N-Ethyl-2-pyrrolidone ≥98 %, for synthesis

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

1.1 **Product identifier**

- **Identification of the substance**: N-Ethyl-2-pyrrolidone
- **Article number**: CN19
- **Registration number (REACH)**: 01-2119472138-36-xxxx
- **Index No**: 616-208-00-5
- **EC number**: 220-250-6
- **CAS number**: 2687-91-4

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

- **Identified uses**: laboratory chemical, laboratory and analytical use

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

- **Carl Roth GmbH + Co KG**
- **Schoemperlenstr. 3-5**
- **D-76185 Karlsruhe**
- **Germany**

- **Telephone**: +49 (0) 721 - 56 06 0
- **Telefax**: +49 (0) 721 - 56 06 149
- **e-mail**: sicherheit@carlroth.de
- **Website**: www.carlroth.de

**Competent person responsible for the safety data sheet**

- **: Department Health, Safety and Environment**

- **e-mail (competent person)**: sicherheit@carlroth.de

1.4 **Emergency telephone number**

<table>
<thead>
<tr>
<th>Name</th>
<th>Street</th>
<th>Postal code/city</th>
<th>Telephone</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Poisons Information Service City Hospital</td>
<td>Dudley Rd</td>
<td>B187QH Birmingham</td>
<td>844 892 0111</td>
<td></td>
</tr>
</tbody>
</table>

**Emergency information service**: +49/(0)89 19240

**SECTION 2: Hazards identification**

2.1 **Classification of the substance or mixture**

**Classification according to Regulation (EC) No 1272/2008 (CLP)**
N-Ethyl-2-pyrrolidone ≥98 %, for synthesis

article number: CN19

### Classification acc. to GHS

<table>
<thead>
<tr>
<th>Section</th>
<th>Hazard class</th>
<th>Hazard class and category</th>
<th>Hazard statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.3</td>
<td>serious eye damage/eye irritation</td>
<td>(Eye Dam. 1)</td>
<td>H318</td>
</tr>
<tr>
<td>3.7</td>
<td>reproductive toxicity</td>
<td>(Repr. 1B)</td>
<td>H360Df</td>
</tr>
</tbody>
</table>

### 2.2 Label elements

**Labelling according to Regulation (EC) No 1272/2008 (CLP)**

**Signal word** Danger

**Pictograms**

GHS05, GHS08

**Hazard statements**

H318 Causes serious eye damage  
H360Df May damage the unborn child. Suspected of damaging fertility (if exposed)

**Precautionary statements**

**Precautionary statements - prevention**

P201 Obtain special instructions before use.  
P280 Wear protective gloves/eye protection/face protection.

**Precautionary statements - response**

P302+P352 IF ON SKIN: Wash with plenty of water.  
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P308+P313 IF exposed or concerned: Get medical advice/attention.

For professional users only

**Labelling of packages where the contents do not exceed 125 ml**

**Signal word**: Danger

**Symbol(s)**

H318 Causes serious eye damage.  
H360Df May damage the unborn child. Suspected of damaging fertility (if exposed).  
P201 Obtain special instructions before use.  
P280 Wear protective gloves/eye protection/face protection.  
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P308+P313 IF exposed or concerned: Get medical advice/attention.

### 2.3 Other hazards

There is no additional information.
SECTION 3: Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Name of substance</th>
<th>N-Ethyl-2-pyrrolidone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index No</td>
<td>616-208-00-5</td>
</tr>
<tr>
<td>Registration number (REACH)</td>
<td>01-2119472138-36-xxxx</td>
</tr>
<tr>
<td>EC number</td>
<td>220-250-6</td>
</tr>
<tr>
<td>CAS number</td>
<td>2687-91-4</td>
</tr>
<tr>
<td>Molecular formula</td>
<td>C₆H₁₁NO</td>
</tr>
<tr>
<td>Molar mass</td>
<td>113,2 g/mol</td>
</tr>
</tbody>
</table>

SECTION 4: First aid measures

4.1 Description of first aid measures

**General notes**
Take off contaminated clothing.

**Following inhalation**
Provide fresh air. In all cases of doubt, or when symptoms persist, seek medical advice.

**Following skin contact**
Rinse skin with water/shower.

**Following eye contact**
In case of contact with eyes flush immediately with plenty of flowing water for 10 to 15 minutes holding eyelids apart and consult an ophthalmologist.

