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

1.1 Product identifier

Identification of the substance: N-Methyl-2-pyrrolidone

- Article number: 4306
- Registration number (REACH): 01-2119472430-46-xxxx
- Index No: 606-021-00-7
- EC number: 212-828-1
- CAS number: 872-50-4

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

Emergency information service: Poison Centre Munich: +49/(0)89 19240

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

<table>
<thead>
<tr>
<th>Classification acc. to GHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>3.2</td>
</tr>
<tr>
<td>3.3</td>
</tr>
<tr>
<td>3.7</td>
</tr>
<tr>
<td>3.8R</td>
</tr>
</tbody>
</table>
2.2 Label elements

Labelling GHS

**Signal word**  Danger

**Pictograms**

GHS07, GHS08

**Hazard statements**

H315  Causes skin irritation
H319  Causes serious eye irritation
H335  May cause respiratory irritation
H360D May damage the unborn child

**Precautionary statements**

Precautionary statements - prevention
P201  Obtain special instructions before use.
P261  Avoid breathing dust/fume/gas/mist/vapours/spray.
P280  Wear protective gloves/protective clothing/eye protection/face protection.

Precautionary statements - response
P302+P352  IF ON SKIN: Wash with plenty of soap and 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.
P312  Call a POISON CENTER/doctor if you feel unwell.

Precautionary statements - storage
P403+P233  Store in a well-ventilated place. Keep container tightly closed.

Precautionary statements - disposal
P501  Dispose of contents/container to industrial combustion plant.

For professional users only

Labelling of packages where the contents do not exceed 125 ml

Signal word: Danger

**Symbol(s)**

H360D  May damage the unborn child.
P201  Obtain special instructions before use.
P280  Wear protective gloves/protective clothing/eye protection/face protection.
P501  Dispose of contents/container to industrial combustion plant.

2.3 Other hazards

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

3.1 Substances

Name of substance  N-Methyl-2-pyrrolidone
Index No  606-021-00-7
Registration number (REACH)  01-2119472430-46-xxxx
EC number  212-828-1
CAS number  872-50-4
Molecular formula  \(C_5H_9NO\)
Molar mass  99.13 g/mol

<table>
<thead>
<tr>
<th>Substance of Very High Concern (SVHC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of substance</td>
</tr>
<tr>
<td>N-Methyl-2-pyrrolidone</td>
</tr>
</tbody>
</table>

Legend

Candidate list  Substances meeting the criteria referred to in Article 57 and for eventual inclusion in Annex XIV
Repr. A57c  Toxic for reproduction (article 57c)

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. In case of skin irritation, consult a physician.

Following eye contact
Irrigate copiously with clean, fresh water for at least 10 minutes, holding the eyelids apart. In case of eye irritation consult an ophthalmologist.

Following ingestion
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
Cough, Diarrhoea, Irritation, Vomiting, Dyspnoea

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

Advices on how to contain a spill
Covering of drains.

Advices 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
Provision of sufficient ventilation. Avoid: Aerosol or mist formation.

- 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>208 mg/kg</td>
<td>human, dermal</td>
<td>worker (industry)</td>
<td>acute - systemic effects</td>
</tr>
<tr>
<td>DNEL</td>
<td>80 mg/m³</td>
<td>human, inhalatory</td>
<td>worker (industry)</td>
<td>acute - systemic effects</td>
</tr>
<tr>
<td>DNEL</td>
<td>14,4 mg/m³</td>
<td>human, inhalatory</td>
<td>worker (industry)</td>
<td>chronic - systemic effects</td>
</tr>
<tr>
<td>DNEL</td>
<td>40 mg/m³</td>
<td>human, inhalatory</td>
<td>worker (industry)</td>
<td>chronic - local effects</td>
</tr>
<tr>
<td>DNEL</td>
<td>4,8 mg/kg bw/day</td>
<td>human, dermal</td>
<td>worker (industry)</td>
<td>chronic - systemic effects</td>
</tr>
</tbody>
</table>
8.2 Exposure controls

Individual protection measures (personal protective equipment)

Eye/face protection

Use safety goggles 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.

