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

1.1 Product identifier

Trade name: 1-Methyl-2-pyrrolidinone

Stock number: 212-828-1

CAS Number: 872-50-4

EC number: 208-021-00-7

1.2 Relevant identified uses of the substance or mixture and uses advised against. No further relevant information available.

Identified use: SU24 Scientific research and development

1.3 Details of the supplier of the safety data sheet

Manufacturer/Supplier:
Thermo Fisher (Kandel) GmbH
Zepplinistr. 7b
76185 Karlsruhe / Germany
Tel: +49 (0) 721 840700
Fax: +49 (0) 721 8407 300
Email: tech@alfa.com
www.alfa.com

Informing department: Product safety Tel + +049 (0) 7275 988687-0

1.4 Emergency telephone number:
Carechem 24: +44 (o) 1235 239 670 (Multi-language emergency number)
Poison Information Center Mainz
www.giftinfo.uni-mainz.de  Telephone: +49(0)6131/19240

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

GHS08 health hazard

Repr. 1B H360D May damage the unborn child.

GHS07

Skin Irrit. 2 H315 Causes skin irritation.

Eye Irrit. 2 H319 Causes serious eye irritation.

STOT SE 3 H335 May cause respiratory irritation.

Other hazards that do not result in classification No information known.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 The substance is classified and labelled according to the CLP regulation.

Hazard pictograms

GHS07 GHS08

Signal word Danger

Hazard statements

H315 Causes skin irritation.

H319 Causes serious eye irritation.

H360D May damage the unborn child.

H335 May cause respiratory irritation.

Precautionary statements

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.

P335 If IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P405 Store locked up.

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

2.3 Other hazards

Results of PBT and vPvB assessment

PBT: Not applicable.

vPvB: Not applicable.

SECTION 3: Composition/information on ingredients

3.1 Substances

CAS# Designation:
872-50-4 1-Methyl-2-pyrrolidinone

Concentration: ≤100%

EC number: 212-828-1

Index number: 606-021-00-7

SECTION 4: First aid measures

4.1 Description of first aid measures

After inhalation
Supply fresh air. If required, provide artificial respiration. Keep patient warm. Consult doctor if symptoms persist. Seek immediate medical advice.

After skin contact
Instantly wash with water and soap and rinse thoroughly. Seek immediate medical advice.

After eye contact
Rinse opened eye for several minutes under running water. Then consult doctor.

After swallowing
Seek medical treatment.

4.2 Most important symptoms and effects, both acute and delayed

Causes skin irritation.

Causes serious eye irritation.

May damage fertility or the unborn child.

(Contd. on page 2)
4.3 Indication of any immediate medical attention and special treatment needed

No further relevant information available.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing agents: CO2, extinguishing powder or water jet. Fight larger fires with water jet or alcohol-resistant foam.

5.2 Special hazards arising from the substance or mixture

If this product is involved in a fire, the following can be released:
- Carbon monoxide and carbon dioxide
- Nitrogen oxides (NOx)

5.3 Advice for firefighters


SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Wear protective equipment. Keep unprotected persons away. Ensure adequate ventilation.

6.2 Environmental precautions: Do not allow material to be released to the environment without proper governmental permits.

6.3 Methods and material for containment and cleaning up:

Absorb with liquid-binding material (sand, diatomite, acid binders, sawdust). Dispose of contaminated material as waste according to section 13. Ensure adequate ventilation.

Prevention of secondary hazards: Keep away from ignition sources.

6.4 Reference to other sections

See section 7 for information on safe handling
See section 8 for information on personal protection equipment.
See Section 13 for information on disposal.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Handle under dry protective gas. Keep containers tightly sealed. Store in cool, dry place in tightly closed containers. Ensure good ventilation/exhaustion at the workplace. Open and handle container with care.

Information about protection against explosions and fires: Keep ignition sources away - Do not smoke.

7.2 Conditions for safe storage, including any incompatibilities

Storage
Requirements to be met by storerooms and containers:
No special requirements.

Information about storage in one common storage facility:
Store in the dark.
Store away from water.
Do not store together with acids.
Store away from oxidising agents.
Store away from reducing agents.

Further information about storage conditions:
Store under dry inert gas. This product is hygroscopic. Keep container tightly sealed.
Store in cool, dry conditions in well sealed containers. Protect from humidity and keep away from water. Protect from the effects of light.
Store in a locked cabinet or with access restricted to technical experts or their assistants.

7.3 Specific end use(s)

No further relevant information available.

