Safety Data Sheet

1. Product and Company Identification

Product Name: 1-Methyl-2-pyrrolidinone (NMP)
Chemical Formula: C_5H_9NO
CAS#: 872-50-4

Identified uses: Laboratory chemicals, Synthesis of substances

Contact Information:
MTI Corporation
860 South 19th Street
Richmond, CA 94804, USA
Tel: 510-525-3070
Fax: 510-412-1032
Email: info@mtixtl.com
Website: www.mtixtl.com

Non-emergency assistance: 1-510-525-3070

Emergency assistance:
Company: CHEMTEL (MTI Contract# MIS2559467) Day or Night
Tel (Within USA and Canada): 1-800-255-3924
Tel (Outside USA and Canada): 1-813-248-0585

2. Hazards Identification

Emergency Overview: GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 4), H227
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Reproductive toxicity (Category 1B), H360
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
For the full text of the H-Statements mentioned in this Section, see Section 16.

GHS Label elements, including precautionary statements

Pictogram	
Signal	Danger
Hazard statement(s)	
H227	Combustible liquid.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H360	May damage fertility or the unborn child.
Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P261	Avoid breathing mist or vapors.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.

P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
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.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

Hazards not otherwise classified (HNOC) or not covered by GHS
Combustible dust

3. Composition/Information on Ingredients

Substance Name

Formula	C_5H_9NO
Molecular weight	99.13 g/mol
CAS-No.	872-50-4

Hazardous Components

N-methyl-2-pyrrolidone	Flam. Liq. 4; Skin Irrit. 2; Eye Irrit. 2A; Repr. 1B; STOT SE 3; H227, H315, H319, H360, H335 Concentration limits: >= 10 %: STOT SE 3, H335;

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

4. First Aid Measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
Fresh air. Call in physician.

In case of skin contact
Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
Rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
Immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. Firefighting Measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder.

Unsuitable extinguishing media

For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance mixture

Carbon oxides
Nitrogen oxides (NOx)
Combustible.
Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air on intense heating.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further Information

Remove container from danger zone and cool with water. Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

6. Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

7. Handling and Storage

7.1 Precautions for safe handling

Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols

Advice on protection against fire and explosion

Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.

Hygiene measures

Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Tightly closed. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.
Store under inert gas. Moisture sensitive.

Storage class

Storage class (TRGS 510): 6.1C: Combustible, acute toxic Cat.3 / toxic compounds or compounds which causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. Exposure Control/ Personal Protection

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control Parameters	Basis
N-methyl-2-pyrrolidone	872-50-4	TWA	15 ppm 60 mg/m3	USA. Workplace Environmental Exposure Levels (WEEL)
	Remarks	Skin		
		STEL	30 ppm 120 mg/m3	USA. Workplace Environmental Exposure Levels (WEEL)
		skin		
		PEL	1 ppm 4 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
	Remarks	Lower Respiratory Tract irritation Pneumoconiosis Neurotoxicity Not classifiable as a human carcinogen		

Biological occupational exposure limits

Component	CAS-No.	Value	Control Parameters	Biological specimen	Basis
N-methyl-2-pyrrolidone	872-50-4	5-Hydroxy-N-methyl-2-pyrrolidone	100 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

Derived No Effect Level (DNEL)

Application Area	Routes of exposure	Health effect	Value
Workers	Skin contact	Long-term systemic effects	4.8mg/kg BW/d
Workers	Inhalation	Long-term systemic effects	14.4 mg/m3

Predicted No Effect Concentration (PNEC)

Compartment	Value
Water	5 mg/l
Sea water	0.025 mg/kg
Fresh water	0.25 mg/l
Onsite sewage treatment plant	10 mg/l
Soil	0.0701 mg/kg
Sea sediment	0.109 mg/kg
Fresh water sediment	1.09 mg/kg

8.2 Exposure controls

Appropriate engineering controls

Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection

Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: butyl-rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Butoject® (KCL 898)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Latex gloves
Minimum layer thickness: 0.6 mm
Break through time: 60 min
Material tested:Lapren® (KCL 706 / Aldrich Z677558, Size M)

Body Protection

Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

required when vapours are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure

Do not let product enter drains.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

a) Appearance	Form: clear, liquid Color: colorless
b) Odor	amine-like
c) Odor Threshold	No data available
d) pH	8.5 - 10.0 at 100 g/l at 20 °C (68 °F)
e) Melting point/freezing point	Melting point: -24.2 °C (-11.6 °F) at 1,013 hPa - OECD Test Guideline 102
f) Initial boiling point and boiling range	202 °C 396 °F at 1,013.25 hPa
g) Flash point	91 °C (196 °F) - Pensky-Martens closed cup - ISO 2719
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	Upper explosion limit: 9.5 %(V) Lower explosion limit: 1.3 %(V)
k) Vapor pressure	0.32 hPa at 20 °C (68 °F) - OECD Test Guideline 104
l) Vapor density	No data available
m) Density	1.03 g/cm3 at 25 °C (77 °F) - OECD Test Guideline 109
n) Water solubility	1,000 g/l at 20 °C (68 °F) - soluble
o) Partition coefficient: n-octanol/water	log Pow: -0.46 at 25 °C (77 °F) - OECD Test Guideline 107 - Bioaccumulation is not expected.
p) Auto-ignition temperature	245 °C (473 °F) at 1,013 hPa - DIN 51794

q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	No data available
t) Oxidizing properties	None

9.2 Other safety information

Conductivity	0.2 - 0.4 µS/cm
Surface tension	40.4 mN/m
Relative vapor density	3.42 - (Air = 1.0)

10. Stability and Reactivity

10.1 Reactivity

Forms explosive mixtures with air on intense heating.
A range from approx. 15 Kelvin below the flash point is to be rated as critical.

