

N METHYL PYRROLIDONE

SECTION 1: IDENTIFICATION

Product Name: N METHYL PYRROLIDONE

Product Number: 000000000000499183

Internal ID: 187

Chemical Family: Cyclic Amide

CAS Number: 872-50-4

Chemical Name: N-Methyl-2-pyrrolidinone

Synonyms: 2-Pyrrolidinone, 1-methyl-, N-Methyl-2-pyrrolidinone, NMP

Manufacturer

Lyondell Chemical Company
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1221 McKinney St.
P.O. Box 2583
Houston Texas 77252-2583

Business Contact

Customer Service 888 777-0232
Product Safety 800 700-0946

24 Hour Emergency Contact

CHEMTREC 800 424-9300
LYONDELL 800-245-4532

SECTION 2 : COMPOSITION/INFORMATION ON INGREDIENTS

<u>Component Name</u>	<u>CAS #</u>	<u>EU Inventory</u>	<u>Concentration Wt.%*</u>	<u>Risk</u>	<u>Symbol</u>
N-Methyl-2-pyrrolidinone	872-50-4	212-828-1	<= 99.9	R36/38	Xi

* Concentration of gaseous products or materials is given in Mole %
Compositions given are typical values not specifications.

SECTION 3: HAZARD IDENTIFICATION

Emergency Overview

This material is HAZARDOUS by OSHA Hazard Communication definition.

Signal Word

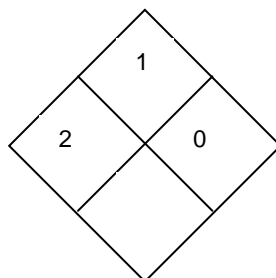
WARNING.

Hazards

Combustible. Eye irritant. Respiratory tract irritant. Irritating to the skin, not a sensitizer. Skin absorption hazard. Irritating to gastrointestinal tract. NMP produced liver tumors and kidney effects in test animals. The relevance of these findings to humans is unknown. Reproductive and developmental effects were present in test animals. The relevance of these findings to humans is unknown

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NFPA®



HMIS®

Health	*	2
Flammability		1
Reactivity		0

Physical State

Liquid.

Color

Clear, colorless to slightly yellow.

Odor

Amine-like odor.

Odor Threshold

No Data Available.

Potential Health Effects**Routes of Exposure**

Skin. Eye Inhalation

Signs and Symptoms of Acute Exposure

See component summary.

- *N-Methyl-2-pyrrolidinone 872-50-4*

Moderate to severe eye irritant. Mildly irritating to the skin but not a skin sensitizer. Skin absorption hazard. Inhalation irritation. Irritating to gastrointestinal tract.

Skin

Skin absorption hazard. Mildly irritating to the skin but not a skin sensitizer.

Inhalation

Signs of respiratory tract irritation (such as nasal discharge and difficulty breathing) may occur after exposure to aerosol or high vapor concentrations.

Eye

Moderate to severe eye irritant. Excess redness of the conjunctiva may occur. Permanent corneal damage is not expected.

Ingestion

Ingestion may cause discomfort and irritation of the gastrointestinal tract, dizziness and shortness of breath.

Chronic Health Effects

See component summary.

- *N-Methyl-2-pyrrolidinone 872-50-4*

Repeated inhalation exposure may cause reversible irritation at the site of initial contact, and transient CNS effects have also been observed. NMP produced liver tumors and kidney effects in test animals. The relevance of these findings to humans is unknown. NMP may adversely affect reproduction in the rat after ingestion, although fertility is unaltered. The

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relevance of these findings to humans is unknown. Fetal effects were seen in pregnant animals exposed to NMP by ingestion, inhalation and skin contact. The relevance of these findings to humans is unknown.

Conditions Aggravated by Exposure

This material or its emissions may defat skin, cause contact dermatitis, or otherwise aggravate existing skin disease.

SECTION 4: FIRST AID MEASURES

General

Take proper precautions to ensure your own health and safety before attempting rescue and providing first aid. For specific information refer to the Emergency Overview in Section 3 of this MSDS.

Skin

Immediately remove contaminated clothing. Wash skin thoroughly with mild soap and water. Flush with lukewarm water for 15 minutes. If sticky, use waterless cleaner first. Seek medical attention if ill effect or irritation develops.

Inhalation

If overcome by exposure, remove victim to fresh air immediately. Give oxygen or artificial respiration as needed. Obtain emergency medical attention. Prompt action is essential.

Eye

Thoroughly flush the eyes with large amounts of clean low-pressure water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If irritation persists, seek medical attention.

Ingestion

If large quantity swallowed, give lukewarm water (pint/ 1/2 litre) if victim completely conscious/alert. Do not induce vomiting. Risk of damage to lungs exceeds poisoning risk. Obtain emergency medical attention.

