1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: N-Methylpyrrolidone

OTHER/GENERIC NAMES: NMP, 1-Methyl-2-pyrrolidone.

PRODUCT USE: Solvent

MANUFACTURER: Honeywell, Burdick & Jackson
1953 South Harvey Street
Muskegon, MI 49442

FOR MORE INFORMATION CALL: (Monday-Friday, 8:00am-5:00pm)
1-800-368-0050

IN CASE OF EMERGENCY CALL:
(24 Hours/Day, 7 Days/Week)
1-800-707-4555 (Honeywell)

For Transportation Emergencies:
1-800-424-9300 (CHEMTREC - Domestic)
703-527-3887 (CHEMTREC - International)

2. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>CAS NUMBER</th>
<th>WEIGHT %</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Methylpyrrolidone</td>
<td>872-50-4</td>
<td>100%</td>
</tr>
</tbody>
</table>

Trace impurities and additional material names not listed above may also appear in Section 15 toward the end of the MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Combustible liquid and vapor. Causes skin, eye and respiratory tract irritation. Harmful if swallowed, inhaled or absorbed through the skin.

POTENTIAL HEALTH HAZARDS

SKIN: Can cause itching, redness, scaling and hives. Quickly absorbed through the skin and is capable of transporting other dissolved toxins into the body.

EYES: Can cause irritation and corneal burns.
INHALATION: Can cause respiratory tract irritation, headache, nausea, dizziness and drowsiness.

INGESTION: Can cause dizziness, drowsiness, nausea, vomiting, cramps, and chills.

DELAYED EFFECTS: Liver and Kidney damage can occur.

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>NTP STATUS</th>
<th>IARC STATUS</th>
<th>OSHA LIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>No ingredients listed in this section.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

SKIN: Flush affected area with large amounts of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention for irritation or any other symptom.

EYES: Immediately flush eyes with large quantities of water for at least 15 minutes. Get immediate medical attention.

INHALATION: Remove victim to fresh air. If breathing has stopped, apply artificial respiration. If breathing is difficult, give oxygen provided a qualified operator is available. Get immediate medical attention.

INGESTION: If person is conscious, rinse mouth with water. Patient may drink water or milk to dilute stomach contents. Do not induce vomiting unless directed to do so by medical personnel. Get immediate medical attention.

ADVICE TO PHYSICIAN: No specific advice. Treat according to symptoms present.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: 187°F (88°C)
FLASH POINT METHOD: Closed Cup
AUTOIGNITION TEMPERATURE: 346°C
UPPER FLAME LIMIT (volume % in air): 9.5%
LOWER FLAME LIMIT (volume % in air): 1.3%
FLAME PROPAGATION RATE (solids): Not Applicable
OSHA FLAMMABILITY CLASS: Combustible Liquid

EXTINGUISHING MEDIA:
Carbon Dioxide, Dry Chemical, or Foam.
6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (Always wear recommended personal protective equipment.)

Eliminate sources of ignition. Isolate the spill area. Contain and recover liquid when possible. Absorb with inert absorbent and place in an approved chemical waste container. For large spills, dike up with inert material and transfer into same container. Do not allow to enter into sewers or waterways.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING: (Always wear recommended personal protective equipment.)

Keep away from heat and open flame. Use with adequate ventilation. Avoid contact with skin, eyes and clothing. Do not eat, drink or smoke in the work area. Wash thoroughly after handling.

STORAGE RECOMMENDATIONS:

Store in a cool, dry, well ventilated area away from heat and sources of ignition and incompatible materials. Keep containers upright and tightly closed. Protect containers from physical damage. Do not reuse containers. Empty containers may contain product residue and/or vapors. Label warnings apply to empty containers that have not been cleaned.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

Ensure adequate mechanical ventilation. Use local ventilation at product handling or transfer points.

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls as appropriate to prevent skin contact.
EYE PROTECTION:
Wear safety glasses with non-perforated sideshields for normal handling. Goggles or a full-face shield may be
necessary depending on quantity of material and conditions of use.

RESPIRATORY PROTECTION:
Not required for properly ventilated areas. If there is potential for inhalation of vapor or mist, use an
appropriate NIOSH approved respirator. Warning! Air-purifying respirators do not protect workers in
oxygen-deficient atmospheres.

The respirator must be selected based on contamination levels and use conditions found in the workplace, must
not exceed the working limits of the respirator and be approved by the National Institute for Occupational
Safety and Health (NIOSH) and used in accordance with Occupational Safety and Health Administration

ADDITIONAL RECOMMENDATIONS:
Provide eyewash station and safety showers convenient to work areas.

EXPOSURE GUIDELINES

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>OTHER LIMIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Methylpyrrolidone</td>
<td>None Established</td>
<td>None Established</td>
<td>10 ppm 8 hr TWA **</td>
</tr>
</tbody>
</table>

* = Limit established by Honeywell International, Inc.
** = Workplace Environmental Exposure Level (AIHA).
*** = Biological Exposure Index (ACGIH).

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:
None.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Clear
PHYSICAL STATE: Liquid
MOLECULAR WEIGHT: 99.15
CHEMICAL FORMULA: C₅H₉NO
ODOR: Amine like odor
SPECIFIC GRAVITY (water = 1.0): 1.03
SOLUBILITY IN WATER (weight %): 100%
pH: Not Applicable
BOILING POINT: 396°F (202°C)
MELTING POINT: -11°F (-24°C)
VAPOR PRESSURE: <1 mm Hg @ 68°F (20°C)
VAPOR DENSITY (air = 1.0): 3.4
EVAPORATION RATE: >1 COMPARED TO: Butyl Acetate = 1
% VOLATILES: ~100
FLASH POINT: 187°F (88°C)
(Flash point method and additional flammability data are found in Section 5.)