SECTION 8: Exposure controls/personal protection

Additional information about design of technical systems: Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

8.1 Control parameters

Components with critical values that require monitoring at the workplace:

<table>
<thead>
<tr>
<th>872-50-4 1-Methyl-2-pyrrolidinone (100.0%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGW (Germany)</td>
</tr>
<tr>
<td>Long-term value: 62 mg/m³; 20 ppm</td>
</tr>
<tr>
<td>2(I);EU, DFG, AGS, H, Y, 11, 19</td>
</tr>
<tr>
<td>WEEL (USA)</td>
</tr>
<tr>
<td>Long-term value: 10 ppm</td>
</tr>
</tbody>
</table>

Ingredients with biological limit values:

<table>
<thead>
<tr>
<th>872-50-4 1-Methyl-2-pyrrolidinone (100.0%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGW (Germany)</td>
</tr>
<tr>
<td>150 mg/L Untersuchungsmaterial: Urin</td>
</tr>
<tr>
<td>Probannehmezeitpunkt: Expositionssende bzw. Schichtende</td>
</tr>
<tr>
<td>Parameter: S-Hydroxy-N-methyl-2-pyrrolidon</td>
</tr>
<tr>
<td>BEI (USA)</td>
</tr>
<tr>
<td>100 mg/L Medium: urine</td>
</tr>
<tr>
<td>Time: end of shift</td>
</tr>
<tr>
<td>Parameter: S-Hydroxy-N-methyl-2-pyrrolidon</td>
</tr>
</tbody>
</table>

Additional information: No data

8.2 Exposure controls

Personal protective equipment

General protective and hygienic measures
The usual precautionary measures should be adhered to in handling the chemicals. Keep away from foodstuffs, beverages and food. Instantly remove any soiled and impregnated garments. Wash hands during breaks and at the end of the work. Store protective clothing separately. Avoid contact with the eyes and skin. Maintain an ergonomically appropriate working environment. Breathing equipment: Use breathing protection with high concentrations. Recommended filter device for short term use: Use a respirator with multi-purpose combination (US) or type ABEK (EN 14387) as a backup to engineering controls. Risk assessment should be performed to determine if air-purifying respirators are appropriate. Only use equipment tested and approved under appropriate government standards such as NIOSH (USA) or CEN (EU).
Protection of hands:
Check protective gloves prior to each use for their proper condition.
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.

Glove thickness: 0.3 mm

Eye protection:
Face protection
Safety glasses with side shields / NIOSH (US) or EN 166(EU)

Body protection: Protective work clothing.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

General Information
Appearance:
Form: Liquid
Odour: Amine-like
Odour threshold: Not determined.

pH-value: Not determined.

Change in condition
Melting point/freezing point: -24 °C
Initial boiling point and boiling range: 204 °C
Sublimation temperature / start: Not determined

Flash point: 86 °C
Inflammability (solid, gaseous): Not applicable.
Ignition temperature: 270 °C
Decomposition temperature: Not determined
Self-inflammability: Not determined.

Explosive properties: Product is not explosive.

Critical values for explosion:
Lower: 1.3 Vol %
Upper: 9.5 Vol %
Steam pressure at 20 °C: 0.29 hPa
Density at 20 °C: 1,033 g/cm³
Relative density: Not determined.
Vapour density: Not determined.
Evaporation rate: Not determined.
Solubility in / Miscibility with Water: Fully miscible
Partition coefficient: n-octanol/water: Not determined.
Viscosity: dynamic at 25 °C: 1.65 mPas
Kinematic: Not determined.

9.2 Other information
No further relevant information available.

SECTION 10: Stability and reactivity

10.1 Reactivity
No information known.

10.2 Chemical stability
Stable under recommended storage conditions.
Thermal decomposition / conditions to be avoided: No decomposition if used and stored according to specifications.

10.3 Possibility of hazardous reactions
Reacts with strong oxidising agents

10.4 Conditions to avoid
No further relevant information available.

10.5 Incompatible materials:
Acids
Oxidising agents
Reducing agents
Water/moisture
Light

10.6 Hazardous decomposition products:
Carbon monoxide and carbon dioxide
Nitrogen oxides (NOx)

SECTION 11: Toxicological information

11.1 Information on toxicological effects
Acute toxicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains acute toxicity data for this substance.
LD/LC50 values that are relevant for classification:
Oral LD50: 3914 mg/kg (rat)
Dermal LD50: 8000 mg/kg (rabbit)

Skin irritation or corrosion:
Causes skin irritation.

Eye irritation or corrosion:
Causes serious eye irritation.

Respiratory or skin sensitisation Based on available data, the classification criteria are not met.