Note to Physician

Treat symptomatically. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.

SECTION 5: FIRE FIGHTING MEASURES

Flammable Properties**Classification**

OSHA/NFPA Class IIIA Combustible Liquid.

Flash Point:

86 °C (186.8 °F) (Closed Cup)

95 °C (203 °F) (Open Cup)

Auto-Ignition Temperature

~ 270 °C (518 °F)

Lower Flammable Limit

~ 1.3 vol%

Upper Flammable Limit

~ 9.5 vol%

Extinguishing Media

Suitable: SMALL FIRE: Use dry chemical, CO₂, water spray or regular foam. LARGE FIRE: Use water spray, water fog or regular foam. Do not use straight streams.

Unsuitable: No additional information available.

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Protection of Firefighters

Protective Equipment/Clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters protective clothing will only provide limited protection.

Fire Fighting Guidance: When heated above the flash point, releases flammable vapors. When mixed with air and exposed to ignition source, vapors can burn in open or explode if confined. Vapors may be heavier than air. May travel long distances along the ground before igniting and flashing back to vapor source. Fine sprays/mists may be combustible at temperatures below normal flash point. Move containers from fire area if you can do it without risk. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. Always stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

Hazardous Combustion Products: Incomplete combustion may produce carbon monoxide, oxides or compounds of nitrogen and other toxic gases.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Release Response

Combustible liquid. Eliminate all sources of ignition. All equipment used when handling this product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Use clean non-sparking tools to collect absorbed material. Dike large spills and place materials in salvage containers. Water spray may reduce vapor; but may not prevent ignition in closed spaces.

SECTION 7: HANDLING AND STORAGE

Handling

Handle empty containers with care - residue may be combustible and burn if exposed to heat/sparks/open flame. In addition to the fire/explosion hazard, residual vapor and liquid may also be toxic. Keep container tightly closed when not in use. Keep away from heat, sparks, open flame, or any ignition source. Isolate, vent, drain, wash and purge systems or equipment before maintenance or repair. Wear recommended personal protective equipment. Observe precautions pertaining to confined space entry.

Storage

Mild or stainless steel. Store away from heat, sparks, open flames, strong oxidizing agents and direct sunlight.

SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls

At elevated temperatures, special ventilation may be required even if the flash point has not been exceeded. Flammable mists or aerosols can be generated below the flash point of high boiling liquids.

Personal Protection

Inhalation No occupational exposure limits have been developed for this material. A respiratory protection program that meets OSHA's 29 CFR 1910.134 or ANSI Z88.2 requirements must be followed whenever workplace conditions warrant respirator use.

Skin Wear chemical resistant gloves such as: Butyl rubber. When skin contact is possible, protective clothing including gloves, apron, sleeves, boots, head and face protection should be worn. The equipment must be cleaned thoroughly after each use.

Eye Eye protection, including both chemical splash goggles and face shield, must be worn when possibility exists for eye contact due to splashing/spraying liquid, airborne particles, or vapor.

Additional Remarks

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Selection of appropriate personal protective equipment should be based on an evaluation of the performance characteristics of the protective equipment relative to the task(s) to be performed, conditions present, duration of use, and the hazards and/or potential hazards that may be encountered during use. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Use good personal hygiene practices. Wash hands before eating, drinking, smoking, or using toilet facilities. Promptly remove soiled clothing/wash thoroughly before reuse.

Occupational Exposure Limits

Component Name	Source / Date	Value	Type	Notation
N-Methyl-2-pyrrolidinone	US (ACGIH)	N/L		
	US (OSHA)	N/L		
	MAK (DE)	19 ppm	8 HRS/TWA	Skin.
	HSE (UK)	25 ppm	8 HRS/TWA	Skin.
	HSE (UK)	75 ppm	15 MIN/STEL	Skin.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Liquid. Clear, colorless to slightly yellow.

Odor: Amine-like odor.

Odor Threshold: No Data Available.

pH: 7 - 8

Boiling Point/Boiling Range: 202 °C (395.6 °F) @ 760 mm Hg

Freezing Point/Melting Point: -25.0 °C (-13 °F)

Flash Point: 86 °C (186.8 °F) (Closed Cup) 95 °C (203 °F) (Open Cup)

Auto-ignition: ~ 270 °C (518 °F)

Flammability: OSHA/NFPA Class IIIA Combustible Liquid.

Lower Flammable Limit: ~ 1.3 vol%

Upper Flammable Limit: ~ 9.5 vol%

Explosive Properties: No Data Available.

Oxidizing Properties: No Data Available.

Vapor Pressure: < 0.3 mm Hg @ 20 °C (68 °F)

Evaporation Rate: ~ 0.03 (butyl acetate = 1)

Relative Density: ~ 1.03 @ 25 °C (77 °F) (Water = 1.0 at 4°C (39.2°F))

Relative Vapor Density: ~ 3.4 @ 15.5 - 32.2 °C (59.9 - 89.96 °F) (Air = 1.0)

Viscosity: No Data Available.

