

## Extended Safety Data Sheet

### LUPEROX® K12G E

Last data update : 2019-04-27

Document type	Name	Last data update	Version	Page
Safety data sheets	<u>LUPEROX® K12G E</u>	2019-04-25	6.0	<u>3</u>
Exposure Scenario	<u>Formulation of the substance</u>	2011-10-20	1.0	<u>19</u>
Exposure Scenario	<u>Polymers processing (industrial)</u>	2011-10-20	1.0	<u>23</u>
Exposure Scenario	<u>Industrial use in chemical synthesis or processes and formulation</u>	2011-12-09	1.0	<u>27</u>
Exposure Scenario	<u>Loading and unloading operations, distribution covering all identified uses</u>	2011-12-09	1.0	<u>31</u>
Exposure Scenario	<u>Formulation of organic peroxides</u>	2017-10-11	2.0	<u>33</u>
Exposure Scenario	<u>Formulation of organic peroxides</u>	2017-10-11	2.0	<u>39</u>
Exposure Scenario	<u>Use of organic peroxide as polymerisation initiator, cross-linking agent</u>	2017-10-11	2.0	<u>43</u>



**Product:** **LUPEROX® K12G E**

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SDS No.: 005190-001 (Version 6.0)

Date 25.04.2019 (Cancel and replace : 24.10.2017)

**1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING**

**1.1. Identification of the product**

Identification of the mixture: LUPEROX® K12G E

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

**Use of the Substance/Mixture :**

Sector of use :	Product category :
Formulation of organic peroxides <b>SU 3:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites	<b>PC32:</b> Polymer preparations and compounds
Formulation of organic peroxides <b>SU 3:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites	<b>PC32:</b> Polymer preparations and compounds
Use of organic peroxide as polymerisation initiator, cross-linking agent <b>SU 3:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites	<b>PC32:</b> Polymer preparations and compounds
Formulation of the substance <b>SU 10:</b> Formulation	
Polymers processing (industrial) <b>SU3:</b> Industrial Manufacturing (all)	
Industrial use in chemical synthesis or processes and formulation <b>SU 3:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites, <b>SU4:</b> Manufacture of food products, <b>SU 8,9:</b> Manufacture of bulk, large scale substances (including petroleum products); manufacture of fine chemicals, <b>SU 10:</b> Formulation, <b>SU11:</b> Manufacture of rubber products, <b>SU12:</b> Manufacture of plastics products, including compounding and conversion, <b>SU14:</b> Manufacture of basic metals, including alloys, <b>SU15:</b> Manufacture of fabricated metal products, except machinery and equipment, <b>SU16:</b> Manufacture of computer, electronic and optical products, electrical equipment, <b>SU17:</b> General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment	
Loading and unloading operations, distribution covering all identified uses <b>SU 3:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites, <b>SU4:</b> Manufacture of food products, <b>SU6a:</b> Manufacture of wood and wood products, <b>SU 8,9:</b> Manufacture of bulk, large scale substances (including petroleum products); manufacture of fine chemicals, <b>SU 10:</b> Formulation [mixing] of preparations and/ or re-packaging (excluding alloys), <b>SU11:</b> Manufacture of rubber products, <b>SU12:</b> Manufacture of plastics products, including compounding and conversion, <b>SU14:</b> Manufacture of basic metals, including alloys, <b>SU15:</b> Manufacture of fabricated metal products, except machinery and equipment, <b>SU16:</b> Manufacture of computer, electronic and optical products, electrical equipment, <b>SU17:</b> General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment, <b>SU 21:</b> Consumer uses: Private households (= general public = consumers), <b>SU 22:</b> Professional uses: Public domain (administration, education, entertainment, services, craftsmen)	

**1.3. Details of the supplier of the safety data sheet**

Supplier	Arkema Coatings Resins Ltd C/O Bostik Ltd Common Road, Stafford, ST16 3EH United Kingdom E-mail address : pars-drp-fds@arkema.com http://www.arkema.com
E-mail address : Exposure scenario	arkema.peroxides-reach-uses@arkema.com

**1.4. Emergency telephone number**

+ 33 1 49 00 77 77  
European emergency phone number: 112

## 2. HAZARDS IDENTIFICATION

### 2.1. Classification of the substance or mixture

#### Classification (REGULATION (EC) No 1272/2008):

Flammable liquid, 3, H226  
Organic peroxides, D, H242  
Oral: Acute toxicity, 4, H302  
Inhalation: Acute toxicity, 4, H332  
Skin corrosion, 1B, H314  
Serious eye damage, 1, H318  
Specific target organ toxicity - single exposure, 3, H335  
Reproductive toxicity, 2, H361d  
Chronic aquatic toxicity, 3, H412

#### Additional information:

For the full text of the H, EUH-phrases mentioned in this Section, see Section 16.

### 2.2. Label elements

#### Label elements (REGULATION (EC) No 1272/2008):

#### Hazardous components which must be listed on the label:

Reaction mass of butane-2,2-diyl dihydroperoxide and dioxidybutane-2,2-diyl dihydroperoxide  
2,2,4-trimethyl-1,3-pentanediol diisobutyrate  
hydrogen peroxide solution  
Tributylamine

Hazard  
pictograms:



Signal word:

**Danger**

#### Hazard statements:

H226 : Flammable liquid and vapour.  
H242 : Heating may cause a fire.  
H302 + H332 : Harmful if swallowed or if inhaled  
H314 : Causes severe skin burns and eye damage.  
H335 : May cause respiratory irritation.  
H361d : Suspected of damaging the unborn child.  
H412 : Harmful to aquatic life with long lasting effects.

#### Precautionary statements:

##### Prevention:

P201 : Obtain special instructions before use.  
P210 : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.  
P234 : Keep only in original container.  
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.

##### Response:

P301 + P330 + P331 : IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.  
P303 + P361 + P353 : IF ON SKIN (or hair): Remove or take off immediately all contaminated clothing. Rinse skin with water and shower.  
P305 + P351 + P338 : IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P310 : Immediately call a POISON CENTER or doctor.

##### Storage:

P403 + P235 : Store in a well-ventilated place. Keep cool.

### 2.3. Other hazards

#### Potential health effects:

Contains material that may adversely affect the developing foetus.  
Inhalation: Harmful by inhalation. Inhalation of vapours due to thermal decomposition : Risk of irritation of respiratory system  
Skin contact: May be harmful in contact with skin.  
Ingestion: Harmful if swallowed.

#### Environmental Effects:

Harmful to fish. Harmful to daphnia. Toxic to algae.

**Physical and chemical hazards:**

Flammable liquid Heating may cause a fire. Thermal decomposition giving flammable and toxic products.  
Decomposition products: See chapter 10

**Other:**

Results of PBT and vPvB assessment : According to REACH regulation, annex XIII, this mixture contains no substance meeting PBT and vPvB criteria.

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

**3.2. Mixtures**

**Chemical nature of the mixture<sup>1</sup>:**

Organic peroxide Preparation based on :

**Hazardous components (accordance with Annex II of Regulation (EC) No 1907/2006 and its amendment(s)) :**

Chemical name <sup>1</sup> & REACH Registration Number <sup>2</sup>	EC-No.	CAS-No.	Concentration	Classification REGULATION (EC) No 1272/2008
Reaction mass of butane-2,2-diyl dihydroperoxide and dioxidybutane-2,2-diyl dihydroperoxide (01-2119514691-43)	700-954-4		35 - 45 %	Org. Perox. D; H242 Acute Tox. 4 (Oral); H302 Acute Tox. 4 (Inhalation); H332 Skin Corr. 1B; H314 Eye Dam. 1; H318
2,2,4-trimethyl-1,3-pentanediol diisobutyrate (01-2119451093-47)	229-934-9	6846-50-0	35 - 45 %	Aquatic Chronic 3; H412 Repr. 2; H361d
4-Hydroxy-4-methylpentan-2-one (01-2119473975-21) (N° ANNEX: 603-016-00-1)	204-626-7	123-42-2	8 - 10 %	Flam. Liq. 3; H226 Eye Irrit. 2; H319 STOT SE 3; H335
Hydrogen peroxide (01-2119485845-22) (01-2119485845-22) (N° ANNEX: 008-003-00-9)	231-765-0	7722-84-1	0 - 2 %	Ox. Liq. 1; H271 Acute Tox. 4 (Oral); H302 Acute Tox. 4 (Inhalation); H332 Skin Corr. 1A; H314 Eye Dam. 1; H318 STOT SE 3; H335 Aquatic Chronic 3; H412
Tributylamine (01-2119474898-14)	203-058-7	102-82-9	0,1 - 0,5 %	Acute Tox. 1 (Inhalation); H330 Acute Tox. 2 (Dermal); H310 Acute Tox. 4 (Oral); H302 Skin Irrit. 2; H315

**Hazardous impurities :**

Chemical name <sup>1</sup>	EC-No.	CAS-No.	Concentration	Classification REGULATION (EC) No 1272/2008
Butanone (N° ANNEX: 606-002-00-3)	201-159-0	78-93-3	5 - 7 %	Flam. Liq.2; H225 Eye Irrit.2; H319 STOT SE3; H336 EUH066

<sup>1</sup>: See chapter 14 for Proper Shipping Name

<sup>2</sup>: See the text of the regulation for applicable exceptions or provisions -

**4. FIRST AID MEASURES**

**4.1. Description of necessary first-aid measures:**

**General advice:**

Risk of ignition. In case of splashes, remove contaminated clothing and plunge it into water immediately. including shoes. Wash contaminated clothing before re-use.

**Inhalation:**

Inhalation of vapours/mists : Move to fresh air. Oxygen or artificial respiration if needed. Hospitalize immediately.

**Skin contact:**

Wash immediately with plenty of water and soap, rinse abundantly and copiously with water. Keep under medical surveillance. Hospitalize immediately.

**Eye contact:**

Wash open eyes immediately, abundantly and thoroughly for at least 15 minutes. Remove contact lenses. Consult an ophthalmologist immediately.

**Ingestion:**

Do not induce vomiting, rinse mouth and lips with plenty of water if the subject is conscious, then hospitalize.

**Protection of first-aiders:**

In case of insufficient ventilation, wear suitable respiratory equipment. Protective suit.

**4.2. Most important symptoms/effects, acute and delayed:** No data available.

**4.3. Indication of immediate medical attention and special treatment needed, if necessary:** No data available.

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## 5. FIREFIGHTING MEASURES

### 5.1. Extinguishing media

**Suitable extinguishing media:** Water spray, Foam, carbon dioxide, powder

### 5.2. Special hazards arising from the substance or mixture:

The product burns violently (protect people from possible projections).  
Heating may cause a fire.  
Through thermal decomposition, formation of very reactive free radicals.  
Thermal decomposition giving flammable and toxic products :  
Ethane - Methane - Ethylene, Carbon oxides

### 5.3. Advice for firefighters:

**Specific methods:**

Fight fire from a distance (more than 15 m). Containers/tanks should be cooled with water spray. In case of fire, remove exposed containers. Ensure a system for the rapid emptying of containers. Do not allow run-off from fire fighting to enter drains or water courses.

**Special protective actions for fire-fighters:**

Wear self-contained breathing apparatus and protective suit.

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## 6. ACCIDENTAL RELEASE MEASURES

### 6.1. Personal precautions, protective equipment and emergency procedures:

Evacuate non-essential staff and those not equipped with individual protection apparatus. Prohibit all sources of sparks and ignition - Do not smoke. Prohibit contact with skin and eyes and inhalation of vapours. Use personal protective equipment. In case of insufficient ventilation, wear suitable respiratory equipment.

### 6.2. Environmental precautions:

Do not release into the environment. Do not let product enter drains. Dam up with sand or inert earth (do not use combustible materials).