**Following ingestion**
Rinse mouth. Do not induce vomiting. In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible).

4.2 Most important symptoms and effects, both acute and delayed
Irritant effects, Gastrointestinal complaints, Malaise, Vomiting, Vertigo, Dizziness, Risk of serious damage to eyes, Risk of blindness

4.3 Indication of any immediate medical attention and special treatment needed
none
SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Co-ordinate fire-fighting measures to the fire surroundings
water spray, foam, dry extinguishing powder, carbon dioxide (CO2)

Unsuitable extinguishing media
water jet

5.2 Special hazards arising from the substance or mixture
Combustible. Vapours are heavier than air, spread along floors and form explosive mixtures with air.

Hazardous combustion products
In case of fire may be liberated: nitrogen oxides (NOx), carbon monoxide (CO), carbon dioxide (CO2)

5.3 Advice for firefighters
Fight fire with normal precautions from a reasonable distance. Wear self-contained breathing apparatus.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel
Use personal protective equipment as required. Avoid contact with skin, eyes and clothes. Do not breathe vapour/spray.

6.2 Environmental precautions
Keep away from drains, surface and ground water.

6.3 Methods and material for containment and cleaning up
Advice on how to contain a spill
Covering of drains.

Advice on how to clean up a spill
Absorb with liquid-binding material (e.g. sand, diatomaceous earth, acid- or universal binding agents).

Other information relating to spills and releases
Place in appropriate containers for disposal. Ventilate affected area.

6.4 Reference to other sections
SECTION 7: Handling and storage

7.1 Precautions for safe handling

• Measures to prevent fire as well as aerosol and dust generation

Keep away from sources of ignition - No smoking.

Advice on general occupational hygiene
Wash hands before breaks and after work. Keep away from food, drink and animal feedingstuffs.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed.

Incompatible substances or mixtures
Observe hints for combined storage.

Consideration of other advice
• Ventilation requirements
Use local and general ventilation.

• Specific designs for storage rooms or vessels
Recommended storage temperature: 15 – 25 °C.

7.3 Specific end use(s)
No information available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

National limit values

Occupational exposure limit values (Workplace Exposure Limits)
Data are not available.

Relevant DNELs/DMELs/PNECs and other threshold levels

• human health values

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Threshold level</th>
<th>Protection goal, route of exposure</th>
<th>Used in</th>
<th>Exposure time</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNEL</td>
<td>16,75 mg/m³</td>
<td>human, inhalatory</td>
<td>worker (industry)</td>
<td>chronic - systemic effects</td>
</tr>
<tr>
<td>DNEL</td>
<td>10,05 mg/m³</td>
<td>human, inhalatory</td>
<td>worker (industry)</td>
<td>chronic - local effects</td>
</tr>
<tr>
<td>DNEL</td>
<td>20,1 mg/m³</td>
<td>human, inhalatory</td>
<td>worker (industry)</td>
<td>acute - local effects</td>
</tr>
<tr>
<td>DNEL</td>
<td>4 mg/kg bw/day</td>
<td>human, dermal</td>
<td>worker (industry)</td>
<td>chronic - systemic effects</td>
</tr>
</tbody>
</table>
**Environmental values**

