

## Product Safety Summary

### N-Methyl-Pyrrolidone

This Product Safety Summary is intended to provide a general overview of the chemical substance. The information on the Summary is basic information and is not intended to provide emergency response information, medical information or treatment information. The summary should not be used to provide in-depth safety and health information. In-depth safety and health information can be found on the Material Safety Data Sheet (MSDS) for the chemical substance.

#### Chemical Identity

Abbreviation: NMP

CAS Number: 872-50-4

Formula: C<sub>5</sub>H<sub>9</sub>NO

Common Names: N-Methyl-2-pyrrolidone

1-Methyl- 2-pyrrolidone

Methylpyrrolidone

#### Product Overview

- N-Methylpyrrolidone (NMP) is a slowly evaporating liquid with low viscosity and excellent solvency power.
- NMP is colorless, has a faint amine odor and is soluble in water and conventional organic solvents.
- NMP is used in a wide range of industrial applications, including process chemicals, engineering plastics, coatings, agricultural chemicals, electronics, paint stripping and cleaning, adhesives and pigment dispersions.
- Although NMP is used in industrial chemical processes, consumers may potentially come into contact with NMP through the use of certain commercially available products, such as certain paint removers or cleaning agents.
- NMP is classified as a combustible liquid and will sustain a fire, when ignited.
- Like any chemical, NMP can create hazards if handled carelessly. All persons associated with the transportation, storage or handling of NMP (or products containing NMP) must understand their hazards. This includes training in the recommended normal and emergency handling procedures.
- The primary hazards of NMP are skin contact causing irritation, redness or dermatitis and inhalation of aerosols causing respiratory irritation. No airborne limits have been established for NMP vapor concentrations in the work environment by Occupational Health and Safety Administration (OSHA) or American Conference of Governmental Industrial Hygienists (ACGIH). The American Industrial Hygiene Association (AIHA) has established a Workplace Environmental Exposure Level (WEEL) 8-hr time-weighted average (TWA) of 10 ppm (skin). The skin notation indicates that cutaneous exposure to NMP liquid and vapor can contribute significantly to the total uptake of NMP by the body.
- For further safety and health information, the current Material Safety Data Sheet (MSDS) should be used for this substance.

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#### Physical/Chemical Properties

- NMP is a clear, colorless, low viscosity liquid with a faint amine odor.
- NMP is highly polar and for this reason it is used as a general purpose organic solvent.
- The specific gravity of NMP is 1.03 and is denser than water.
- The boiling point of NMP is 204.3°C (399.7°F) and the freezing point is -23.6°C (-10.5°F). The flash point of NMP is 91°C (196°F), which is high compared to most other organic solvents. It is a combustible liquid.
- Compared to other organic solvents, the vapor pressure of NMP is relatively low and concentrations in the air will be lower with NMP than with other organic solvents.
- NMP is miscible with conventional organic solvents, water and certain organic monomers. Certain resins and plastics are also soluble in NMP.

#### Health Information

### Acute Hazards

NMP exhibits low toxicity by all routes of exposure. Due to its low vapor pressure, skin exposure represents the primary hazard in most applications. Workers must be properly instructed and supervised in the handling of NMP.

Effects on Respiratory System:

Exposure to NMP aerosol droplets may result in respiratory tract irritation.

Effects on Eyes:

Exposure to NMP may result in moderate eye irritation and may cause temporary corneal clouding.

Effects on Skin:

Skin contact with NMP may result in mild irritation and prolonged contact may cause redness and dermatitis.

Effects on Ingestion:

Ingestion may result in irritation of the gastrointestinal tract.

### Chronic Hazards

NMP may adversely affect the developing fetus based on animal data. While whole body inhalation studies have shown developmental effects in rodents, these effects occur only at very high NMP vapor concentrations and in the presence of maternal toxicity.

At high doses, NMP has caused liver tumors in mice. These results are not considered relevant to humans given the negative results in other test systems and the high doses required to produce effects in mice. Based on the results from a number of long-term carcinogenicity studies and short term tests, there is no indication that NMP itself is carcinogenic.

Extensive toxicology data exist for NMP; refer to the MSDS for the most up-to-date information.

### **Environmental Information**

NMP is nearly non-toxic to aquatic life and is readily degraded by organisms present in typical wastewater treatment plants.

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### **Additional Hazard Information**

Because NMP is combustible, care must be taken when handling it to avoid exposure to flames and other sources of ignition.

The following safety recommendations must be observed:

- Store in an area designed for combustible liquids.
- Specify proper electrical equipment and adequate grounding for static electricity.
- Maintain adequate ventilation in all work areas
- Provide adequate firefighting equipment, including automatic sprinklers, in work and storage areas.

NMP samples are stored safely in clear glass bottles or steel cans with sufficient vapor space to allow for thermal expansion. Bottles should be stored in a temperature-controlled environment. Polyethylene cap liners will prevent the breakdown of coated caps or liners. Electronic grade NMP samples should be stored in high density polyethylene bottles to avoid leaching of elemental components from glass.