### 6.3. Methods and materials for containment and cleaning up:

**Methods for cleaning up:**

After cleaning, flush away traces with water. Recover waste water for processing later.

**Recovery:**

Never return spills in original containers for re-use. Shovel into suitable container for disposal.  
Small quantities : Soak up with inert absorbent material (Clean sand). Do not use vermiculite.  
Do not confine. No sparking tools should be used.

**Elimination:** See chapter 13

**6.4. Reference to other sections:** None.

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## 7. HANDLING AND STORAGE

### 7.1. Precautions for safe handling:

**Technical measures/Precautions:**

Storage and handling precautions applicable to products:  
Organic peroxides. Liquid. Flammable. Harmful. Corrosive.  
Provide appropriate exhaust ventilation at machinery. Provide showers, eye-baths. Provide water supplies near the point of use. Provide self-contained breathing apparatus nearby. Provide fire-blanket nearby. Provide electrical earthing of equipment.

**Safe handling advice:**

Avoid exposure - obtain special instructions before use. Take maximum precautions when handling. Strictly limit the quantities of product in the work area to those which are absolutely necessary for the work in hand. Great cleanliness in work areas is a necessary and important factor for safety. Handle and open container with care (risk of overpressurization in containers). Prohibit all sources of sparks and ignition - Do not smoke. Protect from contamination. Never return any product to the container from which it was originally removed (risk of decomposition). Never mix peroxides directly with accelerators (risk of explosion). Add each component separately to the resin. In case of insufficient ventilation, wear suitable respiratory equipment. Handling of this product must be in accordance with HSE Guidance Note CS21 The Storage and Handling of Organic Peroxides and with ARKEMA brochure Safe Handling of Organic Peroxides. Handling of this product must be in accordance with HSE Guidance Note CS21 The Storage and Handling of Organic Peroxides and with ARKEMA brochure Safe Handling of Organic Peroxides

**Hygiene measures:**

In case of splashes, remove contaminated clothing and plunge it into water immediately. Prohibit contact with skin and eyes and inhalation of vapours. When using do not eat, drink or smoke.  
Wash thoroughly after handling. Remove contaminated clothing and protective equipment before entering eating areas.  
Wash hands after handling. Remove contaminated clothing and protective equipment before entering eating areas.

**7.2. Conditions for safe storage, including any incompatibilities:**

Store in well insulated area (peroxide area) away from other substances. Storage buildings must be built and equipped so as not to exceed the maximum proscribed temperature limit. Use non-combustible construction materials. Keep tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Do not smoke. Keep and Store away from clothing and combustible materials. Store in original container. Use only very clean containers and equipment free from traces of impurities. Never return unused material to storage receptacle. Do not reuse empty packaging to store other products. Provide earthing and safe electrical equipment. Provide a catch-tank in a bunded area. Provide impermeable floor. Consult ARKEMA before storage design.

Storage of this product must be in accordance with HSE Guidance Note CS21 The Storage and Handling of Organic Peroxides.

Storage of this product must be in accordance with HSE Guidance Note CS21 The Storage and Handling of Organic Peroxides.

Storage period: < 6 Months

Do not store above: 30 °C, (to maintain the technical properties of the product).

**Incompatible products:**

Strong oxidizing agents Powerful reducers Acids Bases Amines transition metal salts Sulphur compounds Rust, ash, dusts (risk of self-accelerating exothermic decomposition)

**Packaging material:**

**Recommended:** High density polyethylene (HDPE), Polytetrafluoroethylene (PTFE), Stainless steel

**To be avoided:** Ordinary metals (ordinary steel), copper, rubber (natural or synthetic), Glass - Stoneware (risk of contents spurting or spraying out if container ruptures due to overpressurization)

7.3. **Specific end use(s):** None.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1. Control parameters:

#### Exposure Limit Values

##### Reaction mass of butane-2,2-diyl dihydroperoxide and dioxydibutane-2,2-diyl dihydroperoxide

Source	Date	Value type	Value (ppm)	Value (mg/m3)	Remarks
EH40 WEL	12 2011	STEL	0,2	1,5	-
ACGIH (US)	02 2012	Ceiling	0,2	-	-

##### 4-Hydroxy-4-methylpentan-2-one

Source	Date	Value type	Value (ppm)	Value (mg/m3)	Remarks
EH40 WEL	12 2011	STEL	75	362	-
EH40 WEL	12 2011	TWA	50	241	-
ACGIH (US)	02 2012	TWA	50	-	-

##### Butanone

Source	Date	Value type	Value (ppm)	Value (mg/m3)	Remarks
EH40 WEL	12 2011	SKIN	-	-	Can be absorbed through the skin.
EH40 WEL	12 2011	TWA	200	600	-
EH40 WEL	12 2011	STEL	300	899	-
EU ELV	12 2009	TWA	200	600	Indicative value
EU ELV	12 2009	STEL	300	900	Indicative value
ACGIH (US)	02 2012	TWA	200	-	-
ACGIH (US)	02 2012	STEL	300	-	-

##### Hydrogen peroxide

Source	Date	Value type	Value (ppm)	Value (mg/m3)	Remarks
EH40 WEL	12 2011	STEL	2	2,8	-
EH40 WEL	12 2011	TWA	1	1,4	-
ACGIH (US)	02 2012	TWA	1	-	-

##### Biological occupational exposure limits

Substance name	CAS-No.	Control parameters	Sampling time	Update

**Derived No Effect Level (DNEL):** REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE :

End Use	Inhalation	Ingestion	Skin contact
Workers	5,288 mg/m3 (LT, SE) 15,864 mg/m3 (ST, SE)		3 mg/kg bw/day (LT, SE)
Consumers	1,125 mg/m3 (LT, SE)	0,75 mg/kg bw/day (LT, SE)	1,5 mg/kg bw/day (LT, SE)

LE : Local effects, SE : Systemic effects, LT : Long term, ST : Short term

**Derived No Effect Level (DNEL):** 4-HYDROXY-4-METHYLPENTAN-2-ONE :

End Use	Inhalation	Ingestion	Skin contact
Workers	240 mg/m3 (ST, LE) 59,2 mg/m3 (LT, SE, LE)		840 mg/kg bw/day (LT, SE)
Consumers	120 mg/m3 (ST, LE) 10,4 mg/m3 (LT, SE, LE)	3 mg/kg bw/day (LT, SE)	60 mg/kg bw/day (LT, SE)

LE : Local effects, SE : Systemic effects, LT : Long term, ST : Short term

**Derived No Effect Level (DNEL):** HYDROGEN PEROXIDE :

End Use	Inhalation	Ingestion	Skin contact



Workers	3 mg/m3 (LE, ST) 1,4 mg/m3 (LE, LT)		
Consumers	1,93 mg/m3 (LE, ST) 0,21 mg/m3 (LE, LT)		

LE : Local effects, SE : Systemic effects, LT : Long term, ST : Short term

**Predicted No Effect Concentration:** REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE :

Compartment:	Value:
Fresh water	0,0056 mg/l
Marine water	0,00056 mg/l
Water (Intermittent release)	0,056 mg/l
Effects on waste water treatment plants	1,2 mg/l
Fresh water sediment	0,0876 mg/kg dw
Marine sediment	0,00876 mg/kg dw
Soil	0,0142 mg/kg dw

**Predicted No Effect Concentration:** 4-HYDROXY-4-METHYLPENTAN-2-ONE :

Compartment:	Value:
Fresh water	2 mg/l
Marine water	0,2 mg/l
Water (Intermittent release)	1 mg/l
Effects on waste water treatment plants	10 mg/l
Fresh water sediment	9,06 mg/kg dw
Marine sediment	0,91 mg/kg dw
Soil	0,63 mg/kg dw

**Predicted No Effect Concentration:** HYDROGEN PEROXIDE :

Compartment:	Value:
Fresh water	0,013 mg/l
Marine water	0,013 mg/l
Water (Intermittent release)	0,014 mg/l
Effects on waste water treatment plants	4,66 mg/l
Fresh water sediment	0,047 mg/kg dw
Marine sediment	0,047 mg/kg dw
Soil	0,002 mg/kg dw

## 8.2. Exposure controls:

### General protective measures:

Provide appropriate exhaust ventilation at machinery.  
Frequently monitor and control the working atmosphere.

### Personal protective equipment:

Respiratory protection:

In case of insufficient ventilation, wear suitable respiratory equipment.  
In the case of hazardous fumes, wear self contained breathing apparatus.

Hand protection:

Gloves (PVC, neoprene, nitrile rubber)

Eye/face protection:

Safety glasses/goggles and face-mask (during discharge)

Skin and body protection:

Protective suit

**Environmental exposure controls:** See chapter 6

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1. Information on basic physical and chemical properties

#### Appearance:

**Physical state (20°C):**

liquid

**Colour:**

colourless

**Odour:**

pungent

**Olfactory threshold:**

No data available.

**pH:**

No data available.

**Melting point/range :**

< -20 °C

**Boiling point/boiling range :**

> 100 °C

<b>Flash point:</b>	closed cup: 42 °C (ISO 3680)
<b>Evaporation rate:</b>	No data available.
<b>Flammability (solid, gas):</b>	
Flammability:	Not applicable
<b>Vapour pressure:</b>	20 hPa , at 20 °C
<b>Vapour density:</b>	No data available.
<b>Density:</b>	997,3 kg/m3 , at 20 °C
<b>Water solubility:</b>	< 10 g/l at 20 °C
<b>Partition coefficient: n-octanol/water:</b>	REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE : log Kow : < 2,04 , at 25 °C (OECD Test Guideline 117) 2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE : log Kow : 4,04 - 4,91 (calculated) 4-HYDROXY-4-METHYLPENTAN-2-ONE : May be considered as comparable to a similar product for which experimental results are:log Kow : -0,09 (calculated) BUTANONE : log Kow : 0,3 (OECD Test Guideline 117) HYDROGEN PEROXIDE : log Kow : -1,57 , at 20 °C (calculated)
<b>Auto-ignition temperature:</b>	> 200 °C
<b>Decomposition temperature:</b>	No data available.
<b>Self-Accelerating decomposition temperature (SADT) :</b>	55 °C
<b>Viscosity, dynamic:</b>	11 mPa.s , at 20 °C
<b>Explosive properties:</b>	
Explosivity:	The substance or mixture is an organic peroxide classified as type D.
<b>Oxidizing properties:</b>	Organic peroxide

## 9.2. Other data:

<b>Solubility in other solvents:</b>	Hexane and Chloroform < 10 g/l Methanol and Ethyl Acetate > 500 g/l
<b>Active oxygen content:</b>	8,5 %

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## 10. STABILITY AND REACTIVITY

10.1. **Reactivity:** No data available.

10.2. **Chemical stability:**  
Stable under recommended storage conditions.

10.3. **Possibility of hazardous reactions:**  
Organic peroxides. At high temperature : risk of violent reaction (decomposition)

10.4. **Conditions to avoid:**  
Temperatures above 30 °C  
Keep away from heat and sources of ignition (risk of exothermic decomposition).

10.5. **Incompatible materials to avoid:**  
Strong oxidizing agents, Powerful reducers, Acids, Bases, Amines, transition metal salts, Sulphur compounds, Rust, ash, dusts (risk of self-accelerating exothermic decomposition)  
Follow conditions of use with : accelerators (amines, metallic salts).

10.6. **Hazardous decomposition products:**  
Through thermal decomposition, formation of very reactive free radicals.  
Thermal decomposition giving flammable and toxic products :  
Ethane - Methane - Ethylene, Carbon oxides

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## 11. TOXICOLOGICAL INFORMATION

All available and relevant data on this product and/or the components quoted in section 3 and/or the analogue substances/metabolites have been taken into account for the hazard assessment.