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Threshold level</th>
<th>Environmental compartment</th>
<th>Exposure time</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNEC</td>
<td>0,25 mg/l</td>
<td>freshwater</td>
<td>short-term (single instance)</td>
</tr>
<tr>
<td>PNEC</td>
<td>0,025 mg/l</td>
<td>marine water</td>
<td>short-term (single instance)</td>
</tr>
<tr>
<td>PNEC</td>
<td>10 mg/l</td>
<td>sewage treatment plant (STP)</td>
<td>short-term (single instance)</td>
</tr>
<tr>
<td>PNEC</td>
<td>1,25 mg/kg</td>
<td>freshwater sediment</td>
<td>short-term (single instance)</td>
</tr>
<tr>
<td>PNEC</td>
<td>0,125 mg/kg</td>
<td>marine sediment</td>
<td>short-term (single instance)</td>
</tr>
<tr>
<td>PNEC</td>
<td>0,104 mg/kg</td>
<td>soil</td>
<td>short-term (single instance)</td>
</tr>
</tbody>
</table>

**8.2 Exposure controls**

**Individual protection measures (personal protective equipment)**

**Eye/face protection**

- Use safety goggle with side protection.

**Skin protection**

- **Hand protection**
  
  Wear suitable gloves. Chemical protection gloves are suitable, which are tested according to EN 374. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves. The times are approximate values from measurements at 22°C and permanent contact. Increased temperatures due to heated substances, body heat etc. and a reduction of the effective layer thickness by stretching can lead to a considerable reduction of the breakthrough time. If in doubt, contact manufacturer. At an approx. 1.5 times larger / smaller layer thickness, the respective breakthrough time is doubled / halved. The data apply only to the pure substance. When transferred to substance mixtures, they may only be considered as a guide.

- **Type of material**
  
  Butyl caoutchouc (butyl rubber)

- **Material thickness**
  
  0,65 mm.

- **Breakthrough times of the glove material**
  
  >480 minutes (permeation: level 6)

- **Other protection measures**
  
  Take recovery periods for skin regeneration. Preventive skin protection (barrier creams/ointments) is recommended.

**Respiratory protection**

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United Kingdom (en)

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Environmental exposure controls
Keep away from drains, surface and ground water.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance
Physical state liquid (fluid)
Colour colourless - light yellow
Odour like: amine
Odour threshold No data available

Other physical and chemical parameters
pH (value) 8 – 9 (water: 100 g/l, 20 °C)
Melting point/freezing point <-75 °C
Initial boiling point and boiling range 212,5 °C at 1.013 hPa
Flash point 91 °C at 1.013 hPa
Evaporation rate no data available
Flammability (solid, gas) not relevant (fluid)

Explosive limits
• lower explosion limit (LEL) 1,3 vol%
• upper explosion limit (UEL) 7,7 vol%
Explosion limits of dust clouds not relevant
Vapour pressure 0,18 hPa at 20 °C
Density 0,998 g/cm³ at 20 °C
Vapour density 3,9 (air = 1)
Bulk density Not applicable
Relative density Information on this property is not available.

Solubility(ies)
Water solubility >1.000 g/l at 23 °C
Partition coefficient
n-octanol/water (log KOW) -0,2 (23 °C) (ECHA)
Soil organic carbon/water (log KOC) 1,15 (ECHA)
Auto-ignition temperature 245 °C at 1.013 hPa - ECHA
Decomposition temperature no data available
N-Ethyl-2-pyrrolidone  \( \geq 98\% \), for synthesis
article number: CN19

Viscosity
- \( \text{kinematic viscosity} \quad 2,094 \text{ mm}^2/\text{s} \) at 20 °C
- \( \text{dynamic viscosity} \quad 2,09 \text{ mPa s} \) at 20 °C

Explosive properties
Shall not be classified as explosive

Oxidising properties
none

9.2 Other information
- \( \text{Surface tension} \quad 69 \text{ mN/m} \) (20 °C)
- \( \text{Temperature class (EU, acc. to ATEX)} \quad \text{T3 (Maximum permissible surface temperature on the equipment: 200°C)} \)

SECTION 10: Stability and reactivity

10.1 Reactivity
In case of warming: Vapours can form explosive mixtures with air.

10.2 Chemical stability
The material is stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

10.3 Possibility of hazardous reactions
Violent reaction with: Strong oxidiser, Strong acid, Bases, Acid chlorides, inorganic

10.4 Conditions to avoid
Keep away from heat.

10.5 Incompatible materials
There is no additional information.

10.6 Hazardous decomposition products
Hazardous combustion products: see section 5.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Shall not be classified as acutely toxic.

