

**PYRROLIDINE****1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING**

**Product name** : Pyrrolidine  
**Chemical name** : Pyrrolidine  
**Synonyms** : Tetrahydropyrrole. Tetramethyleneimine. Azacyclopentane.  
**Chemical formula** : C<sub>4</sub>H<sub>9</sub>N.  
**Substance/preparation** : Substance.  
**Use of the substance/preparation** : Intermediate used in the production of pharmaceuticals, pesticides, plasticizers, photographic chemicals, corrosion inhibitors, crop protection agents, rubber auxiliaries, emulsifiers, curing agent and as catalyst.  
**Supplier's name/address** : DSM Specialty Intermediates BV  
P.O. Box 5489  
6130 PL Sittard  
The Netherlands  
**Emergency telephone** : 31-(0)46-47655555.

**2. COMPOSITION/INFORMATION ON INGREDIENTS.**

Chemical name	CAS-no.	EG-no.	ANNEX-I no.	Symbol	R-phrase	%(w/w)
Pyrrolidine	123-75-1	204-648-7	-	F - C	11 - 35 - 20/221/22	Min.99.5

For the complete text of the R-phrases, see section 15.

Occupational Exposure Limit(s), if available, are listed in section 8.

**3. HAZARD IDENTIFICATION.**

**Physical/chemical hazards** : Highly flammable, corrosive liquid.  
Reacts violently with acids.  
The substance may form explosive mixtures with air.  
The vapour is heavier than air and may travel along the ground to a source of ignition and flash back.

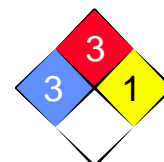
**Environmental hazards** : Slightly water endangering substance.  
See section 12 and 15.

**Health hazards** : Harmful by inhalation, in contact with skin and if swallowed,  
Cause severe burns!

**Symptom(s) of (over)exposure** : See section 4.

**NFPA-code (704)** :

Hazards		
3	3	1
Flammability	Health	Reactivity



**PYRROLIDINE****4. FIRST-AID MEASURES.****General**

- : Protection of first-aiders;  
Use appropriate protection (see section 8).  
Move exposed person to fresh air. Remove contaminated clothing and shoes.

**Inhalation**

- Effects** : Extremely destructive to tissue of the mucous membranes and upper respiratory tract.
- Symptoms** : Headache, dizziness, drowsiness, nausea and may lead to unconsciousness.  
Can cause lung irritation, chest pain and lung oedema.
- First-aid** : Remove victim to fresh air. Keep victim warm and at rest in half upright position. Notify a doctor.

**Skin contact**

- Effects** : Corrosive.
- Symptoms** : Redness, pain, severe burns and may cause permanent skin damage.
- First-aid** : Immediately remove contaminated clothing.  
Wash off with plenty of water. Consult a doctor.

**Eye contact**

- Effects** : Severely corrosive.
- Symptoms** : Vapors causes eye irritation.  
Splashes cause severe irritation, possible corneal burns, eye damage, total blindness.
- First-aid** : Immediately wash out with plenty of water, then accompany victim to a doctor.

**Ingestion**

- Effects** : Corrosive.
- Symptoms** : Swallowing can cause severe burns of the mouth, throat and stomach. Can cause sore throat, vomiting and diarrhea. May affect central nervous system.
- First-aid** : Wash out mouth with plenty of water. Make victim drink much water. Do not induce vomiting. Notify a doctor.

**5. FIRE-FIGHTING MEASURES.****Extinguishing media**

- Suitable** : Water spray, dry chemical, foam or carbon dioxide
- Not suitable** : Water as solid stream may be ineffective.

**Hazardous thermal decomposition and combustion products**

- : May produce toxic and/or corrosive products such as carbonmonoxide and nitrogen oxides (NO, NO<sub>2</sub>...)

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- Protection of firefighters** : Fire-fighters should wear proper protective equipment and self-contained breathing apparatus with full face-piece operated in a positive mode.
- Special risks** : See section 3.

