing is required for the protection of other areas of skin.

Abbreviations and acronyms

ADN	Accord européen relatif au transport international des marchandises Dangereuses par voie de Navigation intérieure
ADR	Accord européen relatif au transport international des marchandises Dangereuses par Route
ANSI	American National Standards Institute
ASTM	American Society of Testing and Materials (US)
ATE	Acute Toxic Estimate
AwSv	Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen
BCF	Bioconcentration Factor
CAS	Chemical Abstract Service
CLP	Regulation on Classification, Labelling and Packaging of Substances and Mixtures
CMR	Cancerogenic Mutagenic Reprotoxic
DIN	Deutsches Institut für Normung
DNEL	Derived No-Effect Level
EC...	Effect Concentration ... %
EWC	European Waste Catalogue
IATA	International Air Transport Association
IBC	Intermediate Bulk Container
ICAO	International Civil Aviation Organization
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
ISO	International Organization for Standardization
IUPAC	International Union of Pure and Applied Chemistry
LOAEL	Lowest Observable Adverse Effect Level
LC...	Lethal Concentration, ...%
LD...	Lethal Dose, ...%
MARPOL	International Convention for the Prevention of Pollution From Ships
NOAEL	No Observed Adverse Effect Level
NOEL/NOEC	No Observed Effect Level/Concentration
OECD	Organisation for Economic Co-operation and Development
PBT	persistent, bioaccumulative, toxic
PNEC	Predicted No-Effect Concentration
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RID	Règlement concernant le transport International ferroviaire de marchandises Dangereuses
STOT	Specific Target Organ Toxicity
TRGS	Technische Regeln für Gefahrstoffe
vPvB	very Persistent, very Bioaccumulative
WGK	Wassergefährdungsklasse

Changes since the last version are highlighted in the margin. This version replaces all previous versions.

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Annex

The operational conditions and the implementation of Risk Management Measures (RMM) are dependent on the following priority-/lead substances for the respective exposure routes:

Lead substance(s), aquatic environment:

dibutyltin dilaurate

Lead substance(s), ozone layer:

Not relevant

Lead substance(s), Inhalation:

Mannich base

Lead substance(s), Dermal:

Mannich base

Lead substance(s), Oral:

Not relevant

Local effects, Skin:

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated

RMMs/OCs for lead component(s) driving the hazards for local effects on skin are sufficiently covered by the lead component(s) which drive the hazards for systemic dermal effects.

Local effects, Inhalation:

Mannich base

Local effects, Eyes:

(Reaction product of 4-[2-(4-hydroxyphenyl)propan-2-yl]phenol, 2-(2-hydroxyethylamino)ethanol and formaldehyde), propoxylated

For RMMs see chapter 8 of the SDS.

Exposure Scenario

Number	Title
ES1	Formulation or re-packing
ES2	Use at industrial sites; Use as an intermediate.
ES3	Use at industrial sites; Rigid foam.
ES4	Widespread use by professional workers; Rigid foam; Indoor use.
ES5	Widespread use by professional workers; Rigid foam; Outdoor use.

ES1: Formulation or re-packing**1.1. Title section**

Exposure Scenario name	: Distribution of substance
Structured Short Title	: Formulation or re-packing

Environment		
CS1	Formulation of preparations [dibutyltin dilaurate]	ERC2
Worker		
CS2	Distribution of substance [Mannich base]	PROC1
CS3	Distribution of substance [Mannich base]	PROC2
CS4	Distribution of substance [Mannich base]	PROC3
CS5	Distribution of substance [Mannich base]	PROC4, PROC9
CS6	Distribution of substance [Mannich base]	PROC5
CS7	Distribution of substance [Mannich base]	PROC8a
CS8	Distribution of substance [Mannich base]	PROC8b
CS9	Distribution of substance [Mannich base]	PROC15

1.2. Conditions of use affecting exposure**1.2.1. Control of environmental exposure: Formulation of preparations (ERC2)
[dibutyltin dilaurate]**

Product (article) characteristics	
Molar Mass	: 631,56 g/mol
Vapour pressure	: 0,0000077 Pa at 25 °C
Water solubility	: 0,00143 g/l at 20 °C
Partition coefficient (n-octanol/water)	: log Pow: 4,44 at: 20,8 °C
Biodegradation	: Not readily biodegradable.
Amount used, frequency and duration of use (or from service life)	
Annual amount per site	: 3,65 tonnes/year (t/y)
Emission days	: 10
Remarks	: days/year

Technical and organisational conditions and measures	
Exhaust air scrubber Incineration Air - minimum efficiency of 100 %	
STP (sewage-treatment plant) Water - minimum efficiency of 100 %	
STP sludge treatment	: Sewage sludge incineration
STP effluent	: 1.000 m3/d
Effectiveness (of a measure)	: 99 %
Percentage removed from waste water	: 99 %
Conditions and measures related to treatment of waste (including article waste)	
Waste treatment	: Incineration Effectiveness 100%
Other conditions affecting environmental exposure	
Receiving surface water flow	: 720.000 m3/h

**1.2.2. Control of worker exposure: Use in closed process, no likelihood of exposure (PROC1)
[Mannich base]**

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: > 25%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
Duration of the activity	: < 8 hours/day
Technical and organisational conditions and measures	
<p>Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.</p>	
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	

Substance/task appropriate gloves.
 Skin coverage with appropriate barrier material based on potential for contact with the chemicals.
 Substance/task appropriate respirator.
 Optional face shield.
 Eye protection
 Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying.
 Recommendation:
 coverall
 (e.g. Tyvek)
 TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942).
 TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941).
 Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products.
 Contaminated and/or damaged gloves must be changed.

Wear suitable gloves tested to EN374.

Other conditions affecting workers exposure

Exposed skin area	:	
PROC 1	:	240 cm ² (palm of one hand)
Indoor or outdoor use	:	Indoor
Temperature	:	<= 40 °C

1.2.3. Control of worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC2) [Mannich base]

Product (article) characteristics

Concentration of the Substance in Mixture/Article	:	> 25%
Remarks	:	Mixture
Molar Mass	:	354 g/mol
Vapour pressure	:	0,0384 Pa at 20 °C
Physical form of product	:	Liquid

Amount used, frequency and duration of use (or from service life)

Duration of the activity	:	< 15 minutes/day
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Technical and organisational conditions and measures

Containment as appropriate.
 Segregation of the emitting process.
 Effective contaminant extraction.
 Provide a good standard of general ventilation.
 Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product.
 Minimize number of staff exposed.
 Minimization of manual phases.
 Avoid contact with contaminated tools.
 Regular cleaning of equipment, work area and clothing.
 Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.
 Training for staff on good practice.
 Good standard of personal hygiene.

Provide a good standard of general ventilation (not less than 5 to 10 air changes per hour).
 Local exhaust ventilation is required.

Handle substance within a predominantly closed system.	
Conditions and measures related to personal protection, hygiene and health evaluation	
<p>Substance/task appropriate gloves. Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Substance/task appropriate respirator. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: coverall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed.</p>	
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 2	: 480 cm ² (palms of both hands)
Indoor or outdoor use	: Indoor
Temperature	: <= 40 °C

1.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation) (PROC3) [Mannich base]

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: > 25%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
Duration of the activity	: < 15 minutes/day
Technical and organisational conditions and measures	
<p>Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice.</p>	

Good standard of personal hygiene.	
Provide a good standard of general ventilation (not less than 5 to 10 air changes per hour). Local exhaust ventilation is required. Handle substance within a predominantly closed system.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Substance/task appropriate gloves. Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Substance/task appropriate respirator. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: coverall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed.	
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 3	: 240 cm ² (palm of one hand)
Indoor or outdoor use	: Indoor
Temperature	: <= 40 °C

**1.2.5. Control of worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4) / Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)
[Mannich base]**

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: > 25%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
Duration of the activity	: < 1 hours/day
Technical and organisational conditions and measures	
Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases.	

Avoid contact with contaminated tools.
 Regular cleaning of equipment, work area and clothing.
 Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.
 Training for staff on good practice.
 Good standard of personal hygiene.

Provide a good standard of general ventilation (not less than 5 to 10 air changes per hour).
 Local exhaust ventilation is required.
 Handle in semi-closed process with occasional controlled exposure.

Conditions and measures related to personal protection, hygiene and health evaluation

Substance/task appropriate gloves.
 Skin coverage with appropriate barrier material based on potential for contact with the chemicals.
 Substance/task appropriate respirator.
 Optional face shield.
 Eye protection
 Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying.
 Recommendation:
 overall
 (e.g. Tyvek)
 TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942).
 TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941).
 Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products.
 Contaminated and/or damaged gloves must be changed.

Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Other conditions affecting workers exposure

Exposed skin area	:	
PROC 4, PROC 9	:	480 cm ² (palms of both hands)
Indoor or outdoor use	:	Indoor
Temperature	:	<= 40 °C

1.2.6. Control of worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) (PROC5) [Mannich base]

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	> 25%
Remarks	:	Mixture
Molar Mass	:	354 g/mol
Vapour pressure	:	0,0384 Pa at 20 °C
Physical form of product	:	Liquid
Amount used, frequency and duration of use (or from service life)		
Duration of the activity	:	< 1 hours/day
Technical and organisational conditions and measures		
Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction.		

Provide a good standard of general ventilation.
 Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product.
 Minimize number of staff exposed.
 Minimization of manual phases.
 Avoid contact with contaminated tools.
 Regular cleaning of equipment, work area and clothing.
 Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.
 Training for staff on good practice.
 Good standard of personal hygiene.

Provide a good standard of general ventilation (not less than 5 to 10 air changes per hour).
 Local exhaust ventilation is required.

Conditions and measures related to personal protection, hygiene and health evaluation

Substance/task appropriate gloves.
 Skin coverage with appropriate barrier material based on potential for contact with the chemicals.
 Substance/task appropriate respirator.
 Optional face shield.
 Eye protection
 Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying.
 Recommendation:
 coverall
 (e.g. Tyvek)
 TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942).
 TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941).
 Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products.
 Contaminated and/or damaged gloves must be changed.

Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Other conditions affecting workers exposure

Exposed skin area	:	
PROC 5	:	480 cm ² (palms of both hands)
Indoor or outdoor use	:	Indoor
Temperature	:	<= 40 °C

1.2.7. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities (PROC8a) [Mannich base]

Product (article) characteristics

Concentration of the Substance in Mixture/Article	:	> 25%
Remarks	:	Mixture
Molar Mass	:	354 g/mol
Vapour pressure	:	0,0384 Pa at 20 °C
Physical form of product	:	Liquid

Amount used, frequency and duration of use (or from service life)

Duration of the activity	:	< 15 minutes/day
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Technical and organisational conditions and measures

Containment as appropriate.
 Segregation of the emitting process.
 Effective contaminant extraction.
 Provide a good standard of general ventilation.
 Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product.
 Minimize number of staff exposed.
 Minimization of manual phases.
 Avoid contact with contaminated tools.
 Regular cleaning of equipment, work area and clothing.
 Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.
 Training for staff on good practice.
 Good standard of personal hygiene.

Effective housekeeping processes in place.
 Fixed capturing hood.
 Room ventilation rate of 1 air change per hour (ACH) is required.

Conditions and measures related to personal protection, hygiene and health evaluation

Substance/task appropriate gloves.
 Skin coverage with appropriate barrier material based on potential for contact with the chemicals.
 Substance/task appropriate respirator.
 Optional face shield.
 Eye protection
 Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying.
 Recommendation:
 overall
 (e.g. Tyvek)
 TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942).
 TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941).
 Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products.
 Contaminated and/or damaged gloves must be changed.

Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Other conditions affecting workers exposure

Exposed skin area	:	
PROC 8a	:	840 cm ² (both hands)
Indoor or outdoor use	:	Indoor
Temperature	:	<= 40 °C
Room size	:	no restriction

1.2.8. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b) [Mannich base]

Product (article) characteristics

Concentration of the Substance in Mixture/Article	:	> 25%
Remarks	:	Mixture
Molar Mass	:	354 g/mol
Vapour pressure	:	0,0384 Pa at 20 °C
Physical form of product	:	Liquid

Amount used, frequency and duration of use (or from service life)	
Duration of the activity	: < 1 hours/day
Technical and organisational conditions and measures	
<p>Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.</p>	
<p>Effective housekeeping processes in place. Fixed capturing hood. Room ventilation rate of 1 air change per hour (ACH) is required. Handle in semi-closed process with occasional controlled exposure.</p>	
Conditions and measures related to personal protection, hygiene and health evaluation	
<p>Substance/task appropriate gloves. Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Substance/task appropriate respirator. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: coverall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed.</p>	
Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls.	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 8b	: 960 cm ² (both hands)
Indoor or outdoor use	: Indoor
Temperature	: <= 40 °C
Room size	: no restriction

1.2.9. Control of worker exposure: Use as laboratory reagent (PROC15) [Mannich base]

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: > 25%

Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
Duration of the activity	: < 1 hours/day
Technical and organisational conditions and measures	
<p>Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.</p>	
<p>Provide a good standard of general ventilation (not less than 5 to 10 air changes per hour). Local exhaust ventilation is required.</p>	
Conditions and measures related to personal protection, hygiene and health evaluation	
<p>Substance/task appropriate gloves. Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Substance/task appropriate respirator. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: coverall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed.</p>	
<p>Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection.</p>	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 15	: 240 cm ² (palm of one hand)
Indoor or outdoor use	: Indoor
Temperature	: <= 40 °C

1.3. Exposure estimation and reference to its source**1.3.1. Environmental release and exposure: Formulation of preparations (ERC2)
[dibutyltin dilaurate]**

Release route	Release rate	Release estimation method	Remarks
Air	0 %		
Water	0,001 %		
Soil	0 %		

Compartment	Exposure level	RCR	Remarks
Freshwater	0,114 mg/m ³ (EUSES v2.1)	0,25	
Marine water	0,0114 mg/m ³ (EUSES v2.1)	0,25	
Freshwater sediment	0,0124 mg/kg wet weight (EUSES v2.1)	0,25	
Marine sediment	0,0012 mg/kg wet weight (EUSES v2.1)	0,25	
STP (sewage-treatment plant)	1,15 mg/m ³ (EUSES v2.1)	< 0,01	
Soil	0,0245 mg/kg wet weight (EUSES v2.1)	0,6	

Additional information on exposure estimation

Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR ≤ 1).

1.3.2. Worker exposure: Use in closed process, no likelihood of exposure (PROC1) [Mannich base]

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,103 mg/m ³ (ECETOC TRA v3.0)	0,103	
long term, inhalative, local,	0,103 mg/m ³ (ECETOC TRA v3.0)	0,103	
long term, dermal, systemic,	0,007 mg/kg bw/day (ECETOC TRA v3.0)	0,17	Gloves: 80% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation

* Qualitative approach used to conclude safe use.

Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

1.3.3. Worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC2) [Mannich base]

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,044 mg/m ³ (ECETOC TRA v3.0)	0,044	LEV: 90% efficiency
long term, inhalative, local,	0,044 mg/m ³ (ECETOC TRA v3.0)	0,044	LEV: 90% efficiency
long term, dermal, systemic,	0,007 mg/kg bw/day (ECETOC TRA v3.0)	0,171	LEV: 90% efficiency, Gloves: 95% protection

acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation
*
Qualitative approach used to conclude safe use.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

**1.3.4. Worker exposure: Use in closed batch process (synthesis or formulation) (PROC3)
[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,133 mg/m ³ (ECETOC TRA v3.0)	0,133	LEV: 90% efficiency
long term, inhalative, local,	0,133 mg/m ³ (ECETOC TRA v3.0)	0,133	LEV: 90% efficiency
long term, dermal, systemic,	0,003 mg/kg bw/day (ECETOC TRA v3.0)	0,086	LEV: 90% efficiency, Gloves: 95% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation
*
Qualitative approach used to conclude safe use.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

**1.3.5. Worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4) / Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)
[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,442 mg/m ³ (ECETOC TRA v3.0)	0,442	LEV: 90% efficiency
long term, inhalative, local,	0,442 mg/m ³ (ECETOC TRA v3.0)	0,442	LEV: 90% efficiency
long term, dermal, systemic,	0,014 mg/kg bw/day (ECETOC TRA v3.0, (modified))	0,34	Gloves: 98% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation
*
Qualitative approach used to conclude safe use.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

**1.3.6. Worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) (PROC5)
[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,442 mg/m ³ (ECETOC TRA v3.0)	0,442	LEV: 90% efficiency
long term, inhalative, local,	0,442 mg/m ³ (ECETOC TRA v3.0)	0,442	LEV: 90% efficiency
long term, dermal, systemic,	0,016 mg/kg bw/day (RISKOFDERM, vA1.11)	0,395	Gloves: 98% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation
*
Qualitative approach used to conclude safe use.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

**1.3.7. Worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities (PROC8a)
[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,00039 mg/m ³ (Advanced REACH Tool (ART) v1.0)	< 0,01	LEV: 90% efficiency
long term, inhalative, local,	0,00039 mg/m ³ (Advanced REACH Tool (ART) v1.0)	< 0,01	LEV: 90% efficiency
long term, dermal, systemic,	0,033 mg/kg bw/day (RISKOFDERM, v2.1)	0,818	Gloves: 98% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation
*
Qualitative approach used to conclude safe use.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

**1.3.8. Worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b)
[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,0004 mg/m ³ (Advanced REACH Tool (ART) v1.0)	< 0,01	LEV: 95% efficiency
long term, inhalative, local,	0,0004 mg/m ³ (Advanced REACH Tool (ART) v1.0)	< 0,01	LEV: 95% efficiency
long term, dermal, systemic,	0,014 mg/kg bw/day (ECETOC TRA v3.0, (modified))	0,34	Gloves: 98% protection, LEV: 95% efficiency
acute, dermal, local,	* (Qualitative assessment)		

long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation

*

Qualitative approach used to conclude safe use.

Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR \leq 1).**1.3.9. Worker exposure: Use as laboratory reagent (PROC15)
[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,044 mg/m ³ (ECETOC TRA v3.0)	0,044	LEV: 90% efficiency, Respirator: 90% protection
long term, inhalative, local,	0,044 mg/m ³ (ECETOC TRA v3.0)	0,044	LEV: 90% efficiency, Respirator: 90% protection
long term, dermal, systemic,	0,002 mg/kg bw/day (ECETOC TRA v3.0)	0,042	LEV: 90% efficiency, Gloves: 95% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation

*

Qualitative approach used to conclude safe use.

Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR \leq 1).**1.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES**

The risk management measures given in this exposure scenario apply to the specified substance in a concentration as indicated in the scenario. The concentration of the substance in the product may differ. A downstream user should evaluate if the risk management measures may be adapted accordingly.

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

If further details are needed, please contact us.

ES2: Use at industrial sites; Use as an intermediate.**2.1. Title section**

Exposure Scenario name	: Use as an intermediate
Structured Short Title	: Use at industrial sites; Use as an intermediate.

Environment		
CS1	Processing aid [dibutyltin dilaurate]	ERC3, ERC4, ERC5, ERC6b, ERC6d
Worker		
CS2	Use as an intermediate [Mannich base]	PROC1
CS3	Use as an intermediate [Mannich base]	PROC2
CS4	Use as an intermediate [Mannich base]	PROC3
CS5	Use as an intermediate [Mannich base]	PROC4, PROC9
CS6	Use as an intermediate [Mannich base]	PROC5
CS7	Use as an intermediate [Mannich base]	PROC8a
CS8	Use as an intermediate [Mannich base]	PROC8b
CS9	Use as an intermediate [Mannich base]	PROC15

2.2. Conditions of use affecting exposure

2.2.1. Control of environmental exposure: Formulation in materials (ERC3) / Industrial use of processing aids in processes and products, not becoming part of articles (ERC4) / Industrial use resulting in inclusion into or onto a matrix (ERC5) / Industrial use of reactive processing aids (ERC6b) / Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers (ERC6d)
[dibutyltin dilaurate]

Product (article) characteristics	
Molar Mass	: 631,56 g/mol
Vapour pressure	: 0,0000077 Pa at 25 °C
Water solubility	: 0,00143 g/l at 20 °C
Partition coefficient (n-octanol/water)	: log Pow: 4,44 at: 20,8 °C
Biodegradation	: Not readily biodegradable.
Amount used, frequency and duration of use (or from service life)	
Fraction of EU tonnage used in region:	: 0,1
Annual amount per site	: 850 tonnes/year (t/y)

Exposure Type	:	Intermittent use/release
Emission days	:	330
Remarks	:	days/year
Technical and organisational conditions and measures		
Technical conditions and measures / Organizational measures Ensure all waste water is collected and treated via a WWTP. Water - minimum efficiency of 100 %		
STP sludge treatment	:	Sewage sludge incineration
Conditions and measures related to treatment of waste (including article waste)		
Waste treatment	:	Incineration Effectiveness 100%

2.2.2. Control of worker exposure: Use in closed process, no likelihood of exposure (PROC1) [Mannich base]

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	> 25%
Remarks	:	Mixture
Molar Mass	:	354 g/mol
Vapour pressure	:	0,0384 Pa at 20 °C
Physical form of product	:	Liquid
Amount used, frequency and duration of use (or from service life)		
Duration of the activity	:	< 8 hours/day
Technical and organisational conditions and measures		
Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.		
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).		
Conditions and measures related to personal protection, hygiene and health evaluation		
Substance/task appropriate gloves. Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Substance/task appropriate respirator. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion		

activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: coverall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed.	
Wear suitable gloves tested to EN374.	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 1	: 240 cm ² (palm of one hand)
Indoor or outdoor use	: Indoor
Temperature	: ≤ 40 °C

2.2.3. Control of worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC2)

[Mannich base]

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: > 25%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
Duration of the activity	: < 15 minutes/day
Technical and organisational conditions and measures	
<p>Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.</p>	
<p>Provide a good standard of general ventilation (not less than 5 to 10 air changes per hour). Local exhaust ventilation is required. Handle substance within a predominantly closed system.</p>	
Conditions and measures related to personal protection, hygiene and health evaluation	
<p>Substance/task appropriate gloves. Skin coverage with appropriate barrier material based on potential for contact with the chemicals.</p>	

Substance/task appropriate respirator. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: coverall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed.	
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 2	: 480 cm ² (palms of both hands)
Indoor or outdoor use	: Indoor
Temperature	: <= 40 °C

2.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation) (PROC3) [Mannich base]

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: > 25%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
Duration of the activity	: < 15 minutes/day
Technical and organisational conditions and measures	
Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.	
Provide a good standard of general ventilation (not less than 5 to 10 air changes per hour). Local exhaust ventilation is required. Handle substance within a predominantly closed system.	

Conditions and measures related to personal protection, hygiene and health evaluation	
Substance/task appropriate gloves. Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Substance/task appropriate respirator. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: coverall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed.	
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 3	: 240 cm ² (palm of one hand)
Indoor or outdoor use	: Indoor
Temperature	: <= 40 °C

**2.2.5. Control of worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4) / Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)
[Mannich base]**

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: > 25%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
Duration of the activity	: < 1 hours/day
Technical and organisational conditions and measures	
Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice.	

Good standard of personal hygiene.	
Provide a good standard of general ventilation (not less than 5 to 10 air changes per hour). Local exhaust ventilation is required. Handle in semi-closed process with occasional controlled exposure.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Substance/task appropriate gloves. Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Substance/task appropriate respirator. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: coverall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed.	
Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls.	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 4, PROC 9	: 480 cm ² (palms of both hands)
Indoor or outdoor use	: Indoor
Temperature	: <= 40 °C

**2.2.6. Control of worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) (PROC5)
[Mannich base]**

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: > 25%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
Duration of the activity	: < 1 hours/day
Technical and organisational conditions and measures	
Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools.	

Regular cleaning of equipment, work area and clothing.
Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.
Training for staff on good practice.
Good standard of personal hygiene.

Provide a good standard of general ventilation (not less than 5 to 10 air changes per hour).
Local exhaust ventilation is required.

Conditions and measures related to personal protection, hygiene and health evaluation

Substance/task appropriate gloves.
Skin coverage with appropriate barrier material based on potential for contact with the chemicals.
Substance/task appropriate respirator.
Optional face shield.
Eye protection
Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying.
Recommendation:
coverall
(e.g. Tyvek)
TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942).
TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941).
Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products.
Contaminated and/or damaged gloves must be changed.

Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Other conditions affecting workers exposure

Exposed skin area	:	
PROC 5	:	480 cm ² (palms of both hands)
Indoor or outdoor use	:	Indoor
Temperature	:	<= 40 °C

2.2.7. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities (PROC8a) [Mannich base]

Product (article) characteristics

Concentration of the Substance in Mixture/Article	:	> 25%
Remarks	:	Mixture
Molar Mass	:	354 g/mol
Vapour pressure	:	0,0384 Pa at 20 °C
Physical form of product	:	Liquid

Amount used, frequency and duration of use (or from service life)

Duration of the activity	:	< 15 minutes/day
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Technical and organisational conditions and measures

Containment as appropriate.
Segregation of the emitting process.
Effective contaminant extraction.
Provide a good standard of general ventilation.
Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product.

Minimize number of staff exposed.
 Minimization of manual phases.
 Avoid contact with contaminated tools.
 Regular cleaning of equipment, work area and clothing.
 Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.
 Training for staff on good practice.
 Good standard of personal hygiene.

Effective housekeeping processes in place.
 Fixed capturing hood.
 Room ventilation rate of 1 air change per hour (ACH) is required.

Conditions and measures related to personal protection, hygiene and health evaluation

Substance/task appropriate gloves.
 Skin coverage with appropriate barrier material based on potential for contact with the chemicals.
 Substance/task appropriate respirator.
 Optional face shield.
 Eye protection
 Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying.
 Recommendation:
 coverall
 (e.g. Tyvek)
 TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942).
 TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941).
 Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products.
 Contaminated and/or damaged gloves must be changed.

Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Other conditions affecting workers exposure

Exposed skin area	:	
PROC 8a	:	840 cm ² (both hands)
Indoor or outdoor use	:	Indoor
Temperature	:	<= 40 °C
Room size	:	no restriction

2.2.8. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b) [Mannich base]

Product (article) characteristics

Concentration of the Substance in Mixture/Article	:	> 25%
Remarks	:	Mixture
Molar Mass	:	354 g/mol
Vapour pressure	:	0,0384 Pa at 20 °C
Physical form of product	:	Liquid

Amount used, frequency and duration of use (or from service life)

Duration of the activity	:	< 1 hours/day
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Technical and organisational conditions and measures	
Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.	
Effective housekeeping processes in place. Fixed capturing hood. Room ventilation rate of 1 air change per hour (ACH) is required. Handle in semi-closed process with occasional controlled exposure.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Substance/task appropriate gloves. Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Substance/task appropriate respirator. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: overall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed.	
Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls.	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 8b	: 960 cm ² (both hands)
Indoor or outdoor use	: Indoor
Temperature	: <= 40 °C
Room size	: no restriction

2.2.9. Control of worker exposure: Use as laboratory reagent (PROC15) [Mannich base]

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: > 25%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C

Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
Duration of the activity	: < 1 hours/day
Technical and organisational conditions and measures	
<p>Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.</p>	
<p>Provide a good standard of general ventilation (not less than 5 to 10 air changes per hour). Local exhaust ventilation is required.</p>	
Conditions and measures related to personal protection, hygiene and health evaluation	
<p>Substance/task appropriate gloves. Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Substance/task appropriate respirator. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: overall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed.</p>	
<p>Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection.</p>	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 15	: 240 cm ² (palm of one hand)
Indoor or outdoor use	: Indoor
Temperature	: <= 40 °C

2.3. Exposure estimation and reference to its source

2.3.1. Environmental release and exposure: Formulation in materials (ERC3) / Industrial use of processing aids in processes and products, not becoming part of articles (ERC4) / Industrial use resulting in inclusion into or onto a matrix (ERC5) / Industrial use of reactive processing aids (ERC6b) / Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers (ERC6d) [dibutyltin dilaurate]

Release route	Release rate	Release estimation	Remarks
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		method	
Air	0 %		Due to the low vapour pressure, no relevant amounts of waste gases containing the substance are formed.
Water	0 %		
Soil	0 %		

Compartment	Exposure level	RCR	Remarks
Freshwater	0,145 mg/m ³ (EUSES v2.1)	0,31	
Marine water	0,0145 mg/m ³ (EUSES v2.1)	0,32	
Freshwater sediment	0,0158 mg/kg wet weight (EUSES v2.1)	0,31	
Marine sediment	0,0016 mg/kg wet weight (EUSES v2.1)	0,32	
STP (sewage-treatment plant)	1,46 mg/m ³ (EUSES v2.1)	< 0,01	
Soil	0,0313 mg/kg wet weight (EUSES v2.1)	0,77	

Additional information on exposure estimation

Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR ≤ 1).

**2.3.2. Worker exposure: Use in closed process, no likelihood of exposure (PROC1)
[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,103 mg/m ³ (ECETOC TRA v3.0)	0,103	
long term, inhalative, local,	0,103 mg/m ³ (ECETOC TRA v3.0)	0,103	
long term, dermal, systemic,	0,007 mg/kg bw/day (ECETOC TRA v3.0)	0,17	Gloves: 80% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation

*
Qualitative approach used to conclude safe use.

Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

**2.3.3. Worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC2)
[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,044 mg/m ³ (ECETOC TRA v3.0)	0,044	LEV: 90% efficiency
long term, inhalative, local,	0,044 mg/m ³ (ECETOC TRA v3.0)	0,044	LEV: 90% efficiency

	TRA v3.0)		
long term, dermal, systemic,	0,007 mg/kg bw/day (ECETOC TRA v3.0)	0,171	LEV: 90% efficiency, Gloves: 95% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation

*

Qualitative approach used to conclude safe use.

Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

**2.3.4. Worker exposure: Use in closed batch process (synthesis or formulation) (PROC3)
[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,133 mg/m ³ (ECETOC TRA v3.0)	0,133	LEV: 90% efficiency
long term, inhalative, local,	0,133 mg/m ³ (ECETOC TRA v3.0)	0,133	LEV: 90% efficiency
long term, dermal, systemic,	0,003 mg/kg bw/day (ECETOC TRA v3.0)	0,086	LEV: 90% efficiency, Gloves: 95% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation

*

Qualitative approach used to conclude safe use.

Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

**2.3.5. Worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4) / Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)
[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,442 mg/m ³ (ECETOC TRA v3.0)	0,442	LEV: 90% efficiency
long term, inhalative, local,	0,442 mg/m ³ (ECETOC TRA v3.0)	0,442	LEV: 90% efficiency
long term, dermal, systemic,	0,014 mg/kg bw/day (ECETOC TRA v3.0, (modified))	0,34	Gloves: 98% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation

*

Qualitative approach used to conclude safe use.

Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR \leq 1).

2.3.6. Worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) (PROC5)

[Mannich base]

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,442 mg/m ³ (ECETOC TRA v3.0)	0,442	LEV: 90% efficiency
long term, inhalative, local,	0,442 mg/m ³ (ECETOC TRA v3.0)	0,442	LEV: 90% efficiency
long term, dermal, systemic,	0,016 mg/kg bw/day (RISKOFDERM, vA1.11)	0,395	Gloves: 98% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation

*

Qualitative approach used to conclude safe use.

Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR \leq 1).

2.3.7. Worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities (PROC8a)

[Mannich base]

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,00039 mg/m ³ (Advanced REACH Tool (ART) v1.0)	< 0,01	LEV: 90% efficiency
long term, inhalative, local,	0,00039 mg/m ³ (Advanced REACH Tool (ART) v1.0)	< 0,01	LEV: 90% efficiency
long term, dermal, systemic,	0,033 mg/kg bw/day (RISKOFDERM, v2.1)	0,818	Gloves: 98% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation

*

Qualitative approach used to conclude safe use.

Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR \leq 1).

2.3.8. Worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b)

[Mannich base]

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,0004 mg/m ³ (Advanced REACH Tool (ART) v1.0)	< 0,01	LEV: 95% efficiency
long term, inhalative, local,	0,0004 mg/m ³ (Advanced REACH Tool (ART) v1.0)	< 0,01	LEV: 95% efficiency
long term, dermal, systemic,	0,014 mg/kg bw/day	0,34	Gloves: 98% protection,

	(ECETOC TRA v3.0, (modified))		LEV: 95% efficiency
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation			
* Qualitative approach used to conclude safe use.			
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).			

2.3.9. Worker exposure: Use as laboratory reagent (PROC15) [Mannich base]

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,044 mg/m ³ (ECETOC TRA v3.0)	0,044	LEV: 90% efficiency, Respirator: 90% protection
long term, inhalative, local,	0,044 mg/m ³ (ECETOC TRA v3.0)	0,044	LEV: 90% efficiency, Respirator: 90% protection
long term, dermal, systemic,	0,002 mg/kg bw/day (ECETOC TRA v3.0)	0,042	LEV: 90% efficiency, Gloves: 95% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation			
* Qualitative approach used to conclude safe use.			
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).			

2.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The risk management measures given in this exposure scenario apply to the specified substance in a concentration as indicated in the scenario. The concentration of the substance in the product may differ. A downstream user should evaluate if the risk management measures may be adapted accordingly.

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

If further details are needed, please contact us.

ES3: Use at industrial sites; Rigid foam.**3.1. Title section**

Exposure Scenario name	: Rigid foam
Structured Short Title	: Use at industrial sites; Rigid foam.