<table>
<thead>
<tr>
<th>Exposure route</th>
<th>Endpoint</th>
<th>Value</th>
<th>Species</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>oral</td>
<td>LD50</td>
<td>3,200 mg/kg</td>
<td>rat</td>
<td>ECHA</td>
</tr>
<tr>
<td>dermal</td>
<td>LD50</td>
<td>&gt;2,000 mg/kg</td>
<td>rat</td>
<td>ECHA</td>
</tr>
</tbody>
</table>

Skin corrosion/irritation
Shall not be classified as corrosive/irritant to skin.

Serious eye damage/eye irritation
Causes serious eye damage.

Respiratory or skin sensitisation
Shall not be classified as a respiratory or skin sensitizer.
Summary of evaluation of the CMR properties

Reproductive toxicity:
May damage the unborn child (if exposed)
Suspected of damaging fertility (if exposed)

• Specific target organ toxicity - single exposure
  Shall not be classified as a specific target organ toxicant (single exposure).

• Specific target organ toxicity - repeated exposure
  Shall not be classified as a specific target organ toxicant (repeated exposure).

Aspiration hazard
Shall not be classified as presenting an aspiration hazard.

Symptoms related to the physical, chemical and toxicological characteristics

• If swallowed
  Vomiting, gastrointestinal complaints

• If in eyes
  Causes serious eye damage, risk of blindness

• If inhaled
  Vertigo, dizziness

• If on skin
  Frequently or prolonged contact with skin may cause dermal irritation

Other information
Gastrointestinal complaints, Vomiting, Diarrhoea, Dizziness, Vertigo, Nausea

SECTION 12: Ecological information

12.1 Toxicity
acc. to 1272/2008/EC: Shall not be classified as hazardous to the aquatic environment.

Aquatic toxicity (acute)

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Value</th>
<th>Species</th>
<th>Source</th>
<th>Exposure time</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50</td>
<td>999 mg/l</td>
<td>fish</td>
<td>ECHA</td>
<td>96 h</td>
</tr>
<tr>
<td>EC50</td>
<td>&gt;104 mg/l</td>
<td>aquatic invertebrates</td>
<td>ECHA</td>
<td>48 h</td>
</tr>
<tr>
<td>ErC50</td>
<td>&gt;101 mg/l</td>
<td>algae</td>
<td>ECHA</td>
<td>72 h</td>
</tr>
</tbody>
</table>

Aquatic toxicity (chronic)

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Value</th>
<th>Species</th>
<th>Source</th>
<th>Exposure time</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOEC</td>
<td>12,5 mg/l</td>
<td>aquatic invertebrates</td>
<td>ECHA</td>
<td>21 d</td>
</tr>
<tr>
<td>growth (EbCx) 20%</td>
<td>&gt;1,000 mg/l</td>
<td>microorganisms</td>
<td>ECHA</td>
<td>30 min</td>
</tr>
</tbody>
</table>
12.2 Process of degradability

The substance is readily biodegradable.
Theoretical Oxygen Demand with nitrification: 2,616 mg/mg
Theoretical Oxygen Demand: 2,121 mg/mg
Theoretical Carbon Dioxide: 2,333 mg/mg

<table>
<thead>
<tr>
<th>Process</th>
<th>Degradation rate</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOC removal</td>
<td>90 – 100 %</td>
<td>28 d</td>
</tr>
</tbody>
</table>

12.3 Bioaccumulative potential

Does not significantly accumulate in organisms.
n-octanol/water (log KOW) -0.2 (23 °C)

12.4 Mobility in soil

Henry's law constant 0.002 Pa m³/mol
The Organic Carbon normalised adsorption coefficient 1,15

12.5 Results of PBT and vPvB assessment

Data are not available.

