| Ministry of Employment and Labor | Material Safety Data Sheet | Industrial Accident Prevention<br>Korea Occupational Safety and Health Agency (KOSHA) |
|---|---|---|

AA00569-0000000025

※ Please make sure to use it with the MSDS number applied.

## 1. PRODUCT AND COMPANY IDENTIFICATION

A. Product Name: N,N-Dimethylacetamide

B. Recommended Use and Restrictions on Use

| | |
|---|---|
| Recommended Use | Raw materials and intermediates, Solvents and extractants |
| Restrictions on Use | For industrial use only |

C. Supplier Information (For imports, provide local supplier information for emergency contact)

| | |
|---|---|
| Company Name | GloryGlobal Co., Ltd. |
| Address | Room 1004, Seoul-Technopark, inside Seoul Tech, 232, Gongneung-ro, Nowon-gu, Seoul, Korea 01811 |
| Emergency Contact Number | 82-2-6223-0862 |

D. Additional Manufacturer/Supplier Information

No data available

## 2. Hazards identification

A. Hazard Classification

Acute toxicity (dermal) : Category 4

Acute toxicity (inhalation: vapor) : Category 3

Serious eye damage/eye irritation : Category 2

Carcinogenicity : Category 2

Reproductive toxicity : Category 1B

B. Warning Label Elements (including precautionary statements)

Pictogram

Signal word: Danger

Hazard Statements

H312 Harmful in contact with skin

H319 Causes serious eye irritation

H331 Toxic if inhaled

H351 Suspected of causing cancer

H360 May damage fertility or the unborn child

Precautionary Statements

Prevention

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and understood.

P261 Avoid breathing dust/fume/gas/mist/vapors/spray.

P264 Wash thoroughly after handling.

P271 Use only outdoors or in a well-ventilated area.

| | |
|---|---|
| | P280 Wear protective gloves/protective clothing/eye protection/face protection. |
| Response | P302+P352 IF ON SKIN: Wash with plenty of water. |
| | P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing. |
| | P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| | P308+P313 IF exposed or concerned: Get medical advice/attention. |
| | P311 Call a POISON CENTER/doctor. |
| | P312 Call a POISON CENTER/doctor if you feel unwell. |
| | P321 Specific treatment (see on this label). |
| | P337+P313 If eye irritation persists: Get medical advice/attention. |
| | P362+P364 Take off contaminated clothing and wash it before reuse. |
| Storage | P403+P233 Store in a well-ventilated place. Keep container tightly closed. |
| | P405 Store locked up. |
| Disposal | P501 Dispose of contents/container in accordance with local/regional/national/international regulations. |

C. Other hazards not included in the classification criteria (e.g., dust explosion hazard)

## 3. Composition / Information on Ingredients

| Chemical Name | Common Name and Synonyms | CAS Number | Content (%) |
|---|---|---|---|
| N,N-Dimethylacetamide | DMAC; Acetic acid dimethylamide; Dimethyl acetamide; DMA | 127-19-5 | 100% |

## 4. First Aid Measures

A. Eye Contact

If in eyes, rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.

If eye irritation persists, get medical advice/attention.

B. Skin Contact

Get emergency medical attention.

Remove contaminated clothing and shoes, and isolate the affected area.

In case of contact with the substance, immediately rinse skin and eyes with running water for at least 20 minutes.

In case of minor skin contact, prevent the spread of contamination.

C. Inhalation

If exposed to excessive dust or fumes, move the person to fresh air. If coughing or other symptoms occur, seek medical attention.

Get medical advice/attention.

D. Ingestion

Get emergency medical attention immediately.

If the substance has been ingested or inhaled, do not perform mouth-to-mouth resuscitation. Use appropriate respiratory medical equipment instead.

E. Notes to Physician

Ensure medical personnel are aware of the substance involved and take appropriate protective measures.

## 5. Fire-Fighting Measures

A. Suitable (and unsuitable) extinguishing media

Use alcohol-resistant foam, carbon dioxide ($CO_2$), or water spray for fires involving this material.

Use dry sand or earth to extinguish fire by smothering.

B. Specific hazards arising from the chemical

Thermal decomposition or combustion may produce irritating and highly toxic gases.

Containers may explode when heated.

The substance may burn but does not ignite easily.

Non-flammable: the substance itself does not burn, but may decompose when heated to release corrosive and/or toxic fumes.

C. Special protective equipment and precautions for fire-fighters

Firefighters should wear appropriate protective equipment.

Fight fire from a safe distance and from upwind.

Be cautious, as the substance may become molten and flow.

Dike fire control water to prevent spreading; do not allow runoff to enter drains or waterways.