Environment		
CS1	Processing aid [dibutyltin dilaurate]	ERC3, ERC4, ERC5, ERC6b, ERC6d
Worker		
CS2	Rigid foam [Mannich base]	PROC1
CS3	Rigid foam [Mannich base]	PROC2
CS4	Rigid foam [Mannich base]	PROC3
CS5	Rigid foam [Mannich base]	PROC4
CS6	Rigid foam [Mannich base]	PROC5
CS7	Rigid foam [Mannich base]	PROC8a
CS8	Rigid foam [Mannich base]	PROC8b
CS9	Rigid foam [Mannich base]	PROC13
CS10	Rigid foam [Mannich base]	PROC15

3.2. Conditions of use affecting exposure

3.2.1. Control of environmental exposure: Formulation in materials (ERC3) / Industrial use of processing aids in processes and products, not becoming part of articles (ERC4) / Industrial use resulting in inclusion into or onto a matrix (ERC5) / Industrial use of reactive processing aids (ERC6b) / Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers (ERC6d) [dibutyltin dilaurate]

Product (article) characteristics	
Molar Mass	: 631,56 g/mol
Vapour pressure	: 0,0000077 Pa at 25 °C
Water solubility	: 0,00143 g/l at 20 °C
Partition coefficient (n-octanol/water)	: log Pow: 4,44 at: 20,8 °C
Biodegradation	: Not readily biodegradable.
Amount used, frequency and duration of use (or from service life)	

Fraction of EU tonnage used in region:	: 0,1
Annual amount per site	: 850 tonnes/year (t/y)
Exposure Type	: Intermittent use/release
Emission days	: 330
Remarks	: days/year
Technical and organisational conditions and measures	
Technical conditions and measures / Organizational measures Ensure all waste water is collected and treated via a WWTP. Water - minimum efficiency of 100 %	
STP sludge treatment	: Sewage sludge incineration
Conditions and measures related to treatment of waste (including article waste)	
Waste treatment	: Incineration Effectiveness 100%

3.2.2. Control of worker exposure: Use in closed process, no likelihood of exposure (PROC1) [Mannich base]

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: 1 - 5%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
General exposures	: < 8 hours/day
Technical and organisational conditions and measures	
Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.	
Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour). Handle substance within a closed system.	
Conditions and measures related to personal protection, hygiene and health evaluation	
Substance/task appropriate gloves. Skin coverage with appropriate barrier material based on potential for contact with the chemicals.	

Substance/task appropriate respirator. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: coverall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed.	
Wear suitable gloves tested to EN374.	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 1	: 240 cm ² (palm of one hand)
Indoor or outdoor use	: Indoor
Temperature	: <= 40 °C

3.2.3. Control of worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC2)

[Mannich base]

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: 1 - 5%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
General exposures	: < 8 hours/day
Technical and organisational conditions and measures	
<p>Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.</p>	
<p>Provide a good standard of general ventilation (not less than 5 to 10 air changes per hour). Local exhaust ventilation is required. Handle substance within a predominantly closed system.</p>	

Conditions and measures related to personal protection, hygiene and health evaluation

Substance/task appropriate gloves.
 Skin coverage with appropriate barrier material based on potential for contact with the chemicals.
 Substance/task appropriate respirator.
 Optional face shield.
 Eye protection
 Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying.
 Recommendation:
 coverall
 (e.g. Tyvek)
 TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942).
 TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941).
 Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products.
 Contaminated and/or damaged gloves must be changed.

Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Other conditions affecting workers exposure

Exposed skin area	:	
PROC 2	:	480 cm ² (palms of both hands)
Indoor or outdoor use	:	Indoor
Temperature	:	<= 40 °C

3.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation) (PROC3) [Mannich base]**Product (article) characteristics**

Concentration of the Substance in Mixture/Article	:	1 - 5%
Remarks	:	Mixture
Molar Mass	:	354 g/mol
Vapour pressure	:	0,0384 Pa at 20 °C
Physical form of product	:	Liquid

Amount used, frequency and duration of use (or from service life)

General exposures	:	< 8 hours/day
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Technical and organisational conditions and measures

Containment as appropriate.
 Segregation of the emitting process.
 Effective contaminant extraction.
 Provide a good standard of general ventilation.
 Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product.
 Minimize number of staff exposed.
 Minimization of manual phases.
 Avoid contact with contaminated tools.
 Regular cleaning of equipment, work area and clothing.
 Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.
 Training for staff on good practice.
 Good standard of personal hygiene.

Provide a good standard of general ventilation (not less than 5 to 10 air changes per hour).
Local exhaust ventilation is required.
Handle substance within a predominantly closed system.

Conditions and measures related to personal protection, hygiene and health evaluation

Substance/task appropriate gloves.
Skin coverage with appropriate barrier material based on potential for contact with the chemicals.
Substance/task appropriate respirator.
Optional face shield.
Eye protection
Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying.
Recommendation:
coverall
(e.g. Tyvek)
TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942).
TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941).
Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products.
Contaminated and/or damaged gloves must be changed.

Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Other conditions affecting workers exposure

Exposed skin area	:	
PROC 3	:	240 cm ² (palm of one hand)
Indoor or outdoor use	:	Indoor
Temperature	:	<= 40 °C

3.2.5. Control of worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4) [Mannich base]

Product (article) characteristics

Concentration of the Substance in Mixture/Article	:	1 - 5%
Remarks	:	Mixture
Molar Mass	:	354 g/mol
Vapour pressure	:	0,0384 Pa at 20 °C
Physical form of product	:	Liquid

Amount used, frequency and duration of use (or from service life)

General exposures	:	< 8 hours/day
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Technical and organisational conditions and measures

Containment as appropriate.
Segregation of the emitting process.
Effective contaminant extraction.
Provide a good standard of general ventilation.
Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product.
Minimize number of staff exposed.
Minimization of manual phases.
Avoid contact with contaminated tools.
Regular cleaning of equipment, work area and clothing.

Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.
Training for staff on good practice.
Good standard of personal hygiene.

Provide a good standard of general ventilation (not less than 5 to 10 air changes per hour).
Local exhaust ventilation is required.
Handle in semi-closed process with occasional controlled exposure.

Conditions and measures related to personal protection, hygiene and health evaluation

Substance/task appropriate gloves.
Skin coverage with appropriate barrier material based on potential for contact with the chemicals.
Substance/task appropriate respirator.
Optional face shield.
Eye protection
Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying.
Recommendation:
coverall
(e.g. Tyvek)
TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942).
TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941).
Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products.
Contaminated and/or damaged gloves must be changed.

Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Other conditions affecting workers exposure

Exposed skin area	:	
PROC 4	:	480 cm ² (palms of both hands)
Indoor or outdoor use	:	Indoor
Temperature	:	<= 40 °C

3.2.6. Control of worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) (PROC5) [Mannich base]

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	1 - 5%
Remarks	:	Mixture
Molar Mass	:	354 g/mol
Vapour pressure	:	0,0384 Pa at 20 °C
Physical form of product	:	Liquid
Amount used, frequency and duration of use (or from service life)		
General exposures	:	< 8 hours/day
Technical and organisational conditions and measures		
Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product.		

Minimize number of staff exposed.
 Minimization of manual phases.
 Avoid contact with contaminated tools.
 Regular cleaning of equipment, work area and clothing.
 Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.
 Training for staff on good practice.
 Good standard of personal hygiene.

Provide a good standard of general ventilation (not less than 5 to 10 air changes per hour).
 Local exhaust ventilation is required.

Conditions and measures related to personal protection, hygiene and health evaluation

Substance/task appropriate gloves.
 Skin coverage with appropriate barrier material based on potential for contact with the chemicals.
 Substance/task appropriate respirator.
 Optional face shield.
 Eye protection
 Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying.
 Recommendation:
 overall
 (e.g. Tyvek)
 TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942).
 TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941).
 Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products.
 Contaminated and/or damaged gloves must be changed.

Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Other conditions affecting workers exposure

Exposed skin area	:	
PROC 5	:	480 cm ² (palms of both hands)
Indoor or outdoor use	:	Indoor
Temperature	:	<= 40 °C

3.2.7. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities (PROC8a) [Mannich base]

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: 1 - 5%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
General exposures	: < 8 hours/day
Technical and organisational conditions and measures	
Containment as appropriate. Segregation of the emitting process.	

Effective contaminant extraction.
 Provide a good standard of general ventilation.
 Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product.
 Minimize number of staff exposed.
 Minimization of manual phases.
 Avoid contact with contaminated tools.
 Regular cleaning of equipment, work area and clothing.
 Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed.
 Training for staff on good practice.
 Good standard of personal hygiene.

Effective housekeeping processes in place.
 Fixed capturing hood.
 Room ventilation rate of 1 air change per hour (ACH) is required.

Conditions and measures related to personal protection, hygiene and health evaluation

Substance/task appropriate gloves.
 Skin coverage with appropriate barrier material based on potential for contact with the chemicals.
 Substance/task appropriate respirator.
 Optional face shield.
 Eye protection
 Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying.
 Recommendation:
 coverall
 (e.g. Tyvek)
 TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942).
 TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941).
 Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products.
 Contaminated and/or damaged gloves must be changed.

Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls.