12.6 Other adverse effects

Data are not available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

This material and its container must be disposed of as hazardous waste. Dispose of contents/container in accordance with local/regional/national/international regulations.

**Sewage disposal-relevant information**

Do not empty into drains.

13.2 Relevant provisions relating to waste

The allocation of waste identity numbers/waste descriptions must be carried out according to the EEC, specific to the industry and process.

13.3 Remarks

Waste shall be separated into the categories that can be handled separately by the local or national waste management facilities. Please consider the relevant national or regional provisions.
SECTION 14: Transport information

14.1 UN number  
(not subject to transport regulations)

14.2 UN proper shipping name  
not relevant

14.3 Transport hazard class(es)  
not relevant

14.4 Packing group  
not relevant not assigned to a packing group

14.5 Environmental hazards  
none (non-environmentally hazardous acc. to the dangerous goods regulations)

14.6 Special precautions for user  
There is no additional information.

14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code  
The cargo is not intended to be carried in bulk.

14.8 Information for each of the UN Model Regulations

• Transport of dangerous goods by road, rail and inland waterway (ADR/RID/ADN)  
Not subject to ADR, RID and ADN.

• International Maritime Dangerous Goods Code (IMDG)  
Not subject to IMDG.

• International Civil Aviation Organization (ICAO-IATA/DGR)  
Not subject to ICAO-IATA.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture  
Relevant provisions of the European Union (EU)

• Regulation 649/2012/EU concerning the export and import of hazardous chemicals (PIC)  
Not listed.

• Regulation 1005/2009/EC on substances that deplete the ozone layer (ODS)  
Not listed.

• Regulation 850/2004/EC on persistent organic pollutants (POP)  
Not listed.

• Restrictions according to REACH, Annex XVII

<table>
<thead>
<tr>
<th>Name of substance</th>
<th>CAS No</th>
<th>Wt%</th>
<th>Type of registration</th>
<th>Conditions of restriction</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Ethyl-2-pyrrolidone</td>
<td></td>
<td>100</td>
<td>1907/2006/EC annex XVII</td>
<td>R3</td>
<td>3</td>
</tr>
<tr>
<td>N-Ethyl-2-pyrrolidone</td>
<td></td>
<td>100</td>
<td>1907/2006/EC annex XVII</td>
<td>R28-30</td>
<td>30</td>
</tr>
</tbody>
</table>

Legend
R28-30 1. Shall not be placed on the market, or used,  
- as substances,  
- as constituents of other substances, or,  
- in mixtures,  
for supply to the general public when the individual concentration in the substance or mixture is equal to or greater than.
**Legend**

- either the relevant specific concentration limit specified in Part 3 of Annex VI to Regulation (EC) No 1272/2008, or,

Without prejudice to the implementation of other Community provisions relating to the classification, packaging and labelling of substances and mixtures, suppliers shall ensure before the placing on the market that the packaging of such substances and mixtures is marked visibly, legibly and indelibly as follows:

‘Restricted to professional users’.

2. By way of derogation, paragraph 1 shall not apply to:
   
   (a) medicinal or veterinary products as defined by Directive 2001/82/EC and Directive 2001/83/EC;
   
   (b) cosmetic products as defined by Directive 76/768/EEC;
   
   (c) the following fuels and oil products:
      - motor fuels which are covered by Directive 98/70/EC,
      - mineral oil products intended for use as fuel in mobile or fixed combustion plants,
      - fuels sold in closed systems (e.g. liquid gas bottles);
   
   (d) artists’ paints covered by Directive 1999/45/EC;
   
   (e) the substances listed in Appendix 11, column 1, for the applications or uses listed in Appendix 11, column 2. Where a date is specified in column 2 of Appendix 11, the derogation shall apply until the said date.

