

## Safety Data Sheet

### 1. Chemical product and company identification

Product name : N-METHYL-2-PYRROLIDINONE

#### Company information

Name of manufacturer : KANTO CHEMICAL CO., INC.  
Address : 2-1, Nihonbashi, Muromachi 2-Chome, Chuo-Ku, Tokyo, 103-0022, Japan  
Name of section : Electronic materials division technical department  
Telephone number : +81-3-6214-1080  
Facsimile number : +81-3-3241-1043  
Mail address : el-info@kanto.co.jp  
Reference No : GE00039 1.4  
Recommended uses and restrictions : Electronic chemicals

### 2. Hazards identification

#### GHS classification

|                |                                                    |                                                       |
|----------------|----------------------------------------------------|-------------------------------------------------------|
| Health hazards | Skin corrosion/irritation                          | Category 2                                            |
|                | Serious eye damage/eye irritation                  | Category 2A                                           |
|                | Reproductive toxicity                              | Category 1B                                           |
|                | Specific target organ toxicity (single exposure)   | Category 3 (narcosis)                                 |
|                | Specific target organ toxicity (repeated exposure) | Category 2 (nervous system, lung, liver, bone marrow) |

Hazard pictograms



Signal word : Danger

Hazard statements : Causes skin irritation  
Causes serious eye irritation  
May cause drowsiness or dizziness  
May damage fertility or the unborn child  
May cause damage to organs (nervous system, lung, liver, bone marrow) through prolonged or repeated exposure

#### Precautionary statements

Prevention : Do not handle until all safety precautions have been read and understood.  
Do not breathe mist/vapors.  
Wash hands, forearms and face thoroughly after handling.  
Use only outdoors or in a well-ventilated area.  
Wear protective gloves/protective clothing/eye protection/face protection.

Response : IF ON SKIN: Wash with plenty of water.  
IF INHALED: Remove person to fresh air and keep comfortable for breathing.



|          |                                                                                                                                                                             |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.                                            |
|          | IF exposed or concerned: Get medical advice/attention. Call a POISON CENTER or doctor if you feel unwell. Get medical advice/attention if you feel unwell.                  |
|          | If skin irritation occurs: Get medical advice/attention. If eye irritation persists: Get medical advice/attention. Take off contaminated clothing and wash it before reuse. |
| Storage  | : Store in a well-ventilated place. Keep container tightly closed. Store locked up.                                                                                         |
| Disposal | : Dispose of contents/container to hazardous or special waste collection point, in accordance with local, regional, national and/or international regulation.               |

### 3. Composition/information on ingredients

|                                     |                                                       |
|-------------------------------------|-------------------------------------------------------|
| Distinction of substance or mixture | : Substance                                           |
| Synonyms                            | : NMP, 1-Methyl-2-pyrrolidone, N-Methyl-2-pyrrolidone |

| Chemical name            | Concentration (%) | Formula                                          | TSCA   | EC-No.    | CAS RN   |
|--------------------------|-------------------|--------------------------------------------------|--------|-----------|----------|
| N-Methyl-2-pyrrolidinone | min. 99.5         | CH <sub>3</sub> NC <sub>4</sub> H <sub>6</sub> O | Listed | 212-828-1 | 872-50-4 |

### 4. First aid measures

#### First aid measures

|                                       |                                                                                                                                                                                         |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| First-aid measures after inhalation   | : Remove the victim to fresh air, and make him blow his nose and gargle.                                                                                                                |
| First-aid measures after skin contact | : Wash the affected areas under running water.                                                                                                                                          |
| First-aid measures after eye contact  | : Wash the affected areas under running water for at least 15 minutes. Get medical treatment.                                                                                           |
| First-aid measures after ingestion    | : The chemical is volatile. Do not induce vomiting because it increases the risk of aspiration into the lungs. Get medical attention immediately. If necessary, rinse mouth with water. |
| Self protection of the first-aiders   | : Rescuers should wear proper protective equipment like rubber gloves, goggles.                                                                                                         |

### 5. Fire fighting measures

|                                 |                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Suitable extinguishing media    | : Water, dry chemical powder, carbon dioxide, dry sand                                                                                                                                                                                                                                                                          |
| Unsuitable extinguishing media  | : None                                                                                                                                                                                                                                                                                                                          |
| Firefighting instructions       | : Move containers from fire area if it can be done without risk, if not possible, apply water from a safe distance to cool and protect surrounding area.<br>Fight fire from windward.<br>Dry chemical powder, carbon dioxide or dry sand should be used for small fires. Foam extinguisher is effective for a large scale fire. |
| Personal protection (Emergency) | : Firefighters should wear protective equipment.                                                                                                                                                                                                                                                                                |



response)

## 6. Accidental release measures

### Personal Precautions, Protective Equipment and Emergency Procedures

General measures : Wear proper protective equipment and avoid contact with skin and inhalation of vapor. Conduct operations from upwind and evacuate people downwind. Remove all sources of ignition. Keep away personnel except for authorized ones from spillage area by stretching ropes.