### 11.1. Information on toxicological effects:

#### Acute toxicity:

**Inhalation:** **From its composition, it must be considered as: Harmful if inhaled.**  
Inhalation of vapours due to thermal decomposition:; Risk of irritation of respiratory system, Toxic effects cannot be excluded

REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE :  
May be considered as comparable to a similar product for which experimental results are:

METHYL ISOBUTYL KETONE PEROXIDE :

• In animals : LC50/4 h/Rat: 1,5 mg/l (Method: OECD Test Guideline 403, Aerosol) (In solution in diisobutyl phthalate, 60 %) (Aerosol)

2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE :

• In animals : No mortality/6 h/Rat: 5,3 mg/l, No specific toxic effects (vapour saturated atmosphere)

4-HYDROXY-4-METHYLPENTAN-2-ONE :

• In man : At high vapour/mist concentrations  
headache, Central nervous system depression, Dizziness, Difficulty in breathing

• In animals : No mortality/4 h/Rat: 7,6 mg/l (Method: OECD Test Guideline 403) (vapour saturated atmosphere)

BUTANONE :

• In man : Effects of excessive exposure may include :  
> 300 ppmheadache  
> 400 - 500 ppmNausea, Cardiovascular problems, confusion, Possible loss of consciousness, Convulsions

• In animals : LC50/4 h/Rat: 34,5 mg/l ( 11700 ppm) (vapour)

**Ingestion:** **From its composition, it must be considered as: Harmful if swallowed.**

REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE :  
• In man : Liver damage, Difficulty in breathing, Abdominal pain, Causes severe digestive tract burns.  
At high concentrations, Lethal cases reported in man

• In animals : LD50/Rat: 1,017 g/kg (Method: OECD Test Guideline 401) (In solution in Dimethyl phthalate, 35 - 39 %)

2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE :

• In animals : No mortality/Rat: 2 g/kg (Method: OECD Test Guideline 425) , No specific toxic effects

4-HYDROXY-4-METHYLPENTAN-2-ONE :

• In animals : LD50/Rat: 3 g/kg (Method: OECD Test Guideline 401)

BUTANONE :

• In man : The effects of ingesting a large dose can include :; Metabolic problems, Difficulty in breathing, Loss of consciousness

• In animals : LD50/Rat: 2.800 - 5.600 mg/kg

**Dermal:** **According to its composition : May be harmful in contact with skin.**

REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE :  
• In animals : LD50/Rabbit: 4 g/kg (Method: OECD Test Guideline 402) (In solution in Dimethyl phthalate, 35 %)

2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE :

• In animals : No mortality/Rabbit: 2 g/kg (Method: OECD Test Guideline 402), Local irritation

4-HYDROXY-4-METHYLPENTAN-2-ONE :

• In animals : No mortality/Rat: 2 ml/kg (Method: OECD Test Guideline 402), No specific toxic effects  
LD50/Rabbit: 13,75 g/kg

BUTANONE :

• In animals : LD50/Rabbit: 5.000 - 13.000 mg/kg

#### Local effects ( Corrosion / Irritation / Serious eye damage ):

**Skin contact:** **According to its composition : Causes severe skin burns.**

REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE :  
• In animals : Corrosive to skin (after occlusive contact, Rabbit, Exposure time: 4 h)  
(In solution in Dimethyl phthalate, 33 %)

**Eye contact:** **From its composition, it must be considered as: May cause irreversible eye damage.**

REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE :  
• In animals : Severe eye irritation (OECD Test Guideline 405, Rabbit)  
(In solution in Dimethyl phthalate, 40 - 60 %)

#### Respiratory or skin sensitisation:

**Inhalation:** No data available.

**Skin contact:** According to its composition, can be considered as : **Not a skin sensitizer**

**CMR effects :**

**Mutagenicity:** According to its composition, can be considered as : **Not genotoxic**

**In vitro**

REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE :  
Ames test in vitro: Inactive (Method: OECD Test Guideline 471) (30 %)  
In vitro test for chromosomal abnormalities on CHO cells: Inactive (Method: OECD Test Guideline 473) (30 %)  
In vitro gene mutations test on mammalian cells: Inactive (Method: OECD Test Guideline 473) (30 %)

**Carcinogenicity:** No data available.

**Reproductive toxicity:**

**Fertility:** According to its composition, this product should not be harmful in normal conditions of use

REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE :  
• In animals : Reproductive/Developmental Effects Screening Assay: Absence of toxic effects on fertility, Effects on newborn, Side effects due to maternal toxicity.  
NOAEL ( Parental toxicity ) : = 50 mg/kg bw/day  
NOAEL ( Fertility ) : = 75 mg/kg bw/day  
NOAEL ( Developmental Toxicity ) : = 50 mg/kg bw/day  
(Method: OECD Test Guideline 421, Rat, By oral route) (Dissolved in 2,2,4-trimethyl-1,3-pentanediol-diisobutyrate / Diacetone alcohol, 32 %)

BUTANONE :  
• In animals : Must be regarded as assimilable to its principal metabolite in vivo., Absence of toxic effects upon the reproductive system  
(Rat, drinking water)

**Foetal development:** According to its composition : **Suspected of damaging the unborn child.**

REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE :  
• In animals : Exposure during pregnancy: No effects on foetal development  
NOAEL ( Developmental Toxicity ) : > 200 mg/kg bw/day  
NOAEL ( Maternal Toxicity ) : 65 mg/kg bw/day  
(Method: OECD Test Guideline 414, Rat, By oral route) (Dissolved in 2,2,4-trimethyl-1,3-pentanediol-diisobutyrate / Diacetone alcohol, 31 %)

2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE :  
• In animals : Exposure during pregnancy  
(Method: OECD Test Guideline 414)  
Absence of congenital malformations and embryotoxic effects at non-toxic doses for the mothers  
NOAEL ( Developmental Toxicity ) : 343 mg/kg bw/day  
NOAEL ( Maternal Toxicity ) : 343 mg/kg bw/day  
(Rat, By diet)  
Toxic effects for foetal development  
NOAEL ( Developmental Toxicity ) : 0,3 g/kg  
NOAEL ( Maternal Toxicity ) : 1 g/kg  
(Rabbit, By oral route)

**Specific target organ toxicity :**

**Single exposure :** The substance or mixture is classified as specific target organ toxicant, single exposure, category 3 with respiratory tract irritation.  
Exposure routes : Inhalation

**Inhalation:**

4-HYDROXY-4-METHYLPENTAN-2-ONE :  
• In man : Irritating to nose, throat and respiratory system (100 ppm, 0,48 mg/l)

**Repeated exposure:** The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE :

- In animals : By oral route: No specific toxic effects  
NOAEL= > 150mg/kg bw/day (Method: OECD Test Guideline 408, Rat, 3 months) (Dissolved in 2,2,4-trimethyl-1,3-pentanediol-diisobutyrate / Diacetone alcohol, 31 %)

BUTANONE :

- In man : Repeated exposure by inhalation: Reported effects on man in industry :  
Possible increases in the neurotoxicity of other solvents
- In animals : By inhalation: Liver disorders, NOAEL= 7,5 mg/l (Method: OECD Test Guideline 413, Rat, 3 Months)

**Aspiration hazard:**  
Not applicable

## 12. ECOLOGICAL INFORMATION

Ecotoxicology Assessment: All available and relevant data on this product and/or the components quoted in section 3 and/or the analogue substances/metabolites have been taken into account for the hazard assessment.

Acute aquatic toxicity : Toxic to aquatic life.  
Chronic aquatic toxicity : Harmful to aquatic life with long lasting effects.

### 12.1. Acute toxicity :

**Fish:** From its composition, it must be considered as: Harmful to fish.

REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE :

LC50, 96 h (Poecilia reticulata) : 44,2 mg/l (Method: OECD Test Guideline 203, Test substance: In solution in Dimethyl phthalate)

2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE :

LC50, 96 h (Lepomis macrochirus (Bluegill sunfish)) (Method: OECD Test Guideline 203) No effect up to the limit of solubility

4-HYDROXY-4-METHYLPENTAN-2-ONE :

LC50, 96 h (Oryzias latipes) : > 100 mg/l (Method: OECD Test Guideline 203)

BUTANONE :

LC50, 96 h (Pimephales promelas (fathead minnow)) : 2.993 mg/l (Method: OECD Test Guideline 203)

HYDROGEN PEROXIDE :

LC50, 96 h (Pimephales promelas (fathead minnow)) : 16,4 mg/l (Method: US EPA)

**Aquatic invertebrates:** From its composition, it must be considered as: Harmful to daphnia.

REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE :

EC50, 48 h (Daphnia magna (Water flea)) : 39 mg/l (Method: OECD Test Guideline 202, Test substance: In solution in Dimethyl phthalate)

2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE :

48 h (Daphnia magna (Water flea)) (Method: US EPA) No effect up to the limit of solubility

4-HYDROXY-4-METHYLPENTAN-2-ONE :

EC50, 48 h (Daphnia magna (Water flea)) : > 1.000 mg/l (Method: OECD Test Guideline 202)

BUTANONE :

EC50, 48 h (Daphnia magna (Water flea)) : 308 mg/l (Method: OECD Test Guideline 202)

HYDROGEN PEROXIDE :

LC50, 48 h (Daphnia pulex (Water flea)) : 2,4 mg/l (Method: US EPA)

**Aquatic plants:** From its composition, it must be considered as: Toxic to algae.

REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE :

ErC50, 72 h (Pseudokirchneriella subcapitata (green algae)) : 5,6 mg/l (Method: OECD Test Guideline 201, Test substance: In solution in Dimethyl phthalate)

2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE :

ErC50, 72 h (Pseudokirchneriella subcapitata (green algae)) (Method: OECD Test Guideline 201) No effect up to the limit of solubility

4-HYDROXY-4-METHYLPENTAN-2-ONE :

ErC50, 72 h (Pseudokirchneriella subcapitata (microalgae)) : > 1.000 mg/l (Method: OECD Test Guideline 201)

BUTANONE :

ErC50, 72 h (Pseudokirchneriella subcapitata (microalgae)) : 1.972 mg/l (Method: OECD Test Guideline 201)

HYDROGEN PEROXIDE :  
ErC50, 72 h (Skeletonema costatum (marine diatom)) : 1,38 mg/l Marine environment

**Microorganisms:**

REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE :  
EC10, 30 min (Activated sludge) : 12 mg/l (Method: OECD Test Guideline 209, Test substance: In solution in Dimethyl phthalate)

4-HYDROXY-4-METHYLPENTAN-2-ONE :  
EC50, 3 h (Activated sludge) : > 1.000 mg/l (Method: OECD Test Guideline 209, Respiration inhibition)

BUTANONE :  
Toxicity threshold, 16 h (Pseudomonas putida) : 1.150 mg/l (Method: Standard : DIN 38412 - Part 8)

HYDROGEN PEROXIDE :  
EC50, 0,5 h (Activated sludge) : 466 mg/l (Method: OECD Test Guideline 209, Respiration inhibition)

**Aquatic toxicity / Long term toxicity:**

**Aquatic invertebrates:**

2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE :  
NOEC r, 21 d (Daphnia magna (Water flea)) : 0,7 mg/l (Method: OECD Test Guideline 211)

4-HYDROXY-4-METHYLPENTAN-2-ONE :  
NOEC r, 21 d (Daphnia magna (Water flea)) : 100 mg/l (Method: OECD Test Guideline 211)

HYDROGEN PEROXIDE :  
NOEC, 21 d (Daphnia magna (Water flea)) : 0,63 mg/l (Reproduction inhibition)

**Aquatic plants:**

REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE :  
ErC10, 72 h (Pseudokirchneriella subcapitata (green algae)) : 2,1 mg/l (Method: OECD Test Guideline 201)

2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE :  
NOEC r, 72 h (Pseudokirchneriella subcapitata (microalgae)) : 3,56 mg/l (Method: OECD Test Guideline 201)