R3

1. Shall not be used in:
   
   - ornamental articles intended to produce light or colour effects by means of different phases, for example in ornamental lamps and ashrays,
   - tricks and jokes,
   - games for one or more participants, or any article intended to be used as such, even with ornamental aspects,
   
2. Articles not complying with paragraph 1 shall not be placed on the market.

3. Shall not be placed on the market if they contain a colouring agent, unless required for fiscal reasons, or perfume, or both, if they:
   
   - can be used as fuel in decorative oil lamps for supply to the general public, and,
   
4. Decorative oil lamps for supply to the general public shall not be placed on the market unless they conform to the European Standard on Decorative oil lamps (EN 14059) adopted by the European Committee for Standardisation (CEN).

5. Without prejudice to the implementation of other Community provisions relating to the classification, packaging and labelling of dangerous substances and mixtures, suppliers shall ensure, before the placing on the market, that the following requirements are met:
   
   (a) lamp oils, labelled with R65 or H304, intended for supply to the general public are visibly, legibly and indelibly marked as follows: ‘Keep lamps filled with this liquid out of the reach of children’; and, by 1 December 2010, ‘Just a sip of lamp oil - or even sucking the wick of lamps - may lead to life-threatening lung damage’;
   
   (b) grill lighter fluids, labelled with R65 or H304, intended for supply to the general public are visibly, legibly and indelibly marked by 1 December 2010 as follows: ‘Just a sip of grill lighter may lead to life threatening lung damage’;
   
   (c) lamp oils and grill lighters, labelled with R65 or H304, intended for supply to the general public are packaged in black opaque containers not exceeding 1 litre by 1 December 2010.

6. No later than 1 June 2014, the Commission shall request the European Chemicals Agency to prepare a dossier, in accordance with Article 69 of the present Regulation with a view to ban, if appropriate, grill lighter fluids and fuel for decorative lamps, labelled R65 or H304, intended for supply to the general public.

7. Natural or legal persons placing on the market for the first time lamp oils and grill lighter fluids, labelled with R65 or H304, shall by 1 December 2011, and annually thereafter, provide data on alternatives to lamp oils and grill lighter fluids labelled R65 or H304 to the competent authority in the Member State concerned. Member States shall make those data available to the Commission.

• Restrictions according to REACH, Title VIII

None.

• List of substances subject to authorisation (REACH, Annex XIV)/SVHC - candidate list not listed

• Seveso Directive

<table>
<thead>
<tr>
<th>2012/18/EU (Seveso III)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
</tr>
<tr>
<td>----</td>
</tr>
<tr>
<td>not assigned</td>
</tr>
</tbody>
</table>

• Directive 75/324/EEC relating to aerosol dispensers

Filling batch


<table>
<thead>
<tr>
<th>VOC content</th>
<th>100 % 998 9/1</th>
</tr>
</thead>
</table>
Safety data sheet
according to Regulation (EC) No. 1907/2006 (REACH), amended by 2015/830/EU

N-Ethyl-2-pyrrolidone ≥98 %, for synthesis

article number: CN19

**Directive on industrial emissions (VOCs, 2010/75/EU)**

<table>
<thead>
<tr>
<th>VOC content</th>
<th>100 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOC content</td>
<td>998 g/l</td>
</tr>
</tbody>
</table>

**Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) - Annex II**

not listed

**Regulation 166/2006/EC concerning the establishment of a European Pollutant Release and Transfer Register (PRTR)**

not listed

**Directive 2000/60/EC establishing a framework for Community action in the field of water policy (WFD)**

not listed

**Regulation 98/2013/EU on the marketing and use of explosives precursors**

not listed

**Regulation 111/2005/EC laying down rules for the monitoring of trade between the Community and third countries in drug precursors**

not listed

**National inventories**

Substance is listed in the following national inventories:

<table>
<thead>
<tr>
<th>Country</th>
<th>National inventories</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>DSL</td>
<td>substance is listed</td>
</tr>
<tr>
<td>CN</td>
<td>IECSC</td>
<td>substance is listed</td>
</tr>
<tr>
<td>EU</td>
<td>ECSI</td>
<td>substance is listed</td>
</tr>
<tr>
<td>EU</td>
<td>REACH Reg.</td>
<td>substance is listed</td>
</tr>
<tr>
<td>JP</td>
<td>CSCL-ENCS</td>
<td>substance is listed</td>
</tr>
<tr>
<td>KR</td>
<td>KECI</td>
<td>substance is listed</td>
</tr>
<tr>
<td>MX</td>
<td>INSQ</td>
<td>substance is listed</td>
</tr>
<tr>
<td>NZ</td>
<td>NZIoC</td>
<td>substance is listed</td>
</tr>
<tr>
<td>PH</td>
<td>PICCS</td>
<td>substance is listed</td>
</tr>
<tr>
<td>TR</td>
<td>CICR</td>
<td>substance is listed</td>
</tr>
<tr>
<td>TW</td>
<td>TCSI</td>
<td>substance is listed</td>
</tr>
<tr>
<td>US</td>
<td>TSCA</td>
<td>substance is listed</td>
</tr>
</tbody>
</table>

**Legend**

CICR: Chemical Inventory and Control Regulation
CSCL-ENCS: List of Existing and New Chemical Substances (CSCL-ENCS)
DSL: Domestic Substances List (DSL)
ECSI: EC Substance Inventory (EINECS, ELINCS, NLP)
IECSC: Inventory of Existing Chemical Substances Produced or Imported in China
INSQ: National Inventory of Chemical Substances
KECI: Korea Existing Chemicals Inventory
NZIoC: New Zealand Inventory of Chemicals
PICCS: Philippine Inventory of Chemicals and Chemical Substances
REACH Reg.: REACH registered substances
TCSI: Taiwan Chemical Substance Inventory
TSCA: Toxic Substance Control Act
15.2 Chemical Safety Assessment
For this substance a chemical safety assessment has been carried out.

SECTION 16: Other information

16.1 Indication of changes (revised safety data sheet)

<table>
<thead>
<tr>
<th>Section</th>
<th>Former entry (text/value)</th>
<th>Actual entry (text/value)</th>
<th>Safety-relevant</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Remarks: For full text of Hazard- and EU Hazard-statements: see SECTION 16.</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>2.2</td>
<td></td>
<td>Pictograms: change in the listing (table)</td>
<td>yes</td>
</tr>
<tr>
<td>2.2</td>
<td></td>
<td>Hazard statements: change in the listing (table)</td>
<td>yes</td>
</tr>
<tr>
<td>2.2</td>
<td></td>
<td>Precautionary statements - prevention: change in the listing (table)</td>
<td>yes</td>
</tr>
<tr>
<td>2.2</td>
<td></td>
<td>Precautionary statements - response: change in the listing (table)</td>
<td>yes</td>
</tr>
<tr>
<td>2.2</td>
<td></td>
<td>Labelling of packages where the contents do not exceed 125 ml: change in the listing (table)</td>
<td>yes</td>
</tr>
<tr>
<td>8.1</td>
<td>Occupational exposure limit values (Workplace Exposure Limits): not relevant</td>
<td>Occupational exposure limit values (Workplace Exposure Limits): Data are not available.</td>
<td>yes</td>
</tr>
<tr>
<td>8.1</td>
<td></td>
<td>• human health values: change in the listing (table)</td>
<td>yes</td>
</tr>
<tr>
<td>8.1</td>
<td></td>
<td>• environmental values: change in the listing (table)</td>
<td>yes</td>
</tr>
<tr>
<td>14.4</td>
<td>Packing group: not relevant</td>
<td>Packing group: not relevant not assigned to a packing group</td>
<td>yes</td>
</tr>
<tr>
<td>14.8</td>
<td></td>
<td>• International Civil Aviation Organization (ICAO-IATA/DGR): Not subject to ICAO-IATA.</td>
<td>yes</td>
</tr>
</tbody>
</table>