### Environmental precautions

Environmental precautions : Attention should be given to avoid discharge of spilled product into rivers and resulting environmental damage. When diluting spill with large amounts of water, discharge of untreated wastewater into the environment must be avoided.

### Methods and Equipment for Containment and Cleaning up

For containment : Absorb spill with inert material (e.g, diatomaceous earth, sand) and flush spillage area with copious amounts of water.

Prevention Measures for Secondary Accidents : Remove nearby sources of ignition and prepare extinguishing media.

## 7. Handling and storage

### Handling

Technical measures : Wear proper protective equipment to avoid contact with skin or inhalation of vapor. Fire is strictly prohibited.  
Ventilate well at working places.

Precautions for safe handling : Use with an enclosed system or a local exhaust ventilation. Use in well-ventilated areas.  
Do not allow contact with oxidizing substances.

### Storage

Storage conditions : Store the bottle tightly closed in a cool, dark place because the substance is hygroscopic.

Material used in packaging/containers : Glass, stainless steel.  
Do not use polyvinyl chloride resin, polystyrene.

## 8. Exposure controls / Personal protection equipment

Appropriate engineering controls : Use with an enclosed system or a local exhaust ventilation.

### Protective equipment

Respiratory protection : If necessary, wear chemical cartridge respirator with an organic vapor cartage

Hand protection : Impervious protective gloves

Eye protection : Safety goggles

Skin and body protection : Protective clothing, protective boots

## 9. Physical and chemical properties

Physical state : Liquid



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|                                                 |                                                                                                 |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------|
| Color                                           | : Colorless - pale yellow                                                                       |
| Odor                                            | : Amine like                                                                                    |
| pH                                              | : No data available                                                                             |
| Melting point                                   | : -24.4 ° C                                                                                     |
| Freezing point                                  | : No data available                                                                             |
| Boiling point                                   | : 202 ° C                                                                                       |
| Flash point                                     | : 95 ° C                                                                                        |
| Auto-ignition temperature                       | : 346 ° C                                                                                       |
| Decomposition temperature                       | : No data available                                                                             |
| Flammability                                    | : Flammable                                                                                     |
| Vapor pressure                                  | : 0.32 hPa (20°C)                                                                               |
| Relative density                                | : No data available                                                                             |
| Density                                         | : 1.027 g/cm <sup>3</sup> (25°C)                                                                |
| Relative gas density                            | : 3.4                                                                                           |
| Solubility                                      | : Water: Miscible. Organic solvents: Readily soluble in ethanol, chloroform, diethylether, etc. |
| Partition coefficient n-octanol/water (log Pow) | : -0.54                                                                                         |
| Explosive limits (Vol-%)                        | : 0.9 - 3.9 Vol-%                                                                               |
| Viscosity, kinematic:                           | : 1.84 mm <sup>2</sup> /s (25°C)                                                                |
| Particle characteristics                        | : No data available                                                                             |

## 10. Stability and reactivity

|                                    |                                          |
|------------------------------------|------------------------------------------|
| Reactivity                         | : May react with oxidizing substances.   |
| Chemical stability                 | : Stable under normal conditions.        |
| Possibility of hazardous reactions | : Stable under normal conditions of use. |
| Conditions to avoid                | : Light, heat.                           |
| Incompatible materials             | : Oxidizing substances.                  |
| Hazardous decomposition products   | : Carbon monoxide, nitrogen oxides.      |

## 11. Toxicological information

|                                     |                                                                                                                                                                                                                                                                                             |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Acute toxicity (oral)               | : No classification<br>rat LD50=3500mg/kg                                                                                                                                                                                                                                                   |
| Acute toxicity (dermal)             | : No classification<br>rabbit LD50=6000mg/kg                                                                                                                                                                                                                                                |
| Acute toxicity (inhalation)         | : No classification (gas)<br>Classification not possible (vapor)<br>No classification (dust, mist)                                                                                                                                                                                          |
| Acute toxicity (mist) - Description | : In rats that underwent head-only inhalation exposure (4 hours), mortality was not observed at 5.1mg/L. Based on the saturated vapor pressure concentration of approximately 1.7mg/L, the tests were thought to be conducted under the mist state. Thus, the substance was not classified. |