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Solubility (Water): Complete (In All Proportions).

Partition Coefficient (Kow): Log Kow = -0.54

Additional Physical and Chemical Properties: Hygroscopic. Additional properties may be listed in Sections 3 and 5.

SECTION 10: STABILITY AND REACTIVITY

Chemical Stability

Stable.

Conditions to Avoid

Severe reducing conditions. In contact with moisture, this hygroscopic (i.e., absorbs water from the air) material may degrade or become contaminated. Heat, sparks, open flame, other ignition sources, and oxidizing conditions.

Substances to Avoid

Severe oxidizing conditions.

Decomposition Products

Carbon monoxide and nitrogen oxide fumes emitted when heated to decomposition.

Hazardous Polymerization

Not expected to occur.

Reactions with Air and Water

Not expected to occur.

SECTION 11: TOXICOLOGICAL INFORMATION

PRODUCT INFORMATION

Product Summary

N-methyl pyrrolidone (NMP) is of slight acute toxicity. Liquid NMP is a moderate to severe eye irritant and mildly irritating to skin but is not a skin sensitizer. It is readily absorbed after ingestion, inhalation and skin contact. Repeated inhalation exposure may cause reversible irritation at the site of initial contact, and transient CNS effects have also been observed. Repeated long term ingestion was associated with an increased severity of spontaneous progressive nephropathy in male rats, and increased liver weight and increased hepatic cell hypertrophy in male and female mice. It is not genotoxic in vitro or in vivo. No increase in tumors was seen in rats exposed by inhalation or via feed for two years, however an increase in liver tumors was noted in mice over a similar period. The relevance of these findings to humans appears doubtful, however, since liver tumors are commonly reported when non-genotoxic chemicals are tested in the mouse bioassay. Adverse effects on reproduction have been reported in rats after ingestion of amounts of NMP which also caused mild generalized changes in the parental animals. Fetal effects have been noted in pregnant animals exposed by ingestion, inhalation and skin contact, and occurred both in the presence and absence of maternal toxicity.

COMPONENT INFORMATION

- *N-Methyl-2-pyrrolidinone* 872-50-4

Acute Toxicity - Lethal Doses

<u>LC50 (Inhl)</u>	Rat	> 5.0 MG/L (AEROSOL)	4 HOURS
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<u>LD50 (Oral)</u>	Rat	4150 MG/KG BWT
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LD50 (Skin) Rat 7000 MG/KG BWT

Irritation

Skin Contact may cause mild skin irritation.

Eye Moderate to severe eye irritant.

Target Organ Effects

Eye. Skin. Respiratory system. Mucous membrane irritant. CNS depressant.

Reproductive Effects

NMP may adversely affect reproduction in the rat after ingestion, although fertility is unaltered. These effects occurred at exposures which also caused mild generalized effects in the parental animals. It is therefore unclear if NMP specifically targets the reproductive system or whether these changes were secondary to other systemic effects. The relevance of these findings to humans is unknown. Fetal effects (including delayed development and the occurrence of soft tissue and skeletal variations) were observed in pregnant animals exposed by ingestion, inhalation and skin contact. While these events generally occurred in the presence of maternal toxicity, mild fetotoxicity was sometimes present in the absence of maternal effects. The relevance of these findings to humans is unknown.

Carcinogenicity

No increase in tumors in rats exposed by inhalation or via feed for 2 years. A dietary study found increased liver tumors in male and female mice given 1100 and 1400 mg/kg bwt/day for 18 months, respectively. Since liver tumors are commonly reported when non-genotoxic chemicals are tested in the mouse bioassay, the relevance of these findings to humans appears doubtful.

SECTION 12: ECOLOGICAL INFORMATION

PRODUCT INFORMATION

Ecotoxicity

This material is expected to be non-hazardous to aquatic species. See component summary.

Environmental Fate and Pathway

This material is not expected to persist in the environment. It is water soluble and is expected to have low volatility. It is expected to be poorly adsorbed onto soils or sediments. Hydrolysis is not expected to be an important factor in the environmental fate process for this material. See component summary.

COMPONENT INFORMATION

- *N-Methyl-2-pyrrolidinone* 872-50-4

Ecotoxicity

This material is expected to be non-hazardous to aquatic species.

Acute toxicity to fish

LC50 / 96 HOURS bluegill. 832 mg/l

LC50 / 96 HOURS fathead minnow 1,072 mg/l

LC50 / 96 HOURS rainbow trout. 3,048 mg/l

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Acute toxicity to aquatic invertebrates

EC50 / 24 HOURS Daphnia magna. > 1,000 mg/l

Toxicity to aquatic plants

EC50 / 72 HOURS Green algae (Scenedesmus subspicatus). > 500 mg/l

Environmental Fate and Pathway

This material is not expected to persist in the environment. It is water soluble and is expected to have low volatility. It is expected to be poorly adsorbed onto soils or sediments. Hydrolysis is not expected to be an important factor in the environmental fate process for this material.