**6. ACCIDENTAL RELEASE MEASURES.**

- Personal precautions** : Avoid any contact with the substance.  
Use appropriate protection.(see section 8).
- Environmental precautions** : Water endangering. See section 12 and 15.  
If the substance has contaminated surface water, inform the appropriate authorities.
- Methods for cleaning up** : Seal leak if possible without risk. Dike spilled material, carefully suck up and recycle if possible.  
Absorb remainder in sand or other inert material and collect this in sealable, labelled metal containers.  
Wash away remainder with plenty of water.  
See section 8 and 13.

**7. HANDLING AND STORAGE.**

- Handling** : Avoid any contact with the substance.  
Use appropriate personal protection (see section 8)  
Use explosion-proof electrical (ventilating, lighting and material handling) equipment.  
Take measures against static discharge.  
Filling and discharging under nitrogen (inert gases).
- Storage** : Keep away from sources of ignition – No smoking.  
Keep in a cool, dry, well ventilated place separated from oxidizing agents and acids.  
Store in closed containers. Store under nitrogen.
- Packaging materials** : Steel containers.
- Use of the substance/preparation** : See section 1.

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION.**

**Avoid exposure first of all by technical and/or organizational measures.**

**Occupational exposure limits**

- MAC value** : Not established.
- Other exposure limits** : Provisional occupational exposure limit:  
2 ppm or 6 mg/m<sup>3</sup> [TLV-TWA 8h] (DSM advice).  
4 ppm or 12 mg/m<sup>3</sup> [TLV-STEL 15 min. ] (DSM advice).
- Engineering measures** : Use in closed systems.  
Use explosion-proof electrical equipment.  
Spatial exhaust, local exhaust or respiratory protection.  
Make earth connections against static electricity.
- Hygienic measures** : When using do not eat, drink or smoke.  
Eye wash and safety shower facility.

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<b>Respiratory system</b>	: At roomtemperature the vapour pressure is 75 hPa. If exposed to concentrations above the provisional occupational exposure limit use self-contained breathing apparatus.
<b>Hand protection</b>	
<b>In full contact</b>	: Use Viton gloves, layer thickness 0.7 mm <b>Breakthrough time:</b> > 8 hours.
<b>In splash contact</b>	: Use butyl rubber gloves, layer thickness 0.7 mm <b>Breakthrough time:</b> > 2 hours.
<b>Eye protection</b>	: Eye protection combined with respiratory protection. Preferably fresh-air mask with cowl.
<b>Skin protection</b>	: Splash-suit and rubber boots.
<b>Environmental exposure controls</b>	: Avoid environmental release.
<b>Remarks</b>	: None.

**9. PHYSICAL AND CHEMICAL PROPERTIES.**

<b>Appearance</b>	: Liquid.
<b>Colour</b>	: Colourless.
<b>Odour</b>	: Amine-like.
<b>pH</b>	: 12.9 (100 g/l 20°C).
<b>Boiling point</b>	: 89°C
<b>Melting point</b>	: - 62°C
<b>Flash point</b>	: 3°C
<b>Lower explosion limit</b>	: 1.6 vol-%.
<b>Upper explosion limit</b>	: 10.6 vol-%.
<b>Autoignition temperature</b>	: 320°C
<b>Flammability</b>	: Flammable.
<b>Oxidizing properties</b>	: Not available
<b>Vapour pressure</b>	: 75 hPa (20°C).      120 hPa (30°C).      260 hPa (50°C).
<b>Vapour density (air=1)</b>	: 2.46
<b>Density</b>	: 0.86 (20°C).
<b>Solubility in water</b>	: Freely soluble.
<b>Solubility</b>	: Soluble in methanol, ether, chloroform and most organic solvents.
<b>Octanol/water coefficient</b>	: Log P <sub>ow</sub> = 1.5
<b>Viscosity</b>	: 0.0061 Pa.s

**10. STABILITY AND REACTIVITY.**

<b>General</b>	: Stable under recommended storage and handling conditions. See section 7.
<b>Conditions to avoid</b>	: Keep away from sources of ignition – No smoking. Exposure to heat.

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- Materials to avoid** : Oxidizing agents, acids, copper, brass and related materials.
- Hazardous decomposition products** : Possibly corrosive and/or toxic decomposition products such as carbon monoxide, nitrogen oxides (NO, NO<sub>2</sub>...).