• type of material

Butyl caoutchouc (butyl rubber)

• material thickness

0.7mm.

• 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

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
Odour: like: amine
Odour threshold: No data available

Other physical and chemical parameters
pH (value): 8.5 – 10 (water: 100 g/l, 20 °C)
Melting point/freezing point: -24.2 °C at 1.013 hPa
Initial boiling point and boiling range: 204.3 °C at 1.016 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): 9.5 vol%
Explosion limits of dust clouds: not relevant
Vapour pressure: 0.32 hPa at 20 °C
Density: 1.03 g/cm³ at 25 °C
Vapour density: 3.42 (air = 1)
Bulk density: Not applicable
Relative density: Information on this property is not available.

Solubility(ies)
Water solubility: 1.000 g/l at 20 °C miscible in any proportion

Partition coefficient
n-octanol/water (log KOW): -0.46 (25 °C) (ECHA)
Soil organic carbon/water (log KOC): 0.87 (ECHA)
Auto-ignition temperature: 245 °C at 1.013 hPa - ECHA
Decomposition temperature: no data available

Viscosity
• kinematic viscosity: 1.613 mm²/s
• dynamic viscosity: 1.661 mPa s at 25 °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 alkali, Strong acid

10.4 **Conditions to avoid**

Direct light irradiation. Keep away from heat.

10.5 **Incompatible materials**

different plastics

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>4.150 mg/kg</td>
<td>rat</td>
<td>ECHA</td>
</tr>
<tr>
<td>inhalation: dust/mist</td>
<td>LC50</td>
<td>&gt;5,1 mg/l/4h</td>
<td>rat</td>
<td>ECHA</td>
</tr>
<tr>
<td>dermal</td>
<td>LD50</td>
<td>&gt;5,000 mg/kg</td>
<td>rat</td>
<td>ECHA</td>
</tr>
</tbody>
</table>

**Skin corrosion/irritation**

Causes skin irritation.

**Serious eye damage/eye irritation**

Causes serious eye irritation.

**Respiratory or skin sensitisation**

Shall not be classified as a respiratory or skin sensitiser.

**Summary of evaluation of the CMR properties**

**Reproductive toxicity:**

May damage the unborn child

• **Specific target organ toxicity - single exposure**

May cause respiratory irritation.
N-Methyl-2-pyrrolidone ≥99.8%, for synthesis

article number: 4306

- **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**
  Diarrhoea, vomiting, nausea

- **If in eyes**
  Irritating to eyes

- **If inhaled**
  Cough, breathing difficulties, Irritation to respiratory tract

- **If on skin**
  Causes skin irritation

**Other information**

None

### 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>&gt;500 mg/l</td>
<td>rainbow trout</td>
<td>ECHA</td>
<td>96 h</td>
</tr>
<tr>
<td>ErC50</td>
<td>600,5 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>EC50</td>
<td>&gt;1.000 mg/l</td>
<td>daphnia magna</td>
<td>ECHA</td>
<td>24 h</td>
</tr>
<tr>
<td>NOEC</td>
<td>12,5 mg/l</td>
<td>daphnia magna</td>
<td>ECHA</td>
<td>21 d</td>
</tr>
</tbody>
</table>

#### 12.2 Process of degradability

The substance is readily biodegradable.