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|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Skin corrosion/irritation     | : Causes skin irritation<br>There was a description that in humans (n=50) who repeatedly received 24-hour patch tests on scratched skin for 15 times, slight to moderate temporary irritation was induced, and similarly, the substance caused skin irritation and contact dermatitis in humans. In rabbit Draize tests, slight erythema (Draize score=0.5 equivalent to Not classified) was observed and in topical tests in which guinea pigs were treated with an aqueous solution containing the substance, slight erythema (shown in 2 out of 10 treated guinea pigs) was observed only at 50% solution. However, application of the substance to the skin of rabbits for 5 to 15 minutes caused severe erythema. Taking the skin irritation potential to humans into account, it was classified into category 2.                                                                                                           |
| Serious eye damage/irritation | : Causes serious eye irritation<br>The substance has been documented to have effects on humans in such forms as severe eye irritation and chronic eye irritation. In Draize tests on rabbits, corneal clouding, iritis, and conjunctivitis were observed, and these symptoms disappeared within 21 days. Also, in another test using rabbits, corneal clouding, redness, and swelling were observed, and these symptoms continued even after 8 days. Furthermore, in other rabbit tests, the substance was documented to cause moderate eye irritation. Based on these effects observed in animals and humans, it was classified into category 2A.                                                                                                                                                                                                                                                                               |
| Respiratory sensitization     | : Classification not possible                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Skin sensitization            | : Classification not possible<br>In a guinea pig sensitization test, no sensitization was observed. Fifty humans, who repeatedly received 24-hour patch tests on scratched skin 15 times, showed no signs of sensitization. In both cases, the details of test conditions are unknown. Meanwhile, workers occupationally exposed to the substance developed contact dermatitis and skin symptoms. Based on the above information, the classification was not possible.                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Germ cell mutagenicity        | : No classification<br>Negative results in micronuclei test using rats and chromosome aberration test using Chinese hamster. Ames tests also yielded negative results.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Carcinogenicity               | : Classification not possible<br>There is no human data on carcinogenicity. Animal studies have shown that in 2-year exposure tests of carcinogenicity by inhalation route and oral route (feeding administration) in rats, no evidence of tumor induction was found. Meanwhile, in 18-month exposure tests of carcinogenicity by oral route (feeding administration) in mice, hepatocellular carcinoma or hepatocellular adenoma were noted in male mice, increase in liver foci of cellular alteration was noted in male and female mice, which suggests increases in peroxisome proliferating action or cell proliferation effect as mechanism of the liver tumor in mice. As mentioned above, conflicting results among animal species were obtained. Moreover, there is no classification results on carcinogenicity by international organizations. Thus, the classification is not possible because of insufficient data. |



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|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reproductive toxicity | : May damage fertility or the unborn child<br>In reproductive toxicity tests by oral and inhalation routes in rats, there were no adverse effects on fertility of parent animals even at dosing levels toxic to parent animals. However, in developmental toxicity tests by oral route in pregnant rats and rabbits during organogenesis, developmental effects including skeleton malformation in fetuses were observed at dosing levels toxic to dams. Skeleton malformation, which is also found in rats on dermal route, is fetal evidence seen at doses that causes maternal toxicity such as suppression of body weight gain. However, skeleton malformation induction was judged to be evidence to suggest serious reproductive toxicity effects of the substance, taking into account description that fetotoxicity and malformation are not secondary effects of maternal toxicity. Thus, the substance was classified into category 1B. |
| STOT-single exposure  | : May cause drowsiness or dizziness<br>The substance causes respiratory tract irritation in animals. In humans, the substance causes severe eye irritation and headache, but in inhalation tests using volunteers there is no report of respiratory tract irritation. Animal studies have shown that inhalation exposure test in rats at 5,100 mg/m <sup>3</sup> (5.1 mg/L) (mixture of vapor and aerosol) caused no deaths. During exposure, tachypnea, irregular respiration, breathlessness, and decline in pain reflex were noted, and tachypnea was noted after exposure. In oral administration tests in rats and mice at 519 mg/kg, incoordination was reported. Based on the above information, the substance was judged to have no respiratory tract irritation in humans. Decline in pain reflex and incoordination in rats suggests anesthetic actions. Thus, the substance was classified into category 3 (narcosis).                 |