Other conditions affecting workers exposure

Exposed skin area	:	
PROC 8a	:	960 cm ² (both hands)
Indoor or outdoor use	:	Indoor
Temperature	:	Not specified.
Room size	:	no restriction

3.2.8. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b) [Mannich base]

Product (article) characteristics

Concentration of the Substance in Mixture/Article	:	1 - 5%
Remarks	:	Mixture
Molar Mass	:	354 g/mol
Vapour pressure	:	0,0384 Pa at 20 °C
Physical form of product	:	Liquid

Amount used, frequency and duration of use (or from service life)

General exposures	: < 8 hours/day
Technical and organisational conditions and measures	
<p>Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.</p>	
<p>Provide a good standard of general ventilation (not less than 5 to 10 air changes per hour). Local exhaust ventilation is required. Handle in semi-closed process with occasional controlled exposure.</p>	
Conditions and measures related to personal protection, hygiene and health evaluation	
<p>Substance/task appropriate gloves. Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Substance/task appropriate respirator. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: overall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed.</p>	
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 8b	: 960 cm ² (both hands)
Indoor or outdoor use	: Indoor
Temperature	: <= 40 °C

3.2.9. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13) [Mannich base]

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: 1 - 5%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid

Amount used, frequency and duration of use (or from service life)	
General exposures	: < 8 hours/day
Technical and organisational conditions and measures	
<p>Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.</p>	
<p>Effective housekeeping processes in place. Dermal: Provide a good standard of general ventilation (not less than 5 to 10 air changes per hour).</p> <p>Inhalation: Fixed capturing hood. Room ventilation rate of 1 air change per hour (ACH) is required.</p>	
Conditions and measures related to personal protection, hygiene and health evaluation	
<p>Substance/task appropriate gloves. Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Substance/task appropriate respirator. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: coverall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed.</p>	
Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls.	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 13	: 480 cm ² (palms of both hands)
Indoor or outdoor use	: Indoor
Temperature	: <= 40 °C
Room size	: no restriction

3.2.10. Control of worker exposure: Use as laboratory reagent (PROC15) [Mannich base]

Product (article) characteristics

Concentration of the Substance in Mixture/Article	: 1 - 5%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
Duration of the activity	: < 4 hours/day
Technical and organisational conditions and measures	
<p>Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.</p>	
<p>Provide a good standard of general ventilation (not less than 5 to 10 air changes per hour). Local exhaust ventilation is required.</p>	
Conditions and measures related to personal protection, hygiene and health evaluation	
<p>Substance/task appropriate gloves. Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Substance/task appropriate respirator. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: overall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed.</p>	
Wear suitable gloves tested to EN374.	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 15	: 240 cm ² (palm of one hand)
Indoor or outdoor use	: Indoor
Temperature	: <= 40 °C

3.3. Exposure estimation and reference to its source

3.3.1. Environmental release and exposure: Formulation in materials (ERC3) / Industrial use of processing aids in processes and products, not becoming part of articles (ERC4) / Industrial use resulting in inclusion into or onto a matrix (ERC5) / Industrial use of reactive processing aids (ERC6b) / Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers (ERC6d) [dibutyltin dilaurate]

Release route	Release rate	Release estimation method	Remarks
Air	0 %		Due to the low vapour pressure, no relevant amounts of waste gases containing the substance are formed.
Water	0 %		
Soil	0 %		

Compartment	Exposure level	RCR	Remarks
Freshwater	0,145 mg/m ³ (EUSES v2.1)	0,31	
Marine water	0,0145 mg/m ³ (EUSES v2.1)	0,32	
Freshwater sediment	0,0158 mg/kg wet weight (EUSES v2.1)	0,31	
Marine sediment	0,0016 mg/kg wet weight (EUSES v2.1)	0,32	
STP (sewage-treatment plant)	1,46 mg/m ³ (EUSES v2.1)	< 0,01	
Soil	0,0313 mg/kg wet weight (EUSES v2.1)	0,77	

Additional information on exposure estimation

Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR ≤ 1).

3.3.2. Worker exposure: Use in closed process, no likelihood of exposure (PROC1) [Mannich base]

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,030 mg/m ³ (ECETOC TRA v3.0)	0,030	
long term, inhalative, local,	0,030 mg/m ³ (ECETOC TRA v3.0)	0,030	
long term, dermal, systemic,	0,001 mg/kg bw/day (ECETOC TRA v3.0)	0,034	Gloves: 80% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation

* Qualitative approach used to conclude safe use.

Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

3.3.3. Worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC2) [Mannich base]

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,295 mg/m ³ (ECETOC TRA v3.0)	0,295	LEV: 90% efficiency
long term, inhalative, local,	0,295 mg/m ³ (ECETOC TRA v3.0)	0,295	LEV: 90% efficiency
long term, dermal, systemic,	0,001 mg/kg bw/day (ECETOC TRA v3.0)	0,034	LEV: 90% efficiency, Gloves: 95% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation
*
Qualitative approach used to conclude safe use.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

3.3.4. Worker exposure: Use in closed batch process (synthesis or formulation) (PROC3) [Mannich base]

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,266 mg/m ³ (ECETOC TRA v3.0)	0,266	LEV: 90% efficiency
long term, inhalative, local,	0,266 mg/m ³ (ECETOC TRA v3.0)	0,266	LEV: 90% efficiency
long term, dermal, systemic,	0,00069 mg/kg bw/day (ECETOC TRA v3.0)	0,017	LEV: 90% efficiency, Gloves: 95% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation
*
Qualitative approach used to conclude safe use.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

3.3.5. Worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4) [Mannich base]

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,442 mg/m ³ (ECETOC TRA v3.0)	0,442	LEV: 90% efficiency
long term, inhalative, local,	0,442 mg/m ³ (ECETOC TRA v3.0)	0,442	LEV: 90% efficiency
long term, dermal, systemic,	0,007 mg/kg bw/day (ECETOC TRA v3.0)	0,172	LEV: 90% efficiency, Gloves: 95% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		

eye, local,	* (Qualitative assessment)		
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Additional information on exposure estimation

*
Qualitative approach used to conclude safe use.

Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

**3.3.6. Worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) (PROC5)
[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,442 mg/m ³ (ECETOC TRA v3.0)	0,442	LEV: 90% efficiency
long term, inhalative, local,	0,442 mg/m ³ (ECETOC TRA v3.0)	0,442	LEV: 90% efficiency
long term, dermal, systemic,	0,014 mg/kg bw/day (ECETOC TRA v3.0)	0,343	LEV: 90% efficiency, Gloves: 95% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation

*
Qualitative approach used to conclude safe use.

Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

**3.3.7. Worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities (PROC8a)
[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,00012 mg/m ³ (Advanced REACH Tool (ART) v1.0)	< 0,01	LEV: 90% efficiency
long term, inhalative, local,	0,00012 mg/m ³ (Advanced REACH Tool (ART) v1.0)	< 0,01	LEV: 90% efficiency
long term, dermal, systemic,	0,006 mg/kg bw/day (ECETOC TRA v3.0, (modified))	0,14	Gloves: 98% protection, LEV: 90% efficiency
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation

*
Qualitative approach used to conclude safe use.

Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

**3.3.8. Worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b)
[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,221 mg/m ³ (ECETOC TRA v3.0)	0,221	LEV: 95% efficiency
long term, inhalative, local,	0,221 mg/m ³ (ECETOC TRA v3.0)	0,221	LEV: 95% efficiency
long term, dermal, systemic,	0,007 mg/kg bw/day (ECETOC TRA v3.0)	0,171	LEV: 95% efficiency, Gloves: 95% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation
*
Qualitative approach used to conclude safe use.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

3.3.9. Worker exposure: Treatment of articles by dipping and pouring (PROC13) [Mannich base]

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,0004 mg/m ³ (Advanced REACH Tool (ART) v1.0)	< 0,01	LEV: 90% efficiency
long term, inhalative, local,	0,0004 mg/m ³ (Advanced REACH Tool (ART) v1.0)	< 0,01	LEV: 90% efficiency
long term, dermal, systemic,	0,006 mg/kg bw/day (ECETOC TRA v3.0, (modified))	0,14	LEV: 90% efficiency, Gloves: 98% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation
*
Qualitative approach used to conclude safe use.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

3.3.10. Worker exposure: Use as laboratory reagent (PROC15) [Mannich base]

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,442 mg/m ³ (ECETOC TRA v3.0)	0,442	LEV: 90% efficiency
long term, inhalative, local,	0,442 mg/m ³ (ECETOC TRA v3.0)	0,442	LEV: 90% efficiency
long term, dermal, systemic,	0,001 mg/kg bw/day (ECETOC TRA v3.0)	0,034	LEV: 90% efficiency, Gloves: 80% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation

*

Qualitative approach used to conclude safe use.

Based on the applied RMMs the risk towards humans is sufficiently controlled ($RCR \leq 1$).**3.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES**

The risk management measures given in this exposure scenario apply to the specified substance in a concentration as indicated in the scenario. The concentration of the substance in the product may differ. A downstream user should evaluate if the risk management measures may be adapted accordingly.