### **Exposure Potential**

Consumers may be exposed to NMP during use of certain NMP-containing products. Due to its low vapor pressure, absorption through the skin represents the most likely and potentially the most significant route of exposure to NMP under most known consumer use conditions. This is particularly true if NMP were to be used in cosmetics or other personal care products. BASF strongly recommends that NMP should not be used in cosmetic applications.

Workplace exposure should be limited by the use of engineering controls, such as ventilation and hoods. For emergency situations and some specially controlled areas, personal protective equipment, such as respirators, may be employed. In general, skin and eye exposure to organic solvents, such as NMP, are prevented through the use of protective eye and face equipment and impermeable gloves and clothing.

Regulations involving hazardous chemicals are continually evolving and thus exposure guidelines are reviewed regularly and modified whenever new information dictates a change. It is important to be aware of the current legislative requirements.

### **Risk Management**

The potential hazards associated with NMP can be avoided if workers are adequately instructed and supervised on the proper procedures for handling NMP.

Every worker should be trained to realize that exposure to a hazardous chemical requires immediate washing of affected areas using large amounts of soap and water, and that immediate attention may markedly decrease the severity of any health effects.

Properly designed emergency showers and eyewash fountains should be placed in convenient locations wherever NMP is used. All employees should know the location and operation of this equipment. All equipment must be frequently inspected to make sure they are in proper working condition.

Because NMP is an eye irritant, chemical splash goggles should be worn when handling it. If NMP enters the eye, flush with water for at least 15 minutes, and consult a physician.

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Gloves of butyl rubber and FEP Teflon<sup>®</sup> provide the best resistance to NMP. Following use, gloves should be rinsed and discarded. Butyl rubber aprons may be used for splash protection; however, the PVC coatings found on most protective clothing dissolve rapidly in NMP.

If vapors or mists are generated, wear a NIOSH/MSHA approved organic vapor/mist respirator.

If skin contact does occur, the affected area should be thoroughly flushed with water to prevent irritation, followed by moisturizing with a protective ointment.

If NMP is swallowed, dilute with plenty of water, induce vomiting immediately, and consult a physician.

Overexposure to NMP vapors can bring about nausea, headache or dizziness. Move the person to fresh air, aid in breathing, if needed, and consult a physician.

If using an NMP-containing product in the home, all instructions and precautions must be read, understood and followed. Chemical-resistant gloves should be worn. It should only be used where adequate ventilation exists and must never be used around open flames or other ignition sources.

### **Federal/Science Findings**

#### **MSDS**

#### **References**

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#### **N-Methyl Pyrrolidone (NMP)**

##### **Specifications**

##### **CAS NO.**

CAS NO. 872-50-4

##### **NATURE**

NATURE It is a clear colourless liquid ( Turns yellow on exposure to heat.)

##### **PHYSICAL PROPERTIES**

Empirical Formula C<sub>5</sub>H<sub>9</sub>NO

Molecular Wt. 99.13

Specific Gravity 1.028 @ 25 °C

Refractive Index 1.47

Boiling Point 202 °C @ 760 mm Hg

Colour (APHA) Max 50

Solubility in Water Miscible

Flash Point 93 °C

Autoignition Temperature 270 °C

Flammability Limits L.E.L : 1.3 vol %

U.E.L. : 9.5 vol %  
Melting Point -24 °C  
Stability Stable under ordinary conditions  
pH 7.5 - 8.0

**SPECIFICATIONS (Standard Grade)**

Purity(min) wt % by GC 99.50  
Water Content (MAX.) % by  
KF 0.50

Other Impurities (max) % by  
GC 0.50

Color Apha(max) 50

**SPECIFICATIONS (Ultra Pure Grade )**

Purity(min) wt % by GC 99.80 min

Water Content (MAX.) % by  
KF 0.05 max

Other Impurities (max) % by  
GC 0.15 max

Color Apha(max) 30 max

**MSDS**

**HEALTH**

☐ NMP is irritating to skin , eyes. In case of contact, affected area should be washed with plenty of water. If sticky, use waterless cleaner. Inhalation should be avoided. In event, victim should be moved to fresh air . Give oxygen or artificial respiration as needed. Obtain emergency medical attention . Prompt action is essential.

**Applications**

APPLICATIONS: Used as a solvent in pharmaceutical synthesis because of its broad solvency.

OIL REFINING: Solvent for selective extraction of aromatic compound mixers and co-solvent for water resolution. Decoloring agent for oils & waxes. Extraction solvent in lube oil processing and in Natural and Synthetic Gas purification.

OTHERS: Solvent for paint stripping and resins. Metal finishing and PCB manufacturing. Pigment dispersant and disperser for paints and varnishes.

STORAGE: Mild or Stainless Steel. Store away from heat sparks, open flames, strong oxidizing agents and direct sunlight.

PACKING: 200 kgs. Net weight in Mild Steel Drums.

HEALTH & SAFETY: NMP is irritating to skin, eyes. In case of contact, affected area should be washed with plenty of water. If sticky, use waterless cleaner. Inhalation should be avoided. If overcome by exposure, victim should be moved to fresh air. Give oxygen or artificial respiration as needed. Obtain emergency medical attention. Prompt action is essential.