STOT-repeated exposure : May cause damage to organs (nervous system, lung, liver, bone marrow) through prolonged or repeated exposure  
There is no human data. Toxicity of inhalation exposure is strongly affected by proportion of aerosol to vapor and exposure range (head-only exposure or whole-body exposure). Regarding experimental animals, in 2-week inhalation toxicity test in rats, head-only exposure at 1,000 mg/m<sup>3</sup> (0.11 mg/L as guidance value) caused only slight nasal irritation, but whole-body exposure at the same concentration (coarse droplets and high relative humidity) caused massive mortality (8-9/10 subjects), apathy, irregular respiration, convulsions, tremors, decreases in body weight/weight gain, irritation in the nasal region, and in dead animals, severe adverse effects on organs and tissues (congestion of almost all organs, lymphocyte depletion and necrosis of spleen, panmyelophthisis, gelatinous bone marrow, and cell depletion of bone marrow, pulmonary edema and multiple purulent pneumonia of lung, necrotic degeneration of liver, ulcer of glandular stomach, and increased adrenal gland weight) were noted. In a 4-week repeated inhalation toxicity test in rats (exposure was cancelled on day 10 at high dosing levels due to massive mortality), at 1,000 mg/m<sup>3</sup> (0.11 mg/L as guidance value), death or sacrifice (13/30), lethargy, irregular respiration, dyspnea, and in death animals, edema and congestion of lung, bone marrow hypoplasia, atrophy and/or necrosis of the thymus gland, spleen, and lymph node (lymphoid tissue) were observed. The maximum vapor phase at room temperature is 1318 mg/m<sup>3</sup> in dry air (0% relative humidity), 412 mg/m<sup>3</sup> at normal humidity (60% relative humidity), and 0 mg/m<sup>3</sup> in wet air (100% relative humidity). Because it is considered that above-mentioned 1,000 mg/m<sup>3</sup> is not vapor, but contains mist, the substance was classified into category 2 (nervous system, lung, liver, bone marrow) based on classification of mist.

Aspiration hazard : Classification not possible

## 12. Ecological information

### Ecotoxicity

Aquatic acute : No classification  
Daphnia magna EC50>1000mg/L/24h  
Aquatic chronic : No classification

### Persistence and degradability

Readily biodegradable  
BOD : 73% (NO<sub>2</sub>), 94% (NH<sub>3</sub>)

### Bioaccumulative potential

Low bioconcentration  
log Pow : -0.54

### Mobility in soil

High mobility  
Koc : 4.6

### Hazardous to the ozone layer

Hazardous to the ozone layer : Classification not possible



### 13. Disposal considerations

|                                      |   |                                                                                                                                             |
|--------------------------------------|---|---------------------------------------------------------------------------------------------------------------------------------------------|
| Ecological waste information         | : | Burn in a chemical incinerator equipped with an afterburner and a scrubber. Or entrust approved waste disposal companies with the disposal. |
| Contaminated container and packaging | : | In case of disposal of empty bottles, dispose bottles after removing the content thoroughly.                                                |

### 14. Transport information

#### International Regulations

##### Transport by sea(IMDG)

|                                   |   |                |
|-----------------------------------|---|----------------|
| UN-No. (IMDG)                     | : | Not applicable |
| Proper Shipping Name (IMDG)       | : | Not applicable |
| Packing group (IMDG)              | : | Not applicable |
| Transport hazard class(es) (IMDG) | : | Not applicable |

##### Air transport(IATA)

|                                   |   |                |
|-----------------------------------|---|----------------|
| UN-No. (IATA)                     | : | Not applicable |
| Proper Shipping Name (IATA)       | : | Not applicable |
| Packing group (IATA)              | : | Not applicable |
| Transport hazard class(es) (IATA) | : | Not applicable |

|                  |   |                |
|------------------|---|----------------|
| Marine pollutant | : | Not applicable |
|------------------|---|----------------|

##### Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

|                    |   |   |
|--------------------|---|---|
| Pollutant category | : | Y |
|--------------------|---|---|

### 15. Regulatory information

Regulatory information with regard to this substance in your country or region should be examined by your own responsibility.

### 16. Other information

|              |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data sources | : | Dictionary of Organic Compounds, The society of Synthetic Organic Chemistry, Kodansha Ltd. (1985) .<br>Solvents Handbook, T, Asahara el, Kodansha Scientific Ltd. (1976) .<br>Dangerous Properties of Industrial Materials, 6th ed. N. I. Sax Van Nostrand Reinhold Company (1984) .<br>Handbook of 17322 Chemical Products, The Chemical Daily Co. (2022) .<br>NITE Chemical Risk Information Platform (NITE-CHRIP), National Institute of Technology and Evaluation. |
|--------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

The information contained herein is based on several references and the present state of our knowledge. However the SDS does not always cover all information about the product, handle the product carefully. The information is intended to ordinary usage, in case of particular handlings, conduct appropriate safety measurements. The information herein is only provision of information, and it does not represent a guarantee the properties of the product.