If safe to do so, move containers away from the fire area.

For tank fires, fight from maximum distance or use unmanned hose holders or monitor nozzles.

Even after the fire is extinguished, cool containers with large amounts of water.

In case of tank fire, evacuate the area immediately if there is a rising sound from the pressure-relief device or discoloration of the tank is observed.

Evacuate immediately if the tank is engulfed in flames.

In the case of a large-scale tank fire, use unmanned equipment if possible. If not, withdraw and allow the fire to burn under control.

## 6. Accidental Release Measures

A. Personal precautions, protective equipment, and emergency procedures

Wipe up spills immediately and follow precautions listed under personal protective equipment.

Remove all sources of ignition.

Stop the leak if it is safe to do so.

Do not touch damaged containers or spilled material without appropriate protective clothing.

Cover the spill with plastic sheeting to prevent spreading.

Be aware of incompatible materials and conditions to avoid.

Avoid inhalation of dust, fume, gas, mist, vapors, or spray.

B. Environmental precautions

Prevent entry into waterways, sewers, basements, or confined areas.

C. Methods and materials for containment and cleaning up

Absorb spill with inert material (e.g., dry sand or earth) and place in a chemical waste container.

Suppress airborne dust and prevent dispersion by moistening with water.

Absorb liquid and clean the contaminated area with detergent and water.

## 7. Handling and Storage

A. Precautions for safe handling

Even after the container is emptied, residue may remain. Follow all MSDS and label precautions.

Use with caution during handling and storage.

Open caps carefully before use.

Be aware of incompatible materials and conditions.

Refer to engineering controls and personal protective equipment for proper handling.

Avoid inhalation of dust, fumes, gas, mist, vapors, or spray.

Wash thoroughly after handling.

B. Conditions for safe storage, including any incompatibilities

Handle only outdoors or in a well-ventilated area.

Completely drain empty drums, seal them properly, and return to drum handler or dispose of appropriately without delay.
Store containers tightly sealed in a well-ventilated area.

## 8. Exposure Controls / Personal Protection

A. Exposure limits

| | |
|---|---|
| Korean Regulation | TWA - 10ppm |
| ACGIH | TWA 10 ppm |
| Biological Exposure Index (BEI) | Not available |
| Other exposure limits | Not available |

B. Appropriate engineering controls

Use process isolation, local exhaust ventilation, or other engineering controls to keep airborne levels below exposure limits.

If dust, fumes, or mist are generated during operation, provide adequate ventilation to maintain concentrations below the exposure limits.

Install eyewash stations and safety showers in facilities where the substance is stored or used.

C. Personal protective equipment

Respiratory protection

Wear respiratory protection certified by the Korea Occupational Safety and Health Agency (KOSHA) suitable for the physical/chemical properties of the exposed gas or liquid.

If exposure concentration is below 100 ppm, use a half-face respirator with appropriate filters or cartridges.

If exposure is below 250 ppm, use a loose-fitting powered air-purifying respirator (PAPR) with suitable filter/cartridge, or a continuous-flow dust/mist respirator (for liquid aerosols).

If exposure is below 500 ppm, use a full-face respirator, powered half-face respirator, or continuous-flow/pressure-demand supplied-air respirator.

If exposure is below 10,000 ppm, use a full-face or hood/helmet-type pressure-demand supplied-air respirator.

If exposure is below 100,000 ppm, use a self-contained breathing apparatus (SCBA) or pressure-demand SCBA.

Eye protection

To protect against eye irritation or harmful vapors, wear safety goggles or chemical splash-proof goggles.

Install eyewash stations and emergency showers near work areas.

Hand protection

Select gloves based on the physical and chemical properties of the material.

Body protection

Protective clothing should be made of materials appropriate to the chemical's physical and chemical properties.

## 9. Physical and Chemical Properties

Product Characteristics

| Item | | Description |
|---|---|---|
| A. Appearance (physical state, color) | Physical state | Liquid |
| | Color | Colorless |
| B. Odor | | Mild ammonia or amine-like odor (fishy smell) |
| C. Odor threshold | | Not available |
| D. pH | | Not available |
| E. Melting/Freezing point | | -20 ℃ |

| | |
|---|---|
| F. Initial boiling point and boiling range | 165 ℃ |
| G. Flash point | 63 ℃ |
| H. Evaporation rate | Not available |
| I. Flammability (solid, gas) | Not available |
| J. Upper/lower flammability or explosive limits | 11.5 / 1.8 % |
| K. Vapor pressure | 2.67 hPa (25℃) |
| L. Solubility | 574.7 g/ℓ (25℃) |
| M. Vapor density | 3.01 (Air=1) |
| N. Relative density (specific gravity) | 0.94 (Water=1) |
| O. Partition coefficient (n-octanol/water) | -0.77 |
| P. Auto-ignition temperature | 490 ℃ |
| Q. Decomposition temperature | Not available |
| R. Viscosity | 0.92 cP (25℃) |
| S. Molecular weight | 87.1211 |

## 10. Stability and Reactivity

A. Chemical stability and possibility of hazardous reactions

Containers may explode when heated.