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

If further details are needed, please contact us.

ES4: Widespread use by professional workers; Rigid foam; Indoor use.**4.1. Title section**

Exposure Scenario name	: Rigid foam, Indoor use
Structured Short Title	: Widespread use by professional workers; Rigid foam; Indoor use.

Environment		
CS1	Processing aid [dibutyltin dilaurate]	ERC8a, ERC8c, ERC8d, ERC8f
Worker		
CS2	Rigid foam, Indoor use [Mannich base]	PROC3
CS3	Rigid foam, Indoor use [Mannich base]	PROC5
CS4	Rigid foam, Indoor use [Mannich base]	PROC8a
CS5	Rigid foam, Indoor use [Mannich base]	PROC11

4.2. Conditions of use affecting exposure

4.2.1. Control of environmental exposure: Wide dispersive indoor use of processing aids in open systems (ERC8a) / Wide dispersive indoor use resulting in inclusion into or onto a matrix (ERC8c) / Wide dispersive outdoor use of processing aids in open systems (ERC8d) / Wide dispersive outdoor use resulting in inclusion into or onto a matrix (ERC8f)
[dibutyltin dilaurate]

Product (article) characteristics	
Molar Mass	: 631,56 g/mol
Vapour pressure	: 0,0000077 Pa at 25 °C
Water solubility	: 0,00143 g/l at 20 °C
Partition coefficient (n-octanol/water)	: log Pow: 4,44 at: 20,8 °C
Biodegradation	: Not readily biodegradable.
Amount used, frequency and duration of use (or from service life)	
Annual amount per site	: 850 tonnes/year (t/y)
Exposure Type	: Continuous use/release
Emission days	: 365
Remarks	: days/year
Conditions and measures related to treatment of waste (including article waste)	
Waste treatment	: Household solid waste (e.g., product packaging) is treated at municipal waste disposal sites

**4.2.2. Control of worker exposure: Use in closed batch process (synthesis or formulation) (PROC3)
[Mannich base]**

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: 1 - 5%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
General exposures	: < 1 hours/day
Technical and organisational conditions and measures	
<p>Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.</p>	
<p>Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour). Handle substance within a predominantly closed system.</p>	
Conditions and measures related to personal protection, hygiene and health evaluation	
<p>Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: overall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed. Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear respiratory protection.</p>	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 3	: 240 cm ² (palm of one hand)
Indoor or outdoor use	: Indoor
Temperature	: <= 40 °C

**4.2.3. Control of worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) (PROC5)
[Mannich base]**

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: 1 - 5%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
General exposures	: < 1 hours/day
Technical and organisational conditions and measures	
<p>Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.</p>	
Provide a good standard of general ventilation (not less than 5 to 10 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
<p>Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: overall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed. Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear respiratory protection.</p>	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 5	: 480 cm ² (palms of both hands)
Indoor or outdoor use	: Indoor
Temperature	: <= 40 °C

**4.2.4. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities (PROC8a)
[Mannich base]**

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: 1 - 5%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
General exposures	: < 1 hours/day
Technical and organisational conditions and measures	
<p>Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.</p>	
<p>Effective housekeeping processes in place. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).</p> <p>Inhalation: Room ventilation rate of 1 air change per hour (ACH) is required.</p>	
Conditions and measures related to personal protection, hygiene and health evaluation	
<p>Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: overall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed. Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear respiratory protection.</p>	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 8a	: 960 cm ² (both hands)

Indoor or outdoor use	:	Indoor
Temperature	:	<= 40 °C
Room size	:	no restriction

4.2.5. Control of worker exposure: Non industrial spraying (PROC11) [Mannich base]

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	1%
Remarks	:	Mixture, (dermal exposure)
Concentration of the Substance in Mixture/Article	:	1 - 5%
Remarks	:	Mixture, (inhalative exposure)
Molar Mass	:	354 g/mol
Vapour pressure	:	0,0384 Pa at 20 °C
Physical form of product	:	Liquid
Amount used, frequency and duration of use (or from service life)		
Duration of the activity	:	< 5 hours/day
Technical and organisational conditions and measures		
<p>Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.</p>		
<p>Effective housekeeping processes in place. Provide a good standard of general ventilation (not less than 1 to 3 air changes per hour). Natural ventilation</p>		
Conditions and measures related to personal protection, hygiene and health evaluation		
<p>Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: overall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed.</p>		

Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear respiratory protection.

Other conditions affecting workers exposure

Exposed skin area	:	
PROC 11	:	1500 cm ² (both hands and forearms)
Indoor or outdoor use	:	Indoor
Temperature	:	<= 40 °C
Room size	:	no restriction

4.3. Exposure estimation and reference to its source

4.3.1. Environmental release and exposure: Wide dispersive indoor use of processing aids in open systems (ERC8a) / Wide dispersive indoor use resulting in inclusion into or onto a matrix (ERC8c) / Wide dispersive outdoor use of processing aids in open systems (ERC8d) / Wide dispersive outdoor use resulting in inclusion into or onto a matrix (ERC8f)
[dibutyltin dilaurate]

Release route	Release rate	Release estimation method	Remarks
Air	0 %		
Water	0,2 %		
Soil	0 %		

Compartment	Exposure level	RCR	Remarks
Freshwater	0,12 mg/m ³ (EUSES v2.1)	0,26	
Marine water	0,012 mg/m ³ (EUSES v2.1)	0,26	
Freshwater sediment	0,0131 mg/kg wet weight (EUSES v2.1)	0,26	
Marine sediment	0,0013 mg/kg wet weight (EUSES v2.1)	0,26	
STP (sewage-treatment plant)	1,16 mg/m ³ (EUSES v2.1)	< 0,01	
Soil	0,0248 mg/kg wet weight (EUSES v2.1)	0,61	

Additional information on exposure estimation

Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR ≤ 1).

4.3.2. Worker exposure: Use in closed batch process (synthesis or formulation) (PROC3)
[Mannich base]

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,088 mg/m ³ (ECETOC TRA v3.0)	0,088	Respirator: 95% protection
long term, inhalative, local,	0,088 mg/m ³ (ECETOC TRA v3.0)	0,088	Respirator: 95% protection
long term, dermal, systemic,	0,000086 mg/kg bw/day (ECETOC TRA v3.0, (modified))	< 0,01	Gloves: 98% protection

acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation
*
Qualitative approach used to conclude safe use.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

**4.3.3. Worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) (PROC5)
[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,088 mg/m ³ (ECETOC TRA v3.0)	0,088	Respirator: 95% protection
long term, inhalative, local,	0,088 mg/m ³ (ECETOC TRA v3.0)	0,088	Respirator: 95% protection
long term, dermal, systemic,	0,002 mg/kg bw/day (ECETOC TRA v3.0, (modified))	0,043	Gloves: 98% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation
*
Qualitative approach used to conclude safe use.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

**4.3.4. Worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities (PROC8a)
[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,000006 mg/m ³ (Advanced REACH Tool (ART) v1.0)	< 0,01	Respirator: 95% protection
long term, inhalative, local,	0,000006 mg/m ³ (Advanced REACH Tool (ART) v1.0)	< 0,01	Respirator: 95% protection
long term, dermal, systemic,	0,002 mg/kg bw/day (ECETOC TRA v3.0, (modified))	0,043	Gloves: 98% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation
*
Qualitative approach used to conclude safe use.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

**4.3.5. Worker exposure: Non industrial spraying (PROC11)
[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,039 mg/m ³ (Advanced REACH Tool (ART) v1.0)	0,039	Respirator: 95% protection
long term, inhalative, local,	0,039 mg/m ³ (Advanced REACH Tool (ART) v1.0)	0,039	Respirator: 95% protection
long term, dermal, systemic,	0,013 mg/kg bw/day (ECETOC TRA v3.0, (modified))	0,332	Gloves: 98% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation
*
Qualitative approach used to conclude safe use.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

4.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The risk management measures given in this exposure scenario apply to the specified substance in a concentration as indicated in the scenario. The concentration of the substance in the product may differ. A downstream user should evaluate if the risk management measures may be adapted accordingly.

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

If further details are needed, please contact us.

ES5: Widespread use by professional workers; Rigid foam; Outdoor use.**5.1. Title section**

Exposure Scenario name	: Rigid foam, Outdoor use
Structured Short Title	: Widespread use by professional workers; Rigid foam; Outdoor use.