4-HYDROXY-4-METHYLPENTAN-2-ONE :  
NOEC r, 72 h (Pseudokirchneriella subcapitata (microalgae)) : 1000 mg/l (Method: OECD Test Guideline 201)

BUTANONE :  
ErC10, 96 h (Pseudokirchneriella subcapitata (microalgae)) : 1289 mg/l (Method: OECD Test Guideline 201)

HYDROGEN PEROXIDE :  
NOEC r, 72 h (Skeletonema costatum) : 0,63 mg/l Marine environment

**12.2. Persistence and degradability :**

**Stability in water:**

2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE :  
Half-life: 211 d at 25 °C and pH 4  
Half-life: > 1 y at 25 °C and pH 7  
Half-life: 25 d at 25 °C and pH 9  
Method: OECD Test Guideline 111

**Biodegradation (In water):** **Based on the available information, it is not possible to conclude on biodegradability of this mixture.**

REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE :  
Readily biodegradable:  
87 % after 28 d (Method: OECD Test Guideline 301D)

2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE :  
The 10 day time window criterion is not fulfilled. Not readily biodegradable.: 71 % after 28 d (Method: OECD Test Guideline 301 B)

4-HYDROXY-4-METHYLPENTAN-2-ONE :  
Readily biodegradable: 98,51 % after 28 d (Method: OECD Test Guideline 301 A)

BUTANONE :  
Readily biodegradable: 98 % after 28 d (Method: OECD Test Guideline 301 D)

HYDROGEN PEROXIDE :

Readily biodegradable: 99 % after 30 min

**12.3. Bioaccumulative potential :**

**Bioaccumulation:**

**None of the product and /or component quoted in section 3 and/or analogue substance/metabolite is expected to bioaccumulate.**

REACTION MASS OF BUTANE-2,2-DIYL DIHYDROPEROXIDE AND DIOXYDIBUTANE-2,2-DIYL DIHYDROPEROXIDE :  
Partition coefficient: n-octanol/water: log Kow : < 2,04 , at 25 °C (Method: OECD Test Guideline 117)

2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE :  
Partition coefficient: n-octanol/water: log Kow : 4,04 - 4,91 (Method: calculated)

4-HYDROXY-4-METHYLPENTAN-2-ONE :  
May be considered as comparable to a similar product for which experimental results are:  
Partition coefficient: n-octanol/water: log Kow : -0,09 (Method: calculated)

BUTANONE :  
Partition coefficient: n-octanol/water: log Kow : 0,3 (Method: OECD Test Guideline 117)

HYDROGEN PEROXIDE :  
Partition coefficient: n-octanol/water: log Kow : -1,57 , at 20 °C (Method: calculated)

2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE :  
Bioconcentration factor (BCF): 195 (23 d, Method: OECD Test Guideline 305, Lepomis macrochirus (Bluegill sunfish))

**12.4. Mobility in soil - Distribution among environmental compartments:**

**Vapor pressure:** 20 hPa, 20 °C

**Absorption / desorption:**

2,2,4-TRIMETHYL-1,3-PENTANEDIOL DIISOBUTYRATE :  
log Koc: 2,69 - 3,6 ( Method: calculated )

**12.5. Results of PBT and vPvB assessment :**

According to REACH regulation, annex XIII, this mixture contains no substance meeting PBT and vPvB criteria.

**12.6. Other adverse effects:** None known.

**13. DISPOSAL CONSIDERATIONS**

**13.1. Waste treatment:**

**Disposal of product:** Do not dispose of waste into sewer. Eliminate the product by incineration after dilution in a suitable flammable solvent (in accordance with local and national regulations). For further information, please contact: ARKEMA  
Can be disposed of as waste water, when in compliance with local regulations.

**Disposal of packaging:** Do not release into the environment. Destroy packaging by incineration at an approved waste disposal site (in accordance with local and national regulations).

**14. TRANSPORT INFORMATION**

Regulation	14.1. UN number	14.2.UN proper shipping name	14.3.Clas s*	Label	14.4. PG*	14.5. Environmental hazards	14.6. Special precautions for user
ADR	3105	ORGANIC PEROXIDE TYPE D, LIQUID (METHYL ETHYL KETONE PEROXIDE)	5.2	5.2		no	
ADN	3105	ORGANIC PEROXIDE TYPE D, LIQUID (METHYL ETHYL KETONE PEROXIDE)	5.2	5.2		no	
RID	3105	ORGANIC PEROXIDE TYPE D, LIQUID (METHYL ETHYL KETONE PEROXIDE)	5.2	5.2		no	
IATA Cargo	3105	Organic peroxide type D, liquid (Methyl ethyl ketone peroxide)	5.2	5.2(74F)		no	
IATA Passenger	3105	Organic peroxide type D, liquid (Methyl ethyl ketone peroxide)	5.2	5.2(74F)		no	
IMDG	3105	ORGANIC PEROXIDE TYPE D, LIQUID (METHYL ETHYL KETONE PEROXIDE)	5.2	5.2		no	EmS Number: F-J, S-R

\*Description: 14.3. Transport hazard class(es)  
14.4. Packing group

**14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code:** Not applicable

**15. REGULATORY INFORMATION**

Safety data sheets: accordance with Annex II of Regulation (EC) No 1907/2006 and its amendment(s)

**15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture:**

Additional regulations ( European Union ) :

The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 1996, Statutory Instruments number 192 of 1996. Applies

Hazardous Waste Regulations 2005 Applies  
The Control of substances Hazardous to Health Regulations 2002 (as ammended) Banned and/or restricted  
UK REGULATION Chip3: Chemical (Hazard Information and Packaging for Supply) Regulations 2002  
Material storage : Hazard group: Type1  
Organic peroxide

Major Accident Hazard Legislation FLAMMABLE LIQUIDS P5c

Major Accident Hazard Legislation Self-reactive substances and mixtures, Type C, D, E or F or organic peroxides, Type C, D, E, or F P6B

**15.2. Chemical safety assessment:**

Chemical Safety Assessments have been carried out for these substances. (4-Hydroxy-4-methylpentan-2-one) (Reaction mass of butane-2,2-diyl dihydroperoxide and dioxydibutane-2,2-diyl dihydroperoxide) (Hydrogen peroxide)

**INVENTORIES:**

EINECS: Conforms to  
TSCA: Conforms to  
DSL: All components of this product are on the Canadian DSL  
IECSC (CN): Conforms to  
ENCS (JP): Conforms to  
ISHL (JP): Conforms to  
KECI (KR): Conforms to  
PICCS (PH): Conforms to  
AICS: Conforms to  
NZIOC: Conforms to

**16. OTHER INFORMATION**

**Full text of H, EUH-phrases referred to under sections 2 and 3**

EUH066 Repeated exposure may cause skin dryness or cracking.  
H225 Highly flammable liquid and vapour.  
H226 Flammable liquid and vapour.  
H242 Heating may cause a fire.  
H271 May cause fire or explosion; strong oxidizer.  
H302 Harmful if swallowed.  
H310 Fatal in contact with skin.  
H314 Causes severe skin burns and eye damage.  
H315 Causes skin irritation.  
H318 Causes serious eye damage.  
H319 Causes serious eye irritation.  
H330 Fatal if inhaled.  
H332 Harmful if inhaled.  
H335 May cause respiratory irritation.  
H336 May cause drowsiness or dizziness.  
H361d Suspected of damaging the unborn child.  
H412 Harmful to aquatic life with long lasting effects.

Bibliography ARKEMA brochure : Safe Handling of Organic Peroxides  
Cahiers et notes documentaires INRS - N°186 - 1erT2002 : "Les peroxydes et leur utilisation"  
Further information This product must be handled only by personnel well informed of safety conditions.  
When used in formulations, contact us for labelling.



**Update:**

Safety datasheet sections which have been updated:		Type:
1	Product name	Revisions
2	Classification and labelling	Revisions
3	Hazardous components	Revisions
8	Exposure Limit Values, Derived No Effect Level (DNEL)	Revisions, Additions
11	11. TOXICOLOGICAL INFORMATION	Revisions
12	12. ECOLOGICAL INFORMATION	Revisions

**Thesaurus:**

NOAEL : No Observed Adverse Effect Level (NOAEL)  
LOAEL : Lowest Observed Adverse Effect Level (LOAEL)  
bw : Body weight  
food : oral feed  
dw : Dry weight  
vPVB : very Persistent and very Bioaccumulative  
PBT : Persistent, Bioaccumulative and Toxic

This information applies to the PRODUCT AS SUCH and conforming to specifications of ARKEMA. In case of formulations or mixtures, it is necessary to ascertain that a new danger will not appear. The information contained is based on our knowledge of the product, at the date of publishing and it is given quite sincerely. Users are advised of possible additional hazards when the product is used in applications for which it was not intended. This sheet shall only be used and reproduced for prevention and security purposes. The references to legislative, regulatory and codes of practice documents cannot be considered as exhaustive. It is the responsibility of the person receiving the product to refer to the totality of the official documents concerning the use, the possession and the handling of the product. It is also the responsibility of the handlers of the product to pass on to any subsequent persons who will come into contact with the product (usage, storage, cleaning of containers, other processes) the totality of the information contained within this safety data sheet and necessary for safety at work, the protection of health and the protection of environment.

**NB: In this document the numerical separator of the thousands is the "." (point), the decimal separator is "," (comma).**



<p><b>1. Title of Exposure Scenario : Formulation of the substance</b>  <b>Scenario description :CGES2.J:</b> Formulation of the substance and its mixtures in batch or continuous operations within closed or contained systems, including incidental exposures during storage, materials transfers, mixing, maintenance, sampling and associated laboratory activities</p> <p><b>Sub of use :</b>  <b>SU 10:</b> Formulation</p> <p><b>Environmental release category:</b>  <b>ERC2:</b> Formulation of preparations</p>	<p><b>Process category:</b>  <b>PROC1:</b> Use in closed process, no likelihood of exposure, <b>PROC2:</b> Use in closed, continuous process with occasional controlled exposure, <b>PROC3:</b> Use in closed batch process (synthesis or formulation), <b>PROC4:</b> Use in batch and other process (synthesis) where opportunity for exposure arises, <b>PROC5:</b> Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact), <b>PROC8a:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities, <b>PROC8b:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities, <b>PROC9:</b> Transfer of substance or preparation into small containers (dedicated filling line, including weighing), <b>PROC14:</b> Production of preparations or articles by tableting, compression, extrusion, pelletsation, <b>PROC15:</b> Use as laboratory reagent</p>
<p><b>2. Conditions of use - Exposure estimation and reference to its source</b></p> <p><b>Control of environmental exposure :</b></p> <p><b>General Information</b>  <b>characteristic:</b>  Liquid, vapour pressure &lt; 0.5 kPa  Non-hydrophobic, Readily biodegradable, Low potential to bioaccumulate  <b>General risk management measures applicable to all activities:</b>  Waste treatment : See chapter 13. Disposal considerations  Recovery : Accidental release measures : See chapter 6</p> <p><b>Control of worker exposure :</b></p> <p><b>General information</b>  <b>characteristic:</b>  Liquid, vapour pressure &lt; 0.5 kPa  <b>Frequency and duration of use:</b> Covers daily exposures up to 8 hours (unless stated differently).  <b>Concentration of the Substance in Mixture/Article:</b>Covers the percentage of the substance in the product up to 100 % (unless stated differently).  <b>General risk management measures applicable to all activities:</b>  Assumes a good basic standard of occupational hygiene is implemented. Avoid splashing. Avoid dispersal of spilled material. Avoid direct eye contact with product, including via hands contamination  Use suitable eye protection and gloves.</p>	<p><b>3. Risk characterisation ratio:</b></p> <p><b>Compartment:</b>  All (environment)</p> <p><b>Exposure Assessment Method:</b>  As the substance doesn't meet the criteria for classification and is neither PBT nor vPvB, according to REACH regulation, article 14(4), development of specific exposure scenarios is not required.</p> <p><b>Exposure routes:</b>  All (worker)</p> <p><b>Exposure Assessment Method:</b>  ECETOC TRA, The long term exposure assessment covers the short term effects.</p>