Theoretical Oxygen Demand with nitrification: 2,502 mg/mg
Theoretical Oxygen Demand: 1,937 mg/mg
Theoretical Carbon Dioxide: 2,22 mg/mg

<table>
<thead>
<tr>
<th>Process</th>
<th>Degradation rate</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>biotic/abiotic</td>
<td>&gt;90 %</td>
<td>20 d</td>
</tr>
<tr>
<td>oxygen depletion</td>
<td>73 %</td>
<td>28 d</td>
</tr>
</tbody>
</table>
N-Methyl-2-pyrrolidone ≥99.8 %, for synthesis

**12.3 Bioaccumulative potential**
Does not significantly accumulate in organisms.

n-octanol/water (log KOW) -0.46 (25 °C)

**12.4 Mobility in soil**
Henry's law constant 0 Pa m³/mol at 20 °C

The Organic Carbon normalised adsorption coefficient 0.87

**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.

**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

**Class**
-

**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

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>AU</td>
<td>AICS</td>
<td>substance is listed</td>
</tr>
<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>JP</td>
<td>ISHA-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
- AICS: Australian Inventory of Chemical Substances
- 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)
- IECS: Inventory of Existing Chemical Substances Produced or Imported in China
- INSQ: National Inventory of Chemical Substances
- ISHA-ENCS: Inventory of Existing and New Chemical Substances (ISHA-ENCS)
- 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
Chemical Safety Assessment

No Chemical Safety Assessment has been carried out for this substance.

SECTION 16: Other information

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>CMR</td>
<td>Carcinogenic, Mutagenic or toxic for Reproduction</td>
</tr>
<tr>
<td>DGR</td>
<td>Dangerous Goods Regulations (see IATA/DGR)</td>
</tr>
<tr>
<td>DMEL</td>
<td>Derived Minimal Effect Level</td>
</tr>
<tr>
<td>DNEL</td>
<td>Derived No-Effect Level</td>
</tr>
<tr>
<td>EINECS</td>
<td>European Inventory of Existing Commercial Chemical Substances</td>
</tr>
<tr>
<td>ELINCS</td>
<td>European List of Notified Chemical Substances</td>
</tr>
<tr>
<td>GHS</td>
<td>&quot;Globally Harmonized System of Classification and Labelling of Chemicals&quot; developed by the United Nations</td>
</tr>
<tr>
<td>IATA</td>
<td>International Air Transport Association</td>
</tr>
<tr>
<td>IATA/DGR</td>
<td>Dangerous Goods Regulations (DGR) for the air transport (IATA)</td>
</tr>
<tr>
<td>ICAO</td>
<td>International Civil Aviation Organization</td>
</tr>
<tr>
<td>IMDG</td>
<td>International Maritime Dangerous Goods Code</td>
</tr>
<tr>
<td>index No</td>
<td>the Index number is the identification code given to the substance in Part 3 of Annex VI to Regulation (EC) No 1272/2008</td>
</tr>
<tr>
<td>MARPOL</td>
<td>International Convention for the Prevention of Pollution from Ships (abbr. of &quot;Marine Pollutant&quot;)</td>
</tr>
<tr>
<td>NLP</td>
<td>No-Longer Polymer</td>
</tr>
<tr>
<td>PBT</td>
<td>Persistent, Bioaccumulative and Toxic</td>
</tr>
<tr>
<td>PNEC</td>
<td>Predicted No-Effect Concentration</td>
</tr>
<tr>
<td>REACH</td>
<td>Registration, Evaluation, Authorisation and Restriction of Chemicals</td>
</tr>
<tr>
<td>Repr.</td>
<td>reproductive toxicity</td>
</tr>
<tr>
<td>RID</td>
<td>Règlement concernant le transport International ferroviaire des marchandises Dangereuses (Regulations concerning the International carriage of Dangerous goods by Rail)</td>
</tr>
<tr>
<td>vPvB</td>
<td>very Persistent and very Bioaccumulative</td>
</tr>
</tbody>
</table>

Key literature references and sources for data
- UN Recommendations on the Transport of Dangerous Good
- 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>H315</td>
<td>causes skin irritation</td>
</tr>
<tr>
<td>H319</td>
<td>causes serious eye irritation</td>
</tr>
<tr>
<td>H335</td>
<td>may cause respiratory irritation</td>
</tr>
<tr>
<td>H360D</td>
<td>may damage the unborn child</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.