

# N-Methyl-2-Pyrrolidone

(NMP)



## Description

N-Methyl-2-Pyrrolidone (NMP) is a powerful, aprotic solvent with high solvency, and low volatility. This colorless, high boiling, high flash point and low vapor pressure liquid carries a mild amine-like odor. NMP has high chemical and thermal stability and is completely miscible with water at all temperatures. NMP can serve as a cosolvent with water, alcohols, glycol ethers, ketones, and aromatic/chlorinated hydrocarbons. NMP is both recyclable by distillation and readily biodegradable. NMP is not found on the Hazardous Air Pollutants (HAPs) list of the 1990 Clean Air Act Amendments.

## Typical Properties

• Purity	99.8% minimum
• Water	400 ppm maximum
• Specific Gravity (25°C/4°C)	1.027
• Boiling Point (760 TORR)	202°C
• Flash Point (SETA)	90°C
• Color, APHA	40 maximum
• Vapor Pressure (20°C)	<0.3 mm Hg
• Melting Point	-25°C
• CAS Number	872-50-4

NMP is a versatile solvent for use in numerous applications including graffiti removal, automotive and industrial cleaning, water borne coatings, and photoresist stripping.

Lyondell Chemical produces NMP in a proprietary process.

## Applications

**Electronics.** NMP has been used in the electronics industry for many years as a photoresist stripper. Now, with the phase out of CFC's, NMP has gained widespread acceptance as a solvent in other electronic applications including semi-aqueous defluxing, degreasing, and coatings (polyamide, epoxy and polyurethane).

**Graffiti Removers.** NMP-based graffiti removers combine high performance and biodegradability with low volatility and low flammability. NMP can be blended with glycol ethers or acetates such as ARCOSOLV® PMA, PEA, and DPMA; they are cost effective and improve performance on surfaces defaced by lipstick and crayon graffiti.

**Agricultural.** The agricultural chemical industry takes advantage of NMP's solvency and handling properties in agricultural formulations.

**Pharmaceuticals.** NMP is used as a solvent in pharmaceutical synthetic procedure because of its broad solvency. One potential use for NMP is as a dermal penetration enhancer for pharmaceuticals.

**Consumer and Industrial Cleaners.** NMP is an effective stripping agent used in floor stripping, oven cleaners, graffiti removers, and paint strippers. Due to its high solvency and low volatility, it is used in automotive and industrial cleaners with solvents such as hydrocarbons, terpenes, Arconate® propylene carbonate and P-Series glycol ethers.

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**Coatings Solvent.** NMP is a powerful solvent for most commercial resins. Due to its high boiling point and excellent solvent power, NMP extends and improves the properties of high temperature bake coatings. For instance, high solid binders are more easily obtained with NMP as the solvent. Quite often, baked finishes yield coatings with outstanding mechanical and dielectric properties. NMP also aids rheological control: better flow and leveling -less cratering and pinholing. For these reasons, NMP has been shown to be highly effective in wire coating and other high temperature coating applications. NMP is also the preferred solvent for urethane dispersions and is an excellent coalescent for acrylic and styrene acrylic latexes.

**Petrochemical Processing.** NMP has been shown to have a selective affinity for unsaturated hydrocarbons, aromatics and sulfur-bearing gases. Due to its relative non-reactivity and high solvency, NMP finds wide applicability as an extraction solvent in lube oil processing as well as in natural and synthetic gas purification's.

**Miscellaneous Solvent Applications.** The excellent thermal and chemical stability of NMP enhances its utility as a solvent or cosolvent in many synthetic reaction systems. NMP shows selective affinity for unsaturated hydrocarbons, aromatics, and sulfur compounds. NMP can serve as a cosolvent with water, aromatic/chlorinated hydrocarbons, alcohols, glycol ethers, and ketones.

## Storage and Handling

NMP is hygroscopic (picks up moisture) but stable under normal conditions. It will violently react with strong oxidizers such as hydrogen peroxide, nitric acid, sulfuric acid, etc. The primary decomposition products produce carbon monoxide and nitrogen oxide fumes. Excessive exposure or spillage should be avoided as a matter of good practice. Lyondell Chemical Company recommends wearing butyl gloves when using NMP. NMP should be stored in clean, phenolic-lined mild steel or alloy drums. Teflon<sup>®1</sup> and Kalrez<sup>®1</sup> have been shown to be suitable gasket materials. Please review MSDS prior to handling.

<sup>1</sup> Teflon and Kalrez are registered trademarks of DuPont.

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