Specific conditions :

Contributing Scenario	PROC	Operational conditions	Concentration of the Substance in Mixture/Article	Risk Management Measures	Conditions and measures related to personal protection, hygiene and health evaluation	Risk characterisation ratio: (Long term)			Risk characterisation ratio: ( Short term)		
						Inhalation	Dermal	Combined routes	Inhalation	Dermal	Combined routes
General exposures (closed systems)	<b>PROC1</b>			Handle substance within a closed system.		< 0,1	< 0,1	< 0,1			
General exposures (closed systems)	<b>PROC2</b>			Handle substance within a closed system.		< 0,1	0,1 - 0,5	0,1 - 0,5			
General exposures (closed systems)	<b>PROC3</b>			Handle substance within a closed system.		0,1 - 0,5	< 0,1	0,1 - 0,5			
General exposures (open systems)	<b>PROC4</b>				Wear suitable gloves tested to EN374. (80 %)	0,1 - 0,5	0,1 - 0,5	0,5			
General exposures (open systems) (as aerosol)	<b>PROC4</b>			Provide extraction ventilation at points where emissions occur.		< 0,1	0,5 - 0,75	0,5 - 1			
Batch processes at elevated temperatures	<b>PROC3</b>			Formulate in enclosed or ventilated mixing vessels. Ensure material transfers are under containment or extract ventilation.		0,1 - 0,5	< 0,1	0,1 - 0,5			
Process sampling	<b>PROC3</b>			No other specific measures identified.		0,1 - 0,5	< 0,1	0,1 - 0,5			
Laboratory activities	<b>PROC15</b>			No other specific measures identified.		0,1 - 0,5	< 0,1	0,1 - 0,5			
Bulk transfers	<b>PROC8b</b>			Remotely vent displaced vapours. Clear spills immediately. Clear transfer lines prior to de-coupling.	Wear suitable gloves tested to EN374. (80 %)	0,1 - 0,5	0,1 - 0,5	0,5			
Mixing operations (open systems) Mixing operations (open systems) (as aerosol)	<b>PROC5</b>				Wear suitable gloves tested to EN374. (80 %)	0,1 - 0,5	0,1 - 0,5	0,5 - 0,75			
Transfer from/pouring from containers Manual	<b>PROC8a</b>				Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (90 %)	0,5 - 0,75	0,1 - 0,5	0,5 - 1			

Drum/batch transfers	PROC8b		No other specific measures identified.		0,1 - 0,5	< 0,1	0,1 - 0,5		
Production or preparation or articles by tableting, compression, extrusion or pelletisation	PROC14		No other specific measures identified.		0,1 - 0,5	0,1 - 0,5	0,5 - 0,75		
Drum and small package filling	PROC9			Wear suitable gloves tested to EN374. (80 %)	0,1 - 0,5	0,1 - 0,5	0,5		
Equipment cleaning and maintenance	PROC8a		Apply vessel entry procedures including use of forced supplied air. Drain down and flush system prior to equipment opening or maintenance.		< 0,1	0,1 - 0,5	0,1 - 0,5		
Storage	PROC1, PROC2		Store substance within a closed system.		< 0,1	< 0,1	< 0,1		

**LE** : Local effects, **SE** : Systemic effects

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

**For a given contributing scenario, several risk management measures can be proposed. It is your responsibility to select the configuration that best suits your activity.**

**Thesaurus:**

PROC : Process category  
SU : Sectors of end-use  
PC : Product category  
ERC : Environmental release category

RCR : Risk characterisation ratio:  
DNEL : Derived No Effect Level (DNEL)  
PNEC : Predicted No Effect Concentration (PNEC)

**NB: In this document the numerical separator of the thousands is the " ." (point), the decimal separator is " ," (comma).**  
This Exposure Scenario may not be exhaustive. Please contact your supplier should you need additional information.



**Product:** **4-Hydroxy-4-methylpentan-2-one** (EC-No. 204-626-7 CAS-No. 123-42-2) Page: 1 / 3

Contact person : arkema-fhiochem-reach-uses@arkema.com Date 20.10.2011  
REACH Registration Number: 01-2119473975-21-0000

**1. Title of Exposure Scenario : Polymers processing (industrial)**

**Scenario description (CGS23.1):** Processing of formulated polymers within closed or contained systems, including incidental exposures during material transfers, additives handling (e.g. pigments, stabilisers, fillers, plasticisers, etc.), moulding, curing and forming activities, material re-works, storage and associated maintenance.

**Sector of use :**

**SU 3:** Industrial Manufacturing (all)

**Environmental release category:**

**ERC3:** Formulation in materials, **ERC4:** Industrial use of processing aids in processes and products, not becoming part of articles, **ERC5:** Industrial use resulting in inclusion into or onto a matrix, **ERC6d:** Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers

**Process category:**

**PROC1:** Use in closed process, no likelihood of exposure, **PROC2:** Use in closed, continuous process with occasional controlled exposure, **PROC3:** Use in closed batch process (synthesis or formulation), **PROC4:** Use in batch and other process (synthesis) where opportunity for exposure arises, **PROC5:** Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact), **PROC6:** Calendaring operations, **PROC8a:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities, **PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities, **PROC9:** Transfer of substance or preparation into small containers (dedicated filling line, including weighing), **PROC13:** Treatment of articles by dipping and pouring, **PROC14:** Production of preparations or articles by tableting, compression, extrusion, pelleting, **PROC21:** Low energy manipulation of substances bound in materials and/ or articles

**2. Conditions of use - Exposure estimation and reference to its source**

**Control of environmental exposure :**

**General information**

**characteristic:**

Liquid, vapour pressure < 0.5 kPa  
Readily biodegradable, Low potential to bioaccumulate, Non-hydrophobic  
**General risk management measures applicable to all activities:**  
Waste treatment : See chapter 13. Disposal considerations  
Recovery : Accidental release measures : See chapter 6

**Control of worker exposure :**

**General information**

**characteristic:**

Liquid, vapour pressure < 0.5 kPa  
**Frequency and duration of use:** Covers daily exposures up to 8 hours (unless stated differently).  
**Concentration of the Substance in Mixture/Article:** Covers the percentage of the substance in the product up to 100 % (unless stated differently).  
**General risk management measures applicable to all activities:**  
Assumes a good basic standard of occupational hygiene is implemented, Avoid splashing, Avoid dispersal of spilled material, Avoid direct eye contact with product, including via hands contamination  
Use suitable eye protection and gloves.  
Assumes use at not more than 20°C above ambient temperature (unless stated differently).

**3. Risk characterisation ratio:**

**Compartment:**

All (environment)

**Exposure Assessment Method:**

As the substance doesn't meet the criteria for classification and is neither PBT nor vPvB, according to REACH regulation, article 14(4), development of specific exposure scenarios is not required.

**Exposure routes:**

All (worker)

**Exposure Assessment Method:**

ECETOC TRA, The long term exposure assessment covers the short term effects.

**Specific conditions :**

Contributing Scenario	PROC	Operational conditions	Concentration of the Substance in Mixture/Article	Risk Management Measures	Conditions and measures related to personal protection, hygiene and health evaluation	Risk characterisation ratio: (Long term)			Risk characterisation ratio: ( Short term)		
						Inhalation	Dermal	Combined routes	Inhalation	Dermal	Combined routes
Bulk transfers (closed systems)	PROC1, PROC2			No other specific measures identified.		< 0,1	0,1 - 0,5	0,1 - 0,5			
Bulk transfers	PROC8b, PROC9			Handle substance within a closed system.	Wear suitable gloves tested to EN374. (80 %)	0,1 - 0,5	0,1 - 0,5	0,5			
Bulk weighing	PROC1, PROC2			Handle substance within a closed system.		< 0,1	0,5 - 0,75	0,5 - 1			
Small scale weighing	PROC9				Wear suitable gloves tested to EN374. (80 %)	0,1 - 0,5	0,1 - 0,5	0,5			
Additive premixing	PROC3, PROC4, PROC5				Wear suitable gloves tested to EN374. (80 %)	0,1 - 0,5	0,1 - 0,5	0,5 - 0,75			
Calendering (including Banburys) Calendering (including Banburys) (as aerosol)	PROC6			Ensure material transfers are under containment or extract ventilation.	Wear suitable gloves tested to EN374. (80 %)	0,1 - 0,5	0,5 - 0,75	0,5 - 1			
Polyol processes	PROC13		Covers the percentage of the substance in the product up to 25 %.		Wear suitable gloves tested to EN374. (80 %)	0,1 - 0,5	0,1 - 0,5	0,5 - 0,75			
Extrusion and masterbatching Injection moulding of articles	PROC14			Provide enhanced general ventilation by mechanical means. (50 %)		0,1 - 0,5	0,1 - 0,5	0,5 - 0,75			
Finishing operations	PROC21			No other specific measures identified.		< 0,1	0,1 - 0,5	0,1 - 0,5			
Equipment maintenance	PROC8a			Avoid carrying out operation for more than 1 hour.	Wear suitable gloves tested to EN374. (80 %)	0,1 - 0,5	0,1 - 0,5	0,1 - 0,5			
Storage	PROC1, PROC2			Store substance within a closed system.		< 0,1	< 0,1	< 0,1			

**LE : Local effects, SE : Systemic effects**

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

**For a given contributing scenario, several risk management measures can be proposed. It is your responsibility to select the configuration that best suits your activity.**



## Exposure scenario : 4-Hydroxy-4-methylpentan-2-one

**Thesaurus:**

PROC : Process category  
SU : Sectors of end-use  
PC : Product category  
ERC : Environmental release category

RCR : Risk characterisation ratio:  
DNEL : Derived No Effect Level (DNEL)  
PNEC : Predicted No Effect Concentration (PNEC)

**NB: In this document the numerical separator of the thousands is the "." (point), the decimal separator is "," (comma).**  
This Exposure Scenario may not be exhaustive. Please contact your supplier should you need additional information.



**Product:** **hydrogen peroxide** Page: 1 / 3

(EC-No. 231-765-0 CAS-No. 7722-84-1) Date 09.12.2011  
 Contact person: arkema-hydroperox-reach-uses@arkema.com  
 REACH Registration Number: 01-2119485845-22-0017, 01-2119485845-22-0018

**1. Title of Exposure Scenario : Industrial use in chemical synthesis or processes and formulation**

**Scenario description (GES1\_I:** Manufacture of the substance or use as an intermediate or a process chemical or extraction agent. Includes recycling/ recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container), sampling and associated laboratory activities., **GES2\_I:** Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tableting, compression, pelleting, extrusion, large and small scale packing, sampling, maintenance and associated laboratory activities., **GES17\_I:** Use of the substance within laboratory settings, including material transfers and equipment cleaning.

**Sector of use :**

**SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites, **SU4:** Manufacture of food products, **SU8,9:** Manufacture of bulk, large scale substances (including petroleum products), manufacture of fine chemicals, **SU 10:** Formulation, **SU11:** Manufacture of rubber products, **SU12:** Manufacture of plastics products, including compounding and conversion, **SU14:** Manufacture of basic metals, including alloys, **SU15:** Manufacture of fabricated metal products, except machinery and equipment, **SU16:** Manufacture of computer, electronic and optical products, electrical equipment, **SU17:** General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment

**Environmental release category:**

**ERC2:** Formulation of preparations, **ERC4:** Industrial use of processing aids in processes and products, not becoming part of articles, **ERC6a:** Industrial use resulting in manufacture of another substance (use of intermediates), **ERC6b:** Industrial use of reactive processing aids, **ERC6c:** Industrial use of monomers for manufacture of thermoplastics, **ERC6d:** Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers

**Process category:**

**PROC1:** Use in closed process, no likelihood of exposure, **PROC2:** Use in closed, continuous process with occasional controlled exposure, **PROC3:** Use in closed batch process (synthesis or formulation), **PROC4:** Use in batch and other process (synthesis) where opportunity for exposure arises, **PROC5:** Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact), **PROC15:** Use as laboratory reagent

**2. Conditions of use - Exposure estimation and reference to its source**

**Control of environmental exposure :**

**General Information**

**characteristic:**

Liquid, vapour pressure 0.5 - 10 kPa

inorganic, Non-hydrophobic, Readily biodegradable, Practically not bioaccumulable, Very slight adsorption

**Frequency and duration of use:**

Number of emission days per year = 300

**Operational conditions:**

Risk from environmental exposure is driven by freshwater.