**11. TOXICOLOGICAL INFORMATION.****Irritation**

- Eyes** : Severly corrosive.
- Skin** : Corrosive.
- Respiratory system** : Corrosive.

**Acute toxicity**

- Oral** : LD<sub>50</sub> Rat : 433 mg/kg
- Dermal** : LD<sub>50</sub> Rabbit : 430 mg/kg
- Inhalation** : LC<sub>50</sub> Rat 4h. : > 10 mg/l

- Chronic toxicity** : If provisional occupational exposure limit is exceeded harmful effect on liver, kidney and central nervous system may occur.

- Sensitization** : No relevant data.

- Carcinogenicity** : No relevant data.

- Mutagenicity** : Not mutagenic in Ames test

- Reproductive toxicity** : No relevant data.

- Epidemiological data** : No relevant data.

**12. ECOLOGICAL INFORMATION.**

- Ecotoxicity** : 96 St LC<sub>50</sub> Fish : 100 -220 mg/l.  
48 St EC<sub>50</sub> Daphnia: 120 mg/l (expected).  
72 St IC<sub>50</sub> Algae : 10 mg/l (expected).
- Mobility** : See data on vapour pressure, watersolubility and log P<sub>ow</sub>.
- Persistence and degradability** : Readily biodegradable.
- Bio-accumulative potential** : Log P<sub>ow</sub> =1.5, resulting in no bio-accumulation.
- Others** : Not available.

**13. DISPOSAL CONSIDERATIONS.**

**Responsibility also of the receiver to have knowledge of national and local regulations.**

- Methods of disposal** : Combustion in an incinerator for chemical waste according to national and local regulations.  
Controlled biodegradation in a waste-water treatment plant is possible.

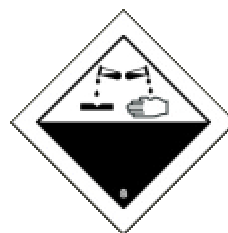
- Contaminated packaging** : After cleaning, re-use is possible.  
Contaminated packaging must be disposed of in a safe way.

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Hazard(s) : See section 3.

**14. TRANSPORT INFORMATION.**

UN-number : UN1922  
Kemmler code : 338 UN1922  
Class ADR/RID/IMO/IATA : 3,(8)  
Proper shipping name : Pyrrolidine  
Max.fill. grade tank (%) : 92  
Hazard label ADR/RID/IMO/IATA :



Packing group ADR/RID/IMO/IATA : II  
Packing instr. (PA/CAO) : 305 (PA) en 307 (CAO)  
Ems number : F-E, S-C  
Tremcard-nr. : 30GFC-II

**15. REGULATORY INFORMATION.**

Responsibility also of the receiver to have knowledge of national and local regulations.

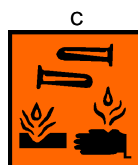
Labelling : DSM-labelling conform directive 67/548/EEC.

Labelname : Pyrrolidine.

Symbol :



Highly flammable



Corrosive

Risk phrases : R11 = Highly flammable.  
R20/21/22 = Harmful by inhalation, in contact with skin and if swallowed.  
R35 = Causes severe burns.

Safety phrases : S09 = Keep container in a well-ventilated place.  
S16 = Keep away from sources of ignition – No smoking.  
S23 = Do not breath vapour  
S26 = In case of contact with the eyes, rinse immediately with plenty of water and seek medical advise  
S36/37/39 = Wear suitable protective clothing, gloves and eye/face protection  
S45 = In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

National regulations

**PYRROLIDINE**

**WGK (Germany)** : Class 1 = Slightly water endangering .  
(DSM-classification conform VwVwS).

**16. OTHER INFORMATION.**

**Training advice** : Handling of this substance is restricted to skilled personnel only.

**Sources of key data** : Literature data and/or investigation reports are available from the manufacturer.

**Issue nr.** : 03/03-01.

**Update motive** : Adaption conform directive 2001/58/EC.

**Replaces SDS dated** : 01-11-1997.

**SDS revised by** : M. Arnoldussen  
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