

N-Methylpyrrolidone (NMP) is a highly polar, aprotic, general purpose organic solvent. A colorless, low-viscosity liquid with a faint amine odor, NMP is miscible in all proportions with water and conventional organic solvents.

As a solvent, NMP is employed in a wide range of industrial applications, including those listed here:

Process Chemicals

- Acetylene Recovery
- Butadiene Extraction
- Extraction of Aromatics
- Lube Oil Extraction
- Gas Purification

Engineering Plastics

- Spinning of Aramid Fibers
- Production of Polyphenylene Sulfide, PPS
- Preparation of Membranes for Ultrafiltration

Coatings

- Solvent for Ink Systems
- Component in Specialty and Waterborne
 Paints or Finishes
- · Synthesis/Diluent of Wire Enamels
- Solvent for Plastic Coatings
- · Coalescing Agent

Agricultural Chemicals

- Solvent and/or Cosolvent for Insecticides, Fungicides, Herbicides and Bioregulators
- Reaction Medium in Synthesis of Active
 Compounds

Electronic

- Cleaner for Silicon Wafers
- Photoresist Stripper in the Manufacture of Microchips
- Auxiliary in Printed Circuit Board Manufacturing

Paint Stripping and Cleaning

- Component in Paint Strippers, Degreasers and Industrial Cleaners
- Removal of Polyurethane Residues and Mold Release Agents
- Removal of Tarry or Polymeric Deposits
 from Reactors

Miscellaneous

- Solvent for Developer (Photo-Reproduction Technique)
- Manufacture of High-Performance Adhesives and Industrial Adhesive Removers
- Solvent for Slimicides Used in the Manufacture of Paper and Paperboard
- Dispersing Agent for Pigments
- Reaction Medium in the Synthesis of Organic Intermediates and Pharmaceuticals

This brochure presents basic information on appropriate precautions for the safe handling and storage of NMP. Additional information on physical properties, applications and toxicology is available from BASF Corporation.



N-Methylpyrrolidone (NMP) is the lactam of 4-methylaminobutyric acid and a very weak base. NMP is a chemically stable and powerful polar solvent. These characteristics are highly useful in a variety of chemical reactions where an inert medium is of concern. Despite the stability of NMP, it can also play an active role in certain reactions: hydrolysis, oxidation, condensation, conversion with chlorinating agents, polymerization and o-alkylation, and related reactions.

Applications

Recovery of Pure Hydrocarbons in Petrochemical Processing

A well-established application for NMP is the large-scale recovery of hydrocarbons by extractive distillation. This technique utilizes the high solubility of hydrocarbons in NMP and the fact that differences in volatility are sometimes considerably increased in the presence of NMP. Compared to other commercial solvents and extraction media, NMP offers the following advantages: no azeotropes are formed with hydrocarbons; NMP is very resistant to heat and chemicals; and NMP has a favorable toxicological and environmental profile.

Desulfurization of Gases

High concentrations of acidic compounds are often present in natural or synthesis gases. Examples are hydrogen sulfide, carbon oxysulfide, carbon dioxide and organic sulfur compounds. Rather than applying a chemical process, they are removed by physical scrubbing in several stages with a mixture of NMP, alcohol and water.

Plastics

NMP is a widely used industrial solvent for natural and synthesis plastics, waxes, resins and various types of paints. It dissolves polymers, such as cellulose derivatives, polyamides, polyimides, polyesters, polystyrene, polyacrylonitrile, polyvinyl chloride, polyvinyl pyrrolidone, polyvinyl acetate, polyurethanes, polycarbonates, polyethersulfones, polysulfones, polyethers and many copolymers.

Surface Coatings

NMP is a non-corrosive high boiler with excellent solvent power and chemical resistance. Thus, NMP improves the properties of many surface coating systems. In particular, these effects are favorable for baked coatings that are cured at relatively high temperatures. NMP allows the production of highly filled paints and finishes. Since it improves the rheological properties, paints with superior flow-out and covering power are obtained. Hence, the coatings are more homogeneous, non-porous and non-cratering, and they display greater resistance to chemicals and higher mechanical strength.

Paint Stripping and Cleaning

Due to its high solvating power for plastics, resins, oil and grease, NMP has been successfully employed as an ingredient in paint removers, cleaners and degreasers. NMP can be used alone or in blends for removal of oil, carbon deposits and other tarry polymeric residues from metal chambers, pistons and cylinders, as well as for wet cleaning of combustion engines.

Plant Protection

NMP can be used as a solvent or co-solvent for the formulation of insecticides, fungicides, herbicides, seed treatment products and bioregulators where highly polar compounds are required. NMP is given preference over other highly polar solvents because it is exempt from the requirement of a tolerance when used as a solvent or co-solvent in pesticide formulations applied to growing crops, and it possesses a favorable toxicological and environmental profile.

Electronic Equipment Manufacture

The production of integrated circuits (ICs) calls for products of very high purity. The Electronic Grade NMP exceeds in all points the standard established by SEMI (Semiconductor Equipment and Materials Institute). This makes NMP a desired solvent for the electronic industry and producers of printed circuit boards. Blends of NMP with common solvents are utilized for the cleaning and degreasing of single-crystal silicon wafers for IC