**General risk management measures applicable to all activities:**

Air : Exhaust air may need to be cleaned by scrubbers or filters to reduce environmental contamination.

Water : onsite wastewater treatment recommended Typical onsite wastewater treatment provides removal efficiency of (%): (99,3 %)

External treatment and disposal of waste should comply with applicable local and/or national regulations.

**3. Risk characterisation ratio:**

**Compartment:**

All (environment)

**Exposure Assessment Method:**

EUSES

## Exposure scenario : hydrogen peroxide

Contributing Scenario	Annual amount per site	Emission or Release Factor: Air	Maximum concentration / release value:		Emission or Release Factor: Soil	Risk characterisation ratio:		Remarks
			Marine water	Fresh water		Water	Soil	
Formulation of preparations, Industrial use of processing aids in processes and products, not becoming part of articles, Industrial use resulting in manufacture of another substance (use of intermediates), Industrial use of reactive processing aids, Industrial use of monomers for manufacture of thermoplastics, Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers	8,950 tonnes/year	29,8 kg/day	0,0126 mg/l	0,0126 mg/l	2,98 kg/day	< 1	< 0,1	In addition to direct release in industrial soil, soil risk characterization ratio is influenced by the deposition of air emission and sludge application (if permitted) to soil.
<b>Control of worker exposure :</b>								
<b>General Information</b>								
<b>characteristic:</b> Liquid, vapour pressure 0.5 - 10 kPa								
<b>Frequency and duration of use:</b> Covers frequency up to, daily yearly use.								
<b>Concentration of the Substance in Mixture/Article:</b> Covers percentage substance in the product up to : <= 70 %								
<b>General risk management measures applicable to all activities:</b> Short-term exposure: Use respirator when performing operations involving potential exposure to vapour of the product (in case of high concentration), irritant effects and corrosive effects: Wear suitable coveralls to prevent exposure to the skin. Wear suitable gloves tested to EN374. Use suitable eye protection. See chapter : 8. Exposure controls/personal protection								
Assumes a good basic standard of occupational hygiene is implemented.								
Indoor								
Assumes use at not more than 20°C above ambient temperature (unless stated differently).								
<b>Exposure routes:</b> All (worker)			<b>Exposure Assessment Method:</b> Short-term, Qualitative approach used to conclude safe use.					
Inhalation exposure			Long-term, ECETOC TRA					
Dermal exposure			Long-term, Not relevant, Decomposition when in contact with skin : no systemic effect					

# Exposure scenario : hydrogen peroxide

**Specific conditions :**

Contributing Scenario	PROC	Operational conditions	Concentration of the Substance in Mixture/Article	Risk Management Measures	Conditions and measures related to personal protection, hygiene and health evaluation	Risk characterisation ratio: (Long term )			Risk characterisation ratio: ( Short term )		
						Inhalation	Dermal	Combined routes	Inhalation	Dermal	Combined routes
Use in closed process, no likelihood of exposure	<b>PROC1</b>	Indoor				< 0,1	(Not relevant)				
Use in closed, continuous process with occasional controlled exposure	<b>PROC2</b>	Indoor				0,5 - 0,75	(Not relevant)				
Use in closed, continuous process with occasional controlled exposure	<b>PROC2</b>	Indoor		Provide extraction ventilation at points where emissions occur. (90 %)		< 0,1	(Not relevant)				
Use in closed batch process (synthesis or formulation) Use in batch and other process (synthesis) where opportunity for exposure arises Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)	<b>PROC3, PROC4, PROC5</b>	Indoor		Provide extraction ventilation at points where emissions occur. (90 %)		0,1 - 0,5	(Not relevant)				
Use as laboratory reagent	<b>PROC15</b>	Indoor		Handle in a fume cupboard or under extract ventilation. (90 %)		0,1 - 0,5	(Not relevant)				

**LE : Local effects, SE : Systemic effects**

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

**For a given contributing scenario, several risk management measures can be proposed. It is your responsibility to select the configuration that best suits your activity.**

**Thesaurus:**

- PROC : Process category
- SU : Sectors of end-use
- PC : Product category
- ERC : Environmental release category

- RCR : Risk characterisation ratio:
- DNEL : Derived No Effect Level (DNEL)
- PNEC : Predicted No Effect Concentration (PNEC)

**NB: In this document the numerical separator of the thousands is the "." (point), the decimal separator is "," (comma).**  
This Exposure Scenario may not be exhaustive. Please contact your supplier should you need additional information.



**1. Title of Exposure Scenario : Loading and unloading operations, distribution covering all identified uses**

**Scenario description :CGES1A.1:** Bulk loading (including marine vessel/barge, rail/road car and IBC loading) of substance within closed or contained systems, including incidental exposures during its sampling, storage, unloading, maintenance and associated laboratory activities.

**Sector of use :**  
**SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites, **SU4:** Manufacture of food products, **SU6a:** Manufacture of wood and wood products, **SU8,9:** Manufacture of bulk, large scale substances (including petroleum products); manufacture of fine chemicals, **SU 10:** Formulation [mixing] of preparations and/ or re-packaging (excluding alloys), **SU11:** Manufacture of rubber products, **SU12:** Manufacture of plastics products, including compounding and conversion, **SU14:** Manufacture of basic metals, including alloys, **SU15:** Manufacture of fabricated metal products, except machinery and equipment, **SU16:** Manufacture of computer, electronic and optical products, electrical equipment, **SU17:** General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment, **SU 21:** Consumer uses: Private households (= general public = consumers), **SU 22:** Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

**Process category:**

**PROC8a:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities, **PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities, **PROC9:** Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

**2. Conditions of use - Exposure estimation and reference to its source**

**Control of environmental exposure :**  
**General Information**  
**characteristic:**  
 Liquid, vapour pressure 0.5 - 10 kPa

**Control of worker exposure :**  
**General Information**  
**characteristic:**  
 Liquid, vapour pressure 0.5 - 10 kPa  
**Frequency and duration of use:**Covers frequency up to: daily yearly use.  
**Concentration of the Substance in Mixture/Article:**Covers percentage substance in the product up to :  
 <= 70 %

**General risk management measures applicable to all activities:**  
 Short-term exposure: Use respirator when performing operations involving potential exposure to vapour of the product (in case of high concentration). Irritant effects and corrosive effects: Wear suitable coveralls to prevent exposure to the skin. Wear suitable gloves tested to EN374. Use suitable eye protection. See chapter : 8. Exposure controls/personal protection

Assumes a good basic standard of occupational hygiene is implemented.  
 Indoor  
 Outdoor location is covered by the worst-case inside location.

**3. Risk characterisation ratio:**

**Compartment:**  
 All (environment)  
**Exposure Assessment Method:**  
 Environmental exposure for loading/unloading is covered by the other scenarios

**Exposure routes:**  
 All (worker)  
**Exposure Assessment Method:**  
 Short-term, Qualitative approach used to conclude safe use.  
 Inhalation exposure  
 Long-term, ECETOC TRA  
 Dermal exposure  
 Long-term; Not relevant; Decomposition when in contact with skin : no systemic effect

# Exposure scenario : hydrogen peroxide

**Specific conditions :**

Contributing Scenario	PROC	Operational conditions	Concentration of the Substance in Mixture/Article	Risk Management Measures	Conditions and measures related to personal protection, hygiene and health evaluation	Risk characterisation ratio: (Long term)			Risk characterisation ratio: ( Short term)		
						Inhalation	Dermal	Combined routes	Inhalation	Dermal	Combined routes
Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities	<b>PROC8a</b>	Indoor		Provide extraction ventilation at points where emissions occur. (90 %)		0,5 - 0,75	(Not relevant)				
Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities	<b>PROC8b</b>	Indoor		Provide extraction ventilation at points where emissions occur. (97 %)		< 0,1	(Not relevant)				
Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	<b>PROC9</b>	Indoor		Provide extraction ventilation at points where emissions occur. (90 %)		0,1 - 0,5	(Not relevant)				

**LE : Local effects, SE : Systemic effects**

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

**For a given contributing scenario, several risk management measures can be proposed. It is your responsibility to select the configuration that best suits your activity.**

**Thesaurus:**

PROC : Process category  
SU : Sectors of end-use  
PC : Product category  
ERC : Environmental release category

RCR : Risk characterisation ratio:  
DNEL : Derived No Effect Level (DNEL)  
PNEC : Predicted No Effect Concentration (PNEC)

**NB: In this document the numerical separator of the thousands is the " " (point), the decimal separator is " , " (comma).**

This Exposure Scenario may not be exhaustive. Please contact your supplier should you need additional information.



**Product:** **Reaction mass of butane-2,2-diyl dihydroperoxide and dioxydibutane-2,2-diyl dihydroperoxide** Page: 1 / 5  
 Number: ARKE-00412 (Version 2.0) Date 11.10.2017 (Cancel and replace : 26.05.2016)  
 Contact person : arkema.peroxides-reach-uses@arkema.com  
 REACH Registration Number: 01-2119514691-43-0003

<p><b>1. Title of Exposure Scenario : Formulation of organic peroxides</b></p> <p><b>Sector of use :</b> SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites</p> <p><b>Environmental release category:</b> ERC2: Formulation of preparations</p>	<p><b>Product category :</b> PC32: Polymer preparations and compounds</p> <p><b>Process category:</b>  <b>PROC1:</b> Use in closed process, no likelihood of exposure, <b>PROC2:</b> Use in closed, continuous process with occasional controlled exposure, <b>PROC3:</b> Use in closed batch process (synthesis or formulation), <b>PROC5:</b> Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact), <b>PROC8a:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities, <b>PROC8b:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities, <b>PROC9:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large line, including weighing), <b>PROC15:</b> Use as laboratory reagent</p>
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<p><b>2. Conditions of use - Exposure estimation and reference to its source</b></p> <p><b>Control of environmental exposure :</b></p> <p><b>General Information</b></p> <p><b>Characteristic:</b> Liquid, vapour pressure &lt; 0.5 kPa Substance is isomeric mixture, Readily biodegradable, Bioaccumulation is unlikely., Non-hydrophobic</p> <p><b>Frequency and duration of use:</b> Continuous exposure: Number of emission days per year = 100</p> <p><b>Environment factors not influenced by risk management:</b> Risk from environmental exposure is driven by freshwater., Risk from environmental exposure is driven by marine water., Risk from environmental exposure is driven by marine sediment., Risk from environmental exposure is driven by soil.</p> <p><b>Operational conditions:</b> <b>General risk management measures applicable to all activities:</b> Water : Domestic sewage treatment plant is assumed Onsite wastewater treatment required. Typical onsite wastewater treatment technology provides removal efficiency of (%): (87.5 %)</p>	<p><b>3. Risk characterisation ratio:</b></p> <hr/> <p><b>Compartment:</b> All (environment)</p> <p><b>Exposure Assessment Method:</b> CHESAR, A&amp; B Table approach from TGD 2003</p>
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## Exposure scenario : Reaction mass of butane-2,2-diyl dihydroperoxide and dioxidybutane-2,2-diyl dihydroperoxide

Contributing Scenario	Annual amount per site	Emission or Release Factor: Air	Maximum concentration / release value:		Emission or Release Factor: Soil	Risk characterisation ratio:		Remarks
			Marine water	Fresh water		Water	Soil	
Formulation of preparations	33 tonnes/year	0,825 kg/day	0,56 µg/l	5,6 µg/l	0,01 %	< 1	< 1	In addition to direct release in soil, soil risk characterization ratio is influenced by the deposition of air emission and sludge application (if permitted) to soil.