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):
Stable under normal conditions of use and storage. Avoid heat, flames, ignition sources and incompatible material.

INCOMPATIBILITIES:
Oxidizers, and strong acids.

HAZARDOUS DECOMPOSITION PRODUCTS:
Thermal decomposition may produce carbon monoxide, carbon dioxide, and nitrogen oxides.

HAZARDOUS POLYMERIZATION:
Not expected to occur.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:
Oral-Rat LD₅₀: 3914 mg/ kg.
Oral-Mouse LD₅₀: 5130 mg/ kg.
Dermal Approximate LD₅₀ (rabbit): 4000-8000 mg/ kg (intact skin) and 2000-4000 mg/ kg(abraded skin).
Dermal Irritation (rabbit): slight irritation, Primary Dermal Irritation Index of 0.5/ 8.0.
Eye (rabbit): severe irritation.

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:

Subchronic:
In a repeated dose study in which mice were fed dietary concentrations of 0, 1,000, 2,500, or 7500 ppm over a 3-month period, concentrations of 2500 and 7500 produced toxic effects of the liver. The study concluded that 1000 ppm was a NOAEL level.
Chronic:
Rats were exposed to vapor concentrations of 0, 40 (10 ppm), or 400 mg/ m³ (100 ppm) 6 hr/ d, 5 d/ wk for 2 years. No life-shortening toxic or carcinogenic effect was observed at any level. The body weight of males exposed to 400 mg/ m³ was reduced slightly, while a NOEL was determined to be 40 mg/ m³.

OTHER DATA:

Reproductive/Developmental Toxicity:
Three inhalation developmental/ reproductive studies in rats showed toxicological effects in the offspring, with a fourth study giving indications of behavioral problems, making that the endpoint of concern. Data from these studies indicate an inhalation NOEL of approximately 100 ppm (400 mg/ m³) for reproductive/ developmental effects in rats.

For rats exposed dermally, the fetal and maternal NOAEL is reported to be 237 mg/ kg/ day. Developmental effects were observed at the maternally toxic level of 750 mg/ kg/ day.

Mutagenicity:
Ames Test: Negative
Mouse Micronucleous Test: Negative, after single oral doses up to 3800 mg/ kg.
Chinese Hamster Bone Marrow Test: Negative, after single oral doses up to 3800 mg/ kg.

12. ECOLOGICAL INFORMATION

No data reported.

13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded?  Not listed.
If yes, the RCRA ID number is:  Not Applicable.
OTHER DISPOSAL CONSIDERATIONS:
Whatever cannot be saved for recovery or recycling should be managed in an approved waste disposal facility. Dispose of container and unused contents in accordance with federal, state and local requirements.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

Proper DOT Shipping Description:
- Domestic non-bulk shipment (119 gal or less): Not Regulated
- Domestic bulk shipment (> 119 gal): Combustible Liquid, N.O.S. (N-Methylpyrrolidone), NA 1993, III.

Label(s) or Placards Required:
- Domestic non-bulk shipment (119 gal or less): None Required.
- Domestic bulk shipment (> 119 gal): Combustible Placard.


For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: On the TSCA Inventory.

OTHER TSCA ISSUES: TSCA Section 4(a) Final Testing Consent Orders
TSCA Section 8(a) Inventory Update Rule
TSCA Section 12(b) One-Time Export Notification. Notice required only for first export or intended export to a particular country.

SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>SARA/CERCLA RQ (lb)</th>
<th>SARA EHS TPQ (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No ingredients listed in this section.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.


SARA 313 TOXIC CHEMICALS: The following ingredients are SARA 313 "Toxic Chemicals". CAS numbers and weight percents are found in Section 2.

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Methylpyrrolidone [872-50-4]</td>
<td>De Minimis concentration is 1.0%.</td>
</tr>
</tbody>
</table>

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>WEIGHT %</th>
<th>COMMENT</th>
</tr>
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<tbody>
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</table>

ADDITIONAL REGULATORY INFORMATION:
N-Methylpyrrolidone is on the California Proposition 65 List of chemicals known to the State to cause reproductive toxicity.

WHMIS CLASSIFICATION (CANADA):
Class B, Division 3.
This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by the Controlled Products Regulations.

FOREIGN INVENTORY STATUS:
N-Methylpyrrolidone is on the following inventories:
- Australian.
- Canadian DSL.
- Chinese.
- EINECS.
- Japanese (ENCS).
- Korean.
- Philippine (PICCS).

16. OTHER INFORMATION

PREVIOUS ISSUE DATE: June, 2000
CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:
Amended Hazards Identification, Section 3.
Amended First Aid Measures, Section 4.
Amended Personal Protective Equipment, Section 8.
Amended Exposure Guidelines, Section 8.
Amended Toxicological Information (Other Data), Section 11.
Amended Transport Information, Section 14.
Amended Other TSCA Issues, Section 15.
Amended Additional Regulatory Information, Section 15.
Amended Foreign Inventory Status, Section 15.

OTHER INFORMATION:  NFPA Rating:
Health: 2
Flammability: 1
Reactivity: 0