Germ cell mutagenicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains mutation data for this substance.
Carcinogenicity:
No classification data on carcinogenic properties of this material is available from the EPA, IARC, NTP, OSHA or ACGIH.

Reproductive toxicity:
May damage fertility of the unborn child.

Specific target organ system toxicity - repeated exposure: No effects known.
Specific target organ system toxicity - single exposure: May cause respiratory irritation.

Aspiration hazard: No effects known.

Additional toxicological information: To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.

(Contd. on page 4)
SECTION 12: Ecological information

12.1 Toxicity
Aquatic toxicity: No further relevant information available.

12.2 Persistence and degradability No further relevant information available.

12.3 Bioaccumulative potential No further relevant information available.

12.4 Mobility in soil No further relevant information available.

Additional ecological information:
General notes:
Do not allow material to be released to the environment without proper governmental permits. Do not allow undiluted product or large quantities to reach ground water, water course or sewage system. Avoid transfer into the environment.

12.5 Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

12.6 Other adverse effects No further relevant information available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Recommendation
Hand over to disposers of hazardous waste. Must be specially treated under adherence to official regulations. Consult state, local or national regulations for proper disposal.

Uncleaned packagings:
Recommendation: Disposal must be made according to official regulations.
Recommended cleaning agent: Water, if necessary with cleaning agent.

SECTION 14: Transport information

UN-Number
ADR, ADN, IMDG, IATA Not applicable

UN proper shipping name
ADR, ADN, IMDG, IATA Not applicable

Transport hazard class(es)
ADR, ADN, IMDG, IATA Not applicable

Packing group
ADR, ADN, IMDG, IATA Not applicable

14.2 UN proper shipping name
ADR, ADN, IMDG, IATA Not applicable

14.3 Transport hazard class(es)
ADR, ADN, IMDG, IATA Not applicable

14.4 UN Number
ADR, ADN, IMDG, IATA Not applicable

14.5 Environmental hazards:
ADR, ADN, IMDG, IATA Not applicable.

14.6 Special precautions for user
ADR, ADN, IMDG, IATA Not applicable.

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code Not applicable.

UN "Model Regulation": Not applicable

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
Australian Inventory of Chemical Substances Substance is listed.
Standard for the Uniform Scheduling of Medicines and Poisons Substance is not listed.

Directive 2012/18/EU
Named dangerous substances - ANNEX I Substance is not listed.
REGULATION (EC) No 1907/2006 ANNEX XVII Conditions of restriction: 3, 30
National regulations
Information about limitation of use:
Employment restrictions concerning young persons must be observed.
Employment restrictions concerning women of child-bearing age must be observed.
For use only by technically qualified individuals.

Classification according to VbF: A III

Technical instructions (air):

<table>
<thead>
<tr>
<th>Class</th>
<th>Share in %</th>
</tr>
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<tbody>
<tr>
<td>NK</td>
<td>100.0</td>
</tr>
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</table>

Water hazard class: Water hazard class 1 (Assessment by list): slightly hazardous for water.
Other regulations, limitations and prohibitive regulations
ELINCS (European List of Notified Chemical Substances) Substance is not listed.

Substance of Very High Concern (SVHC) according to the REACH Regulations (EC) No. 1907/2006.
This substance is included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH).
The conditions of restrictions according to Article 67 and Annex XVII of the Regulation (EC) No 1907/2006 (REACH) for the manufacturing, placing on the market and use must be observed.
Substance is not listed.

Annex XIV of the REACH Regulations (requiring Authorisation for use) Substance is not listed.

15.2 Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

Department issuing SDS: Global Marketing Department

Abbreviations and acronyms:
ICAO: International Civil Aviation Organisation
ADR: Accords européens sur le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)
IMDG: International Maritime Code for Dangerous Goods
IATA: International Air Transport Association
GHS: Globally Harmonised System of Classification and Labelling of Chemicals
UN: Standard for the Uniform Scheduling of Medicines and Poisons
Australian Inventory of Chemical Substances

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Disposal must be made according to official regulations.
Recommendation:
Uncleaned packagings:
Water, if necessary with cleaning agent.
Recommended cleaning agent: Water, if necessary with cleaning agent.

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Safety data sheet
according to 1907/2006/EC, Article 31

Trade name 1-Methyl-2-pyrrolidinone

REL: Recommended Exposure Limit
BEI: Biological Exposure Limit
Skin Irr. 2: Skin corrosion/irritation – Category 2
Eye Irr. 2: Serious eye damage/eye irritation – Category 2
Repr. 1B: Reproductive toxicity – Category 1B
STOT SE 3: Specific target organ toxicity (single exposure) – Category 3