**Control of worker exposure :**

**General Information**

**characteristic:**

Liquid, vapour pressure < 0.5 kPa

**Frequency and duration of use:** Covers daily exposures up to 8 hours (unless stated differently). Covers frequency up to: daily yearly use.

**Concentration of the Substance in Mixture/Article:** Covers the percentage of the substance in the product up to 100 % (unless stated differently).

**General risk management measures applicable to all activities:**

Containment as appropriate Minimise number of staff exposed Segregation from the emitting process Effective contaminant extraction Good standard of general ventilation Minimization of manual phases. Avoidance of contact with contaminated tools and objects Regular cleaning of equipment, work area and clothing. Management/supervision checking compliance with RMMs and OCs Train staff on good practice. Assumes a good basic standard of occupational hygiene is implemented.

Provide a basic standard of general ventilation (1 to 3 air changes per hour), (unless stated differently)

Physchem risk management measures: refer to Chapter 7 : Handling and storage

Corrosion : See chapter 8

Indoor

Outdoor location is covered by the worst-case inside location.

**Exposure routes:**

All (worker)

**Exposure Assessment Method:**

CHESAR. With regards to the physchem risk, no specific exposure scenario has been generated.

## Exposure scenario : Reaction mass of butane-2,2-diyl dihydroperoxide and dioxidibutane-2,2-diyl dihydroperoxide

**Specific conditions :**

Contributing Scenario	PROC	Operational conditions	Concentration of the Substance in Mixture/Article	Risk Management Measures	Conditions and measures related to personal protection, hygiene and health evaluation	Risk characterisation ratio: ( Long term )			Risk characterisation ratio: ( Short term )		
						Inhalation	Dermal	Combined routes	Inhalation	Dermal	Combined routes
Use in closed process, no likelihood of exposure	<b>PROC1</b>	Indoor				< 0,1	< 0,1	< 0,1			
Use in closed, continuous process with occasional controlled exposure	<b>PROC2</b>	Indoor		Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	Wear suitable gloves tested to EN374. (80 %)  Face shield or eye protection if splash or eye contact is possible.  Wear a respirator conforming to EN140 with Type A/P2 filter or better. (95 %)	<b>0,1 - 0,5</b>	< 0,1	<b>0,2 - 0,6</b>			
Use in closed batch process (synthesis or formulation)	<b>PROC3</b>	Indoor		Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	Wear suitable gloves tested to EN374. (80 %)  Face shield or eye protection if splash or eye contact is possible.  Wear a respirator conforming to EN140 with Type A/P2 filter or better. (95 %)	<b>0,1 - 0,5</b>	< 0,1	<b>0,2 - 0,6</b>			
Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)	<b>PROC5</b>	Indoor		Provide extraction ventilation at points where emissions occur. (90 %)  Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (95 %)  Face shield or eye protection if splash or eye contact is possible.	<b>0,2 - 0,6</b>	0,1 - 0,3	<b>0,3 - 0,9</b>			

## Exposure scenario : Reaction mass of butane-2,2-diyl dihydroperoxide and dioxidibutane-2,2-diyl dihydroperoxide

PROC8a	Indoor		Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (95 %)  Face shield or eye protection if splash or eye contact is possible.  Wear a full face respirator conforming to EN140 with Type A filter or better. (95 %)	0,2 - 0,6	0,1 - 0,3	0,3 - 0,9		
<b>PROC8a</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities	Indoor		Provide appropriate exhaust ventilation at machinery. (95 %)	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (95 %)  Face shield or eye protection if splash or eye contact is possible.	0,1 - 0,5	0,1 - 0,3	0,2 - 0,8		
<b>PROC8b</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities	Indoor		Provide extract ventilation to material transfer points and other openings. (90 %)  Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (95 %)  Face shield or eye protection if splash or eye contact is possible.	0,2 - 0,6	0,1 - 0,3	0,3 - 0,9		
<b>PROC9</b> Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Indoor		Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (95 %)  Face shield or eye protection if splash or eye contact is possible.	0,2 - 0,6	0,1 - 0,3	0,3 - 0,9		
<b>PROC15</b> Use as laboratory reagent	Indoor		Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).  Avoid carrying out operation for more than 1 hour.	When direct contact with the substance is possible : Wearing protective gloves is recommended. (90 %)  Face shield or eye protection if splash or eye contact is possible.  Wear a respirator conforming to EN140 with Type A filter or better. (90 %)	< 0,3	< 0,3	0,1 - 0,6		

**LE : Local effects, SE : Systemic effects**

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

**For a given contributing scenario, several risk management measures can be proposed. It is your responsibility to select the configuration that best suits your activity.**

## Exposure scenario : Reaction mass of butane-2,2-diyl dihydroperoxide and dioxidibutane-2,2-diyl dihydroperoxide

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**Thesaurus:**

PROC : Process category  
SU : Sectors of end-use  
PC : Product category  
ERC : Environmental release category

RCR : Risk characterisation ratio:  
DNEL : Derived No Effect Level (DNEL)  
PNEC : Predicted No Effect Concentration

**NB: In this document the numerical separator of the thousands is the " " (point), the decimal separator is " , " (comma).**  
This Exposure Scenario may not be exhaustive. Please contact your supplier should you need additional information.



**Product:** **Reaction mass of butane-2,2-diyl dihydroperoxide and dioxydibutane-2,2-diyl dihydroperoxide** Page: 1 / 4  
 Number: ARKE-00413 (Version 2.0) Date 11.10.2017 (Cancel and replace : 26.05.2016)  
 Contact person : arkema.peroxides-reach-uses@arkema.com  
 REACH Registration Number: 01-2119514691-43-0003

<b>1. Title of Exposure Scenario : Formulation of organic peroxides</b>	
<b>Sector of use :</b> SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	<b>Product category :</b> PC32: Polymer preparations and compounds
<b>Environmental release category:</b> ERC3: Formulation in materials	<b>Process category:</b> PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact), <b>PROC8a</b> : Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities, <b>PROC8b</b> : Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities, <b>PROC9</b> : Transfer of substance or preparation into small containers (dedicated filling line, including weighing), <b>PROC14</b> : Production of preparations or articles by tableting, compression, extrusion, pelletisation, <b>PROC15</b> : Use as laboratory reagent

<b>2. Conditions of use - Exposure estimation and reference to its source</b>	
<b>Control of environmental exposure :</b>	
<p><b>General information</b></p> <p><b>characteristic:</b> Liquid, vapour pressure &lt; 0,5 kPa Substance is isomeric mixture, Readily biodegradable, Bioaccumulation is unlikely., Non-hydrophobic</p> <p><b>Frequency and duration of use:</b> Continuous exposure: Continuous release. Number of emission days per year = 100</p> <p><b>Environment factors not influenced by risk management:</b> Risk from environmental exposure is driven by freshwater., Risk from environmental exposure is driven by freshwater sediment., Risk from environmental exposure is driven by marine water., Risk from environmental exposure is driven by marine sediment., Risk from environmental exposure is driven by soil.</p> <p><b>Operational conditions:</b> <b>General risk management measures applicable to all activities:</b> Water : Domestic sewage treatment plant is assumed (87,5 %)</p>	
<b>3. Risk characterisation ratio:</b>	
<b>Compartment:</b> All (environment)	<b>Exposure Assessment Method:</b> CHESAR, Approach based on OECD Emission Scenario Document n°3 (Plastic additives - scenario for curing agents)

## Exposure scenario : Reaction mass of butane-2,2-diyl dihydroperoxide and dioxidybutane-2,2-diyl dihydroperoxide

Contributing Scenario	Annual amount per site	Emission or Release Factor: Air	Maximum concentration / release value:		Emission or Release Factor: Soil	Risk characterisation ratio:		Remarks
			Marine water	Fresh water		Water	Soil	
Formulation in materials	999 tonnes/year	0,5 kg/day	0,56 µg/l	5,6 µg/l	0,1 %	< 1	< 1	In addition to direct release in soil, soil risk characterization ratio is influenced by the deposition of air emission and sludge application (if permitted) to soil.

**Control of worker exposure :**

**General Information**

**characteristic:**

Liquid, vapour pressure < 0.5 kPa

**Frequency and duration of use:** Covers daily exposures up to 8 hours (unless stated differently). Covers frequency up to: daily yearly use.

**Concentration of the Substance in Mixture/Article:** Covers the percentage of the substance in the product up to 100 % (unless stated differently).

**General risk management measures applicable to all activities:**

Containment as appropriate Minimise number of staff exposed Segregation from the emitting process Effective contaminant extraction Good standard of general ventilation Minimization of manual phases. Avoidance of contact with contaminated tools and objects Regular cleaning of equipment, work area and clothing. Management/supervision checking compliance with RMMs and OCs Train staff on good practice. Assumes a good basic standard of occupational hygiene is implemented.

Provide a basic standard of general ventilation (1 to 3 air changes per hour), (unless stated differently)

Physchem risk management measures: refer to Chapter 7 : Handling and storage

Skin sensitiser : see chapter 8 Corrosion : See chapter 8

Indoor

Outdoor location is covered by the worst-case inside location.

**Exposure routes:**

All (worker)

**Exposure Assessment Method:**

CHESAR, With regards to the physchem risk, no specific exposure scenario has been generated.



## Exposure scenario : Reaction mass of butane-2,2-diyl dihydroperoxide and dioxidibutane-2,2-diyl dihydroperoxide

**Specific conditions :**

Contributing Scenario	PROC	Operational conditions	Concentration of the Substance in Mixture/Article	Risk Management Measures	Conditions and measures related to personal protection, hygiene and health evaluation	Risk characterisation ratio: ( Long term)			Risk characterisation ratio: ( Short term)		
						Inhalation	Dermal	Combined routes	Inhalation	Dermal	Combined routes
Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)	<b>PROC5</b>	Indoor		Provide extraction ventilation at points where emissions occur. (90 %)  Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (95 %)  Face shield or eye protection if splash or eye contact is possible.	0,2 - 0,6	0,1 - 0,3	0,3 - 0,9			
Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities	<b>PROC8a</b>	Indoor		Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (95 %)  Face shield or eye protection if splash or eye contact is possible.  Wear a full face respirator conforming to EN140 with Type A filter or better. (95 %)	0,2 - 0,6	0,1 - 0,3	0,3 - 0,9			
Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities	<b>PROC8b</b>	Indoor		Provide appropriate exhaust ventilation at machinery. (95 %)	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (95 %)  Face shield or eye protection if splash or eye contact is possible.	0,1 - 0,5	0,1 - 0,3	0,2 - 0,8			
Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	<b>PROC9</b>	Indoor		Provide extract ventilation to material transfer points and other openings. (90 %)  Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (95 %)  Face shield or eye protection if splash or eye contact is possible.	0,2 - 0,6	0,1 - 0,3	0,3 - 0,9			

Production of preparations or articles by tableting, compression, extrusion, pelletisation	PROC14	Indoor		Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (90 %)  Face shield or eye protection if splash or eye contact is possible.  Wear a full face respirator conforming to EN140 with Type A filter or better. (95 %)	0,2 - 0,6	0,1 - 0,3	0,3 - 0,9		
Use as laboratory reagent	PROC15	Indoor		Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).  Avoid carrying out operation for more than 1 hour.	When direct contact with the substance is possible : Wearing protective gloves is recommended. (90 %)  Face shield or eye protection if splash or eye contact is possible.  Wear a respirator conforming to EN140 with Type A filter or better. (90 %)	< 0,3	< 0,3	0,1 - 0,6		

LE : Local effects, SE : Systemic effects

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

For a given contributing scenario, several risk management measures can be proposed. It is your responsibility to select the configuration that best suits your activity.