10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature).

10.3 Possibility of hazardous reactions

Risk of ignition or formation of inflammable gases or vapours with:
Oxidizing agents
Violent reactions possible with:
Strong acids
Strong bases
various plastics

10.4 Conditions to avoid

Strong heating

10.5 Incompatible materials

No data available.

10.6 Hazardous decomposition products

In the event of fire: see section 5

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - 4,150 mg/kg
(OECD Test Guideline 401)
LC50 Inhalation - Rat - male and female - 4 h - > 5.1 mg/l - aerosol

(OECD Test Guideline 403)
LD50 Dermal - Rat - male and female - > 5,000 mg/kg
(OECD Test Guideline 402)

Skin corrosion/irritation
Skin - Rabbit
Result: Irritating to skin. - 24 h
(OECD Test Guideline 404)
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation
(OECD Test Guideline 405)
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Respiratory or skin sensitization
Local lymph node assay (LLNA) - Mouse

Result: negative
(OECD Test Guideline 429)

Germ cell mutagenicity

Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: In vitro mammalian cell gene mutation test
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative
Test Type: unscheduled DNA synthesis assay
Test system: rat hepatocytes
Method: OECD Test Guideline 482
Result: negative

Test Type: In vivo micronucleus test
Species: Mouse
Cell type: Bone marrow
Application Route: Oral
Method: OECD Test Guideline 474
Result: negative

Test Type: Chromosome aberration test
Species: Chinese hamster
Cell type: Bone marrow
Application Route: Oral
Method: OECD Test Guideline 475
Result: negative

Carcinogenicity

Limited evidence of a carcinogenic effect.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

May damage the unborn child.

Specific target organ toxicity - single exposure

Inhalation - May cause respiratory irritation. - Respiratory system

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

Additional Information

Repeated dose toxicity - Rabbit - male - Dermal - 20 d - NOAEL (No observed adverse effect level) - 826 mg/kg - LOAEL (Lowest observed adverse effect level) - 1,653 mg/kg Remarks: Subacute toxicity

RTECS: UY5790000
Prolonged or repeated exposure may cause:, Vomiting, Diarrhea, Abdominal pain, Rats exposed to 1-methyl-2-pyrrolidinone at a concentration of 1 mg/L as an aerosol for 10 days showed depletion of hematopoietic cells in the bone marrow and atrophy of the lymphoid tissues of the thymus, spleen, and lymph nodes.

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Bone marrow - Irregularities - Based on Human Evidence

12. Ecological Information

12.1 Toxicity

Toxicity to fish	static test LC50 - Oncorhynchus mykiss (rainbow trout) - > 500 mg/l - 96 h Remarks: (ECHA
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - ca. 4,897 mg/l - 48 h Remarks: (IUCLID)
Toxicity to algae	static test EC50 - Desmodesmus subspicatus (green algae) - 672.8 mg/l - 72h (DIN 38412)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	semi-static test NOEC - Daphnia magna (Water flea) - 12.5 mg/l - 21 d (OECD Test Guideline 211)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 73 % - Readily biodegradable. (OECD Test Guideline 301C)
Biochemical Oxygen Demand (BOD)	1.100 mg/g Remarks: (Lit.)
Chemical Oxygen Demand (COD)	1.600 mg/g Remarks: (Lit.)
Biodegradability	Result: - Readily biodegradeable

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment PBT/vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. Disposal Considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

14. Transport Information

DOT (US)

NA-Number: 1993 Class: NONE Packing group: III

Proper shipping name: Combustible liquid, n.o.s. (N-methyl-2-pyrrolidone)

Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG

Not dangerous goods

IATA

Not dangerous goods

15. Regulatory Information

SARA 302 Components

This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
N-methyl-2-pyrrolidone	872-50-4	2007-03-01

SARA 311/312 Hazards

Fire Hazard, Chronic Health Hazard

Massachusetts Right to Know Components

	CAS-No.	Revision Date
N-methyl-2-pyrrolidone	872-50-4	2007-03-01

Pennsylvania Right to Know Components

N-methyl-2-pyrrolidone	872-50-4	2007-03-01

California Prop. 65 Components

	CAS-No.	Revision Date
which is/are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.N-methyl-2-pyrrolidone	872-50-4	2009-02-01

16. Other Information

The information above is believed to be accurate and represents the best information currently available to us. However, it does not represent any guarantee of the properties of the product. We make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we shall not be held liable for any damage resulting from handling or from contact with the above product. Users should make their own investigations to determine the suitability of the information for their particular purposes.