Abbreviations and acronyms

<table>
<thead>
<tr>
<th>Abbr.</th>
<th>Descriptions of used abbreviations</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADN</td>
<td>Accord européen relatif au transport international des marchandises dangereuses par voies de navigation intérieures (European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways)</td>
</tr>
<tr>
<td>ADR</td>
<td>Accord européen relatif au transport international des marchandises dangereuses par route (European Agreement concerning the International Carriage of Dangerous Goods by Road)</td>
</tr>
<tr>
<td>CAS</td>
<td>Chemical Abstracts Service (service that maintains the most comprehensive list of chemical substances)</td>
</tr>
<tr>
<td>CLP</td>
<td>Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures</td>
</tr>
<tr>
<td>CMR</td>
<td>Carcinogenic, Mutagenic or toxic for Reproduction</td>
</tr>
<tr>
<td>DGR</td>
<td>Dangerous Goods Regulations (see IATA/DGR)</td>
</tr>
</tbody>
</table>
### Abbr. | Descriptions of used abbreviations
--- | ---
DMEL | Derived Minimal Effect Level
DNEL | Derived No-Effect Level
EC50 | Effective Concentration 50 %. The EC50 corresponds to the concentration of a tested substance causing 50 % changes in response (e.g. on growth) during a specified time interval
EINECS | European Inventory of Existing Commercial Chemical Substances
ELINCS | European List of Notified Chemical Substances
ErC50 | ≡ EC50: in this method, that concentration of test substance which results in a 50 % reduction in either growth (EbC50) or growth rate (ErC50) relative to the control
GHS | “Globally Harmonized System of Classification and Labelling of Chemicals” developed by the United Nations
IATA | International Air Transport Association
IATA/DGR | Dangerous Goods Regulations (DGR) for the air transport (IATA)
ICAO | International Civil Aviation Organization
IMDG | International Maritime Dangerous Goods Code
Index No | the Index number is the identification code given to the substance in Part 3 of Annex VI to Regulation (EC) No 1272/2008
LC50 | Lethal Concentration 50%; the LC50 corresponds to the concentration of a tested substance causing 50 % lethality during a specified time interval
LD50 | Lethal Dose 50 %: the LD50 corresponds to the dose of a tested substance causing 50 % lethality during a specified time interval
MARPOL | International Convention for the Prevention of Pollution from Ships (abbr. of "Marine Pollutant")
NLP | No-Longer Polymer
NOEC | No Observed Effect Concentration
PBT | Persistent, Bioaccumulative and Toxic
PNEC | Predicted No-Effect Concentration
REACH | Registration, Evaluation, Authorisation and Restriction of Chemicals
RID | Règlement concernant le transport International ferroviaire des marchandises Dangereuses (Regulations concerning the International carriage of Dangerous goods by Rail)
SVHC | Substance of Very High Concern
VOC | Volatile Organic Compounds
vPvB | very Persistent and very Bioaccumulative

### Key literature references and sources for data
- Regulation (EC) No. 1272/2008 (CLP, EU GHS)
- Dangerous Goods Regulations (DGR) for the air transport (IATA)
- International Maritime Dangerous Goods Code (IMDG)

### List of relevant phrases (code and full text as stated in chapter 2 and 3)

<table>
<thead>
<tr>
<th>Code</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>H318</td>
<td>causes serious eye damage</td>
</tr>
<tr>
<td>H360Df</td>
<td>may damage the unborn child. Suspected of damaging fertility (if exposed)</td>
</tr>
</tbody>
</table>
Disclaimer

The above information describes exclusively the safety requirements of the product and is based on our present-day knowledge. The information is intended to give you advice about the safe handling of the product named in this safety data sheet, for storage, processing, transport and disposal. The information cannot be transferred to other products. In the case of mixing the product with other products or in the case of processing, the information on this safety data sheet is not necessarily valid for the new made-up material.