**Thesaurus:**

- PROC : Process category
- SU : Sectors of end-use
- PC : Product category
- ERC : Environmental release category

- RCR : Risk characterisation ratio:
- DNEL : Derived No Effect Level (DNEL)
- PNEC : Predicted No Effect Concentration

**NB: In this document the numerical separator of the thousands is the "." (point), the decimal separator is "," (comma).**  
This Exposure Scenario may not be exhaustive. Please contact your supplier should you need additional information.

**Product:** **Reaction mass of butane-2,2-diyl dihydroperoxide and dioxydibutane-2,2-diyl dihydroperoxide** Page: 1 / 6  
 Number: ARKE-00414 (Version 2.0) Date 11.10.2017 (Cancel and replace : 26.05.2016)  
 Contact person : arkema.peroxides-reach-uses@arkema.com  
 REACH Registration Number: 01-2119514691-43-0003

<p><b>1. Title of Exposure Scenario : Use of organic peroxide as polymerisation initiator, cross-linking agent</b></p> <p><b>Sector of use :</b> SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites</p> <p><b>Product category :</b> PC32: Polymer preparations and compounds</p> <p><b>Environmental release category:</b> ERC6d: Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers</p>	<p><b>Process category:</b>  <b>PROC1:</b> Use in closed process, no likelihood of exposure, <b>PROC2:</b> Use in closed, continuous process with occasional controlled exposure, <b>PROC3:</b> Use in closed batch process (synthesis or formulation), <b>PROC4:</b> Use in batch and other process (synthesis) where opportunity for exposure arises, <b>PROC5:</b> Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact), <b>PROC6:</b> Calendaring operations, <b>PROC7:</b> Industrial spraying, <b>PROC8a:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities, <b>PROC8b:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities, <b>PROC9:</b> Transfer of substance or preparation into small containers (dedicated filling line, including weighing), <b>PROC10:</b> Roller application or brushing, <b>PROC13:</b> Treatment of articles by dipping and pouring, <b>PROC14:</b> Production of preparations or articles by tableting, compression, extrusion, pelletsation, <b>PROC15:</b> Use as laboratory reagent</p>
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<p><b>2. Conditions of use - Exposure estimation and reference to its source</b></p> <p><b>Control of environmental exposure :</b></p> <p><b>General Information</b>  <b>characteristic:</b> Liquid, vapour pressure &lt; 0,5 kPa          Substance is isomeric mixture, Readily biodegradable, Bioaccumulation is unlikely., Non-hydrophobic  <b>Frequency and duration of use:</b>          Continuous exposure:          Continuous release.          Number of emission days per year = 20  <b>Environment factors not influenced by risk management:</b>          Risk from environmental exposure is driven by freshwater., Risk from environmental exposure is driven by freshwater sediment., Risk from environmental exposure is driven by marine water., Risk from environmental exposure is driven by marine sediment., Risk from environmental exposure is driven by soil.</p> <p><b>Operational conditions:</b>  <b>General risk management measures applicable to all activities:</b>          Water : Domestic sewage treatment plant is assumed Required Removal Efficiency (wastewater): (87,5 %)</p>	<p><b>3. Risk characterisation ratio:</b></p> <p><b>Compartment:</b> All (environment)</p> <p><b>Exposure Assessment Method:</b> CHESAR Approach based on OECD Emission Scenario Document n°3 (Plastic additives - scenario for curing agents)</p>
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## Exposure scenario : Reaction mass of butane-2,2-diyl dihydroperoxide and dioxidibutane-2,2-diyl dihydroperoxide

Contributing Scenario	Annual amount per site	Emission or Release Factor: Air	Maximum concentration / release value:		Emission or Release Factor: Soil	Risk characterisation ratio:		Remarks
			Marine water	Fresh water		Water	Soil	
Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers	320 tonnes/year	0,8 kg/day	0,56 µg/l	5,6 µg/l	0,025 %	< 1	< 1	In addition to direct release in soil, soil risk characterization ratio is influenced by the deposition of air emission and sludge application (if permitted) to soil.
<p><b>Control of worker exposure :</b></p> <p><b>General information</b></p> <p>characteristic: Liquid, vapour pressure &lt; 0.5 kPa</p> <p><b>Frequency and duration of use:</b>Covers daily exposures up to 8 hours (unless stated differently). Covers frequency up to: daily yearly use.</p> <p><b>Concentration of the Substance in Mixture/Article:</b>Covers the percentage of the substance in the product up to 100 % (unless stated differently).</p> <p><b>General risk management measures applicable to all activities:</b></p> <p>Containment as appropriate Minimise number of staff exposed Segregation from the emitting process Effective contaminant extraction Good standard of general ventilation Minimization of manual phases. Avoidance of contact with contaminated tools and objects Regular cleaning of equipment, work area and clothing. Management/supervision checking compliance with RMMs and OCs Train staff on good practice. Assumes a good basic standard of occupational hygiene is implemented.</p> <p>Provide a basic standard of general ventilation (1 to 3 air changes per hour), (unless stated differently)</p> <p>Physchem risk management measures: refer to Chapter 7 : Handling and storage Corrosion : See chapter 8</p> <p>Indoor Outdoor location is covered by the worst-case inside location.</p>								
<p><b>Exposure routes:</b> All (worker)</p> <p><b>Exposure Assessment Method:</b> CHESAR, With regards to the physchem risk, no specific exposure scenario has been generated.</p>								

## Exposure scenario : Reaction mass of butane-2,2-diyl dihydroperoxide and dioxidybutane-2,2-diyl dihydroperoxide

**Specific conditions :**

Contributing Scenario	PROC	Operational conditions	Concentration of the Substance in Mixture/Article	Risk Management Measures	Conditions and measures related to personal protection, hygiene and health evaluation	Risk characterisation ratio: ( Long term)			Risk characterisation ratio: ( Short term)		
						Inhalation	Dermal	Combined routes	Inhalation	Dermal	Combined routes
Use in closed process, no likelihood of exposure	<b>PROC1</b>	Indoor				< 0,1	< 0,1	< 0,1			
Use in closed, continuous process with occasional controlled exposure	<b>PROC2</b>	Indoor		Provide extraction ventilation at points where emissions occur. (90 %)  Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	Wear suitable gloves tested to EN374. (80 %)  Face shield or eye protection if splash or eye contact is possible.	<b>0,1 - 0,5</b>	< 0,1	<b>0,2 - 0,6</b>			
Use in closed batch process (synthesis or formulation)	<b>PROC3</b>	Indoor		Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).  Provide extraction ventilation at points where emissions occur. (90 %)	Face shield or eye protection if splash or eye contact is possible.  Wear suitable gloves tested to EN374. (80 %)	<b>0,1 - 0,5</b>	< 0,1	<b>0,2 - 0,6</b>			
Use in batch and other process (synthesis) where opportunity for exposure arises	<b>PROC4</b>	Indoor		Provide extraction ventilation at points where emissions occur. (90 %)  Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (90 %)  Face shield or eye protection if splash or eye contact is possible.	<b>0,2 - 0,6</b>	0,1 - 0,3	<b>0,3 - 0,9</b>			
Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)	<b>PROC5</b>	Indoor		Provide extraction ventilation at points where emissions occur. (90 %)  Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (95 %)  Face shield or eye protection if splash or eye contact is possible.	<b>0,2 - 0,6</b>	0,1 - 0,3	<b>0,3 - 0,9</b>			

## Exposure scenario : Reaction mass of butane-2,2-diyl dihydroperoxide and dioxidibutane-2,2-diyl dihydroperoxide

Catendering operations	PROC6	Indoor	Covers the percentage of the substance in the product up to 5%.	Provide appropriate exhaust ventilation at machinery. (90 %)	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (95 %)  Face shield or eye protection if splash or eye contact is possible.	0,1 - 0,5	< 0,1	0,2 - 0,6		
Industrial spraying	<b>PROC7</b>	Indoor	Covers the percentage of the substance in the product up to 5%.	Provide appropriate exhaust ventilation at machinery. (95 %)	Face shield or eye protection if splash or eye contact is possible.  Complete suit protecting against chemicals  Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (95 %)  Wear a respirator conforming to EN140 with Type A filter or better. (90 %)	0,1 - 0,3	0,1 - 0,3	0,1 - 0,6		
Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities	<b>PROC8a</b>	Indoor		Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (95 %)  Face shield or eye protection if splash or eye contact is possible.  Wear a full face respirator conforming to EN140 with Type A filter or better. (95 %)	0,2 - 0,6	0,1 - 0,3	0,3 - 0,9		
Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities	<b>PROC8b</b>	Indoor		Provide appropriate exhaust ventilation at machinery. (95 %)	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (95 %)  Face shield or eye protection if splash or eye contact is possible.	0,1 - 0,5	0,1 - 0,3	0,2 - 0,8		

## Exposure scenario : Reaction mass of butane-2,2-diyl dihydroperoxide and dioxidibutane-2,2-diyl dihydroperoxide

PROC9	Indoor	Indoor	Provide extract ventilation to material transfer points and other openings. (90 %)  Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (95 %)  Face shield or eye protection if splash or eye contact is possible.	0,2 - 0,6	0,1 - 0,3	0,3 - 0,9
Transfer of substance or preparation into small containers (dedicated filling line, including weighing)							
<b>PROC10</b> Roller application or brushing	Indoor	Covers the percentage of the substance in the product up to 5%.	Provide appropriate exhaust ventilation at machinery. (90 %)	Face shield or eye protection if splash or eye contact is possible.  Complete suit protecting against chemicals  Wear chemically resistant gloves (tested to EN374) in combination with basic employee training. (90 %)	0,1 - 0,5	0,1 - 0,3	0,2 - 0,8
<b>PROC13</b> Treatment of articles by dipping and pouring	Indoor	Covers the percentage of the substance in the product up to 5%.	Provide appropriate exhaust ventilation at machinery. (90 %)	Wear suitable gloves tested to EN374. (80 %)  Face shield or eye protection if splash or eye contact is possible.	0,1 - 0,5	0,1 - 0,3	0,2 - 0,8
<b>PROC14</b> Production of preparations or articles by tableting, compression, extrusion, pelletisation	Indoor	Covers the percentage of the substance in the product up to 5%.	Provide appropriate exhaust ventilation at machinery. (90 %)	Wear suitable gloves tested to EN374. (80 %)  Face shield or eye protection if splash or eye contact is possible.	0,1 - 0,5	< 0,1	0,2 - 0,6
<b>PROC15</b> Use as laboratory reagent	Indoor		Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).  Avoid carrying out operation for more than 1 hour.	When direct contact with the substance is possible : Wearing protective gloves is recommended.  Face shield or eye protection if splash or eye contact is possible.	< 0,3	< 0,3	0,1 - 0,6

**LE : Local effects, SE : Systemic effects**

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**  
**For a given contributing scenario, several risk management measures can be proposed. It is your responsibility to select the configuration that best suits your activity.**

## Exposure scenario : Reaction mass of butane-2,2-diyl dihydroperoxide and dioxidibutane-2,2-diyl dihydroperoxide

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**Thesaurus:**

PROC : Process category  
SU : Sectors of end-use  
PC : Product category  
ERC : Environmental release category

RCR : Risk characterisation ratio:  
DNEL : Derived No Effect Level (DNEL)  
PNEC : Predicted No Effect Concentration

**NB: In this document the numerical separator of the thousands is the " " (point), the decimal separator is " , " (comma).**  
This Exposure Scenario may not be exhaustive. Please contact your supplier should you need additional information.