Persistence and Degradability

Biodegradation: BOD (Modified MITI Method) = 73% (28 days). BOD (Modified MITI Method) = 92% (14 days). This material is expected to be readily biodegradable.

Bioaccumulation: BCF = 0.16. This material is not expected to bioaccumulate.

SECTION 13: DISPOSAL CONSIDERATIONS

Contaminated product, soil, water, container residues and spill cleanup materials may be hazardous wastes. Comply with applicable federal, state, and local regulations.

SECTION 14: TRANSPORT INFORMATION

Special Requirements

Not regulated by U.S. Department of Transportation (USDOT) when shipped in packages of 119 gallons or less. If you reformulate or further process this material, you should consider re-evaluation of the regulatory status of the components listed in the composition section of this sheet, based on final composition of your product.

Proper Shipping Name N-METHYL 2-PYRROLIDONE

SECTION 15: REGULATORY INFORMATION

Regulatory Status

Country	Inventory		
Australia	AICS	X	X = All components are included or are otherwise exempt from inclusion on this inventory.
Canada	DSL	X	
Canada	NDSL		
China	IECS	X	
European Union	EINECS	X	
European Union	ELINCS		
European Union	NLP		
Japan	ENCS	X	
Korea	ECL	X	
Philippines	PICCS	X	
United States	TSCA	X	

C = Contact Lyondell/Equistar by e-mail at product.safety@lyondell.com or product.safety@equistarchem.com for additional information.

SARA 302/304

Chemicals with provided CAS numbers in this material are not subject to the reporting requirements of CERCLA.

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SARA 311/312

Based upon available information, this material is classified as the following health and/or physical hazards according to Section 311 & 312:

Immediate (Acute) Health Hazard.
Fire Hazard.

SARA 313

This material contains the following chemicals with known CAS numbers subject to the reporting requirements of SARA Title III, Section 313 and 40 CFR 372:

<u>Component</u>	<u>Reporting Threshold</u>
N-Methyl-2-pyrrolidinone / CAS# 872-50-4.	1.0%

State Reporting

This product contains the following ingredients for which the state of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute:

- N-Methyl-2-pyrrolidinone / CAS# 872-50-4.

A Volatile Organic Compound (VOC) is any volatile compound of carbon excluding methane, carbon monoxide, carbonic acid, metallic carbides or carbonates, ammonium carbonate, 1,1-trichloromethane, methylene chloride, (FC-23), (CFC-113), (CFC-22), (CFC-114), and (CFC-115). By this definition, this is a (VOC) material.

Massachusetts Substances List (MSL) - Hazardous substances on the MSL must be identified when present in materials at levels greater than state specified criterion. The criterion is: $\geq 1\%$. Components with CAS numbers present in this material at a level which could require reporting under the statute are:

- N-Methyl-2-pyrrolidinone / CAS# 872-50-4.

Massachusetts Substances List (MSL) - Extraordinarily hazardous substances on the MSL-EHL must be identified when present in materials at levels greater than state specified criterion. The criterion is $\geq 0.0001\%$. Components with CAS numbers present in this material at levels which could require reporting under the statute are:

- N-Methyl-2-pyrrolidinone / CAS# 872-50-4.

Hazardous Substances listed by the State of Pennsylvania must be identified when present in materials at levels greater than the state specified criterion. The criterion is $\geq 1\%$. Components with CAS numbers in this material at a level which could require reporting under the statute are:

- N-Methyl-2-pyrrolidinone / CAS# 872-50-4.

SECTION 16: OTHER INFORMATION

Latest Revision(s)

Revised Section(s): 3 9 11 12 Date of Revision: February 13 2003 Revised Section(s): 8 Date of Revision: April 1 2004 Revised Section(s): 5 9 Date of Revision: August 31 2004 Revised Section(s): 15 November 2004

N METHYL PYRROLIDONE**DISCLAIMER OF RESPONSIBILITY**

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Numerical Data Presentation

The presentation of numerical data, such as that used for physical and chemical properties and toxicological values, is expressed using a comma (,) to separate digits into groups of three and a period (.) as the decimal marker. For example, 1,234.56 mg/kg = 1 234,56 mg/kg

Language Translations

The information presented in this document has been translated from English by a vendor Lyondell believes to be reliable. Lyondell and its vendor have made a good-faith effort to verify the accuracy of the translation, but assume no responsibility for any errors that may have occurred. Please refer to our web sites (www.lyondell.com and www.equistarchem.com) for the original document written in English.

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