The substance may burn but does not ignite easily.

Non-flammable: the substance itself does not burn, but may decompose when heated to produce corrosive and/or toxic fumes.

May emit irritating, corrosive, or toxic gases in case of fire.

B. Conditions to avoid

Heat, sparks, open flames, and other sources of ignition.

C. Incompatible materials

Flammable substances, reducing agents.

D. Hazardous decomposition products

Irritating and highly toxic gases may be produced by thermal decomposition or combustion.

Corrosive and/or toxic fumes.

## 11. Toxicological Information

A. Information on likely routes of exposure

This substance can be absorbed through mucous membranes, eyes, and skin, potentially causing systemic effects.
(According to ACGIH and Korean Ministry of Employment and Labor Notice No. 2018-24; "Skin")

B. Health hazard information

| | | | |
|---|---|---|---|
| Acute Toxicity | Oral | N,N-Dimethylacetamide | LD50 4800 ㎎/kg Rat (female) |
| | Dermal | N,N-Dimethylacetamide | LD50 2240 ㎎/kg Rabbit (male, OECD TG 402) |
| | Inhalation | N,N-Dimethylacetamide | vapor LC50 8.8 ㎎/ℓ Rat (female, OECD TG 403) |
| Skin Corrosion/Irritation | | N,N-Dimethylacetamide | No irritation observed in rabbit test. Erythema Index: 1 (OECD TG 404) |
| Serious Eye Damage/Eye Irritation | | N,N-Dimethylacetamide | Irritating in rabbit test. Corneal Index: 2, Conjunctival Index: 2, Conjunctival Swelling Index: 2 (OECD TG 405) |
| Respiratory Sensitization | | N,N-Dimethylacetamide | Not available |
| Skin Sensitization | | N,N-Dimethylacetamide | Non-sensitizing in guinea pig study |

| | | | |
|---|---|---|---|
| Carcinogenicity | IARC | N,N-Dimethylacetamide | Not available |
| | NTP | N,N-Dimethylacetamide | Not available |
| | OSHA | N,N-Dimethylacetamide | Not available |
| | ACGIH | N,N-Dimethylacetamide | Not available |
| Carcinogenicity | Occupational Safety and Health Act (of Korea) | N,N-Dimethylacetamide | Not available |
| | Public Notice by the Ministry of Employment and Labor (MOEL) | N,N-Dimethylacetamide | Not available |
| | EU CLP | N,N-Dimethylacetamide | Not available |
| Germ Cell Mutagenicity | | N,N-Dimethylacetamide | Negative in bacterial reverse mutation test (OECD TG 471) |
| Reproductive Toxicity | | N,N-Dimethylacetamide | In 1-generation dermal reproductive toxicity study on rats: slight decrease in mating index in dams over generations, but no effect on fertility, gestation, parturition, or offspring mortality. No observed adverse effect level (NOAEL): 500 mg/kg bw/day (P, male), 1000 mg/kg bw/day (P, female), 500 mg/kg bw/day (F1a, F1b) (OECD TG 415)<br>- In rabbit developmental toxicity study: significant change in fetal weight observed; some non-statistically significant malformations noted. NOAEC = 0.7 mg/L (developmental), 2 mg/L (maternal), LOAEC = 2 mg/L (maternal) (OECD TG 414) |
| Specific Target Organ Toxicity – Single Exposure | | N,N-Dimethylacetamide | Effects on liver in mammals reported. In humans, may cause dizziness, drowsiness, weakness. Insufficient evidence for classification. |
| Specific Target Organ Toxicity – Repeated Exposure | | N,N-Dimethylacetamide | In chronic repeated exposure study on rats, liver hypertrophy observed. Other effects include alopecia, perianal discoloration in females, significant weight loss, decreased appetite, reduced hemoglobin and red blood cell count, reduced coagulation time, and changes in organ weights. No mortality observed. NOAEL: 100 mg/kg bw/day (male), 300 mg/kg bw/day (female); LOAEL: 300 mg/kg bw/day (male), 1000 mg/kg bw/day (OECD TG 453) |
| Aspiration Hazard | | N,N-Dimethylacetamide | Not available |

## 12. Ecological Information

A. Ecotoxicity

| | | |
|