Environment		
CS1	Processing aid [dibutyltin dilaurate]	ERC8a, ERC8c, ERC8d, ERC8f
Worker		
CS2	Rigid foam, Outdoor use [Mannich base]	PROC3
CS3	Rigid foam, Outdoor use [Mannich base]	PROC5
CS4	Rigid foam, Outdoor use [Mannich base]	PROC8a
CS5	Rigid foam, Outdoor use [Mannich base]	PROC11

5.2. Conditions of use affecting exposure

5.2.1. Control of environmental exposure: Wide dispersive indoor use of processing aids in open systems (ERC8a) / Wide dispersive indoor use resulting in inclusion into or onto a matrix (ERC8c) / Wide dispersive outdoor use of processing aids in open systems (ERC8d) / Wide dispersive outdoor use resulting in inclusion into or onto a matrix (ERC8f)
[dibutyltin dilaurate]

Product (article) characteristics	
Molar Mass	: 631,56 g/mol
Vapour pressure	: 0,0000077 Pa at 25 °C
Water solubility	: 0,00143 g/l at 20 °C
Partition coefficient (n-octanol/water)	: log Pow: 4,44 at: 20,8 °C
Biodegradation	: Not readily biodegradable.
Amount used, frequency and duration of use (or from service life)	
Annual amount per site	: 850 tonnes/year (t/y)
Exposure Type	: Continuous use/release
Emission days	: 365
Remarks	: days/year
Conditions and measures related to treatment of waste (including article waste)	
Waste treatment	: Household solid waste (e.g., product packaging) is treated at municipal waste disposal sites

**5.2.2. Control of worker exposure: Use in closed batch process (synthesis or formulation) (PROC3)
[Mannich base]**

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: 1 - 5%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
General exposures	: < 1 hours/day
Technical and organisational conditions and measures	
<p>Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.</p>	
Handle substance within a predominantly closed system.	
Conditions and measures related to personal protection, hygiene and health evaluation	
<p>Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: coverall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed. Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear respiratory protection.</p>	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 3	: 240 cm ² (palm of one hand)
Indoor or outdoor use	: Outdoor
Temperature	: <= 40 °C

**5.2.3. Control of worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) (PROC5)
[Mannich base]**

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: 1 - 5%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
General exposures	: < 1 hours/day
Technical and organisational conditions and measures	
<p>Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.</p>	
Conditions and measures related to personal protection, hygiene and health evaluation	
<p>Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: coverall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed. Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear respiratory protection.</p>	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 5	: 480 cm ² (palms of both hands)
Indoor or outdoor use	: Outdoor
Temperature	: ≤ 40 °C

**5.2.4. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities (PROC8a)
[Mannich base]**

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: 1 - 5%
Remarks	: Mixture
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
General exposures	: < 1 hours/day
Technical and organisational conditions and measures	
<p>Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.</p>	
Effective housekeeping processes in place.	
Conditions and measures related to personal protection, hygiene and health evaluation	
<p>Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: overall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed. Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear respiratory protection.</p>	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 8a	: 960 cm ² (both hands)
Indoor or outdoor use	: Outdoor
Temperature	: <= 40 °C

**5.2.5. Control of worker exposure: Non industrial spraying (PROC11)
[Mannich base]**

Product (article) characteristics	
Concentration of the Substance in Mixture/Article	: 1%
Remarks	: Mixture, (dermal exposure)
Concentration of the Substance in Mixture/Article	: 1 - 5%
Remarks	: Mixture, (inhalative exposure)
Molar Mass	: 354 g/mol
Vapour pressure	: 0,0384 Pa at 20 °C
Physical form of product	: Liquid
Amount used, frequency and duration of use (or from service life)	
Duration of the activity	: < 5 hours/day
Technical and organisational conditions and measures	
<p>Containment as appropriate. Segregation of the emitting process. Effective contaminant extraction. Provide a good standard of general ventilation. Persons who suffer from skin complaints or other hypersensitivity reactions of skin should not work with the product. Minimize number of staff exposed. Minimization of manual phases. Avoid contact with contaminated tools. Regular cleaning of equipment, work area and clothing. Supervision in place to check that the risk management measures in place are being used correctly and operation conditions followed. Training for staff on good practice. Good standard of personal hygiene.</p>	
Effective housekeeping processes in place.	
Conditions and measures related to personal protection, hygiene and health evaluation	
<p>Skin coverage with appropriate barrier material based on potential for contact with the chemicals. Optional face shield. Eye protection Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying. Recommendation: coverall (e.g. Tyvek) TM3 powered filtering devices with full face mask using A2P2 filters as a minimum (EN12942). TH3 powered filtering devices with hood using A2P2 filters as a minimum (EN12941). Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products. Contaminated and/or damaged gloves must be changed. Wear chemically resistant gloves (tested to EN374) in combination with intensive management supervision controls. Wear respiratory protection.</p>	
Other conditions affecting workers exposure	
Exposed skin area	:
PROC 11	: 1500 cm ² (both hands and forearms)
Indoor or outdoor use	: Outdoor

Temperature	: <= 40 °C
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5.3. Exposure estimation and reference to its source

5.3.1. Environmental release and exposure: Wide dispersive indoor use of processing aids in open systems (ERC8a) / Wide dispersive indoor use resulting in inclusion into or onto a matrix (ERC8c) / Wide dispersive outdoor use of processing aids in open systems (ERC8d) / Wide dispersive outdoor use resulting in inclusion into or onto a matrix (ERC8f)
[dibutyltin dilaurate]

Release route	Release rate	Release estimation method	Remarks
Air	0 %		
Water	0,2 %		
Soil	0 %		

Compartment	Exposure level	RCR	Remarks
Freshwater	0,12 mg/m ³ (EUSES v2.1)	0,26	
Marine water	0,012 mg/m ³ (EUSES v2.1)	0,26	
Freshwater sediment	0,0131 mg/kg wet weight (EUSES v2.1)	0,26	
Marine sediment	0,0013 mg/kg wet weight (EUSES v2.1)	0,26	
STP (sewage-treatment plant)	1,16 mg/m ³ (EUSES v2.1)	< 0,01	
Soil	0,0248 mg/kg wet weight (EUSES v2.1)	0,61	

Additional information on exposure estimation

Based on the applied RMMs the risk towards environment is sufficiently controlled (RCR ≤ 1).

5.3.2. Worker exposure: Use in closed batch process (synthesis or formulation) (PROC3)
[Mannich base]

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,062 mg/m ³ (ECETOC TRA v3.0)	0,062	Respirator: 95% protection
long term, inhalative, local,	0,062 mg/m ³ (ECETOC TRA v3.0)	0,062	Respirator: 95% protection
long term, dermal, systemic,	0,000086 mg/kg bw/day (ECETOC TRA v3.0, (modified))	< 0,01	Gloves: 98% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation

*
Qualitative approach used to conclude safe use.

Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

5.3.3. Worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) (PROC5)**[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,207 mg/m ³ (ECETOC TRA v3.0)	0,207	Respirator: 95% protection
long term, inhalative, local,	0,207 mg/m ³ (ECETOC TRA v3.0)	0,207	Respirator: 95% protection
long term, dermal, systemic,	0,002 mg/kg bw/day (ECETOC TRA v3.0, (modified))	0,043	Gloves: 98% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation
*
Qualitative approach used to conclude safe use.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

5.3.4. Worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities (PROC8a)**[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,0000022 mg/m ³ (Advanced REACH Tool (ART) v1.0)	< 0,01	Respirator: 95% protection
long term, inhalative, local,	0,0000022 mg/m ³ (Advanced REACH Tool (ART) v1.0)	< 0,01	Respirator: 95% protection
long term, dermal, systemic,	0,002 mg/kg bw/day (ECETOC TRA v3.0, (modified))	0,043	Gloves: 98% protection
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation
*
Qualitative approach used to conclude safe use.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

5.3.5. Worker exposure: Non industrial spraying (PROC11)**[Mannich base]**

Exposure route	Exposure level	RCR	Remarks
long term, inhalative, systemic,	0,032 mg/m ³ (Advanced REACH Tool (ART) v1.0)	0,032	Respirator: 95% protection
long term, inhalative, local,	0,032 mg/m ³ (Advanced REACH Tool (ART) v1.0)	0,032	Respirator: 95% protection
long term, dermal, systemic,	0,013 mg/kg bw/day	0,332	Gloves: 98% protection

	(ECETOC TRA v3.0, (modified))		
acute, dermal, local,	* (Qualitative assessment)		
long term, dermal, local,	* (Qualitative assessment)		
eye, local,	* (Qualitative assessment)		

Additional information on exposure estimation	
*	
Qualitative approach used to conclude safe use.	
Based on the applied RMMs the risk towards humans is sufficiently controlled ($R_{CR} \leq 1$).	

5.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The risk management measures given in this exposure scenario apply to the specified substance in a concentration as indicated in the scenario. The concentration of the substance in the product may differ. A downstream user should evaluate if the risk management measures may be adapted accordingly.

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

If further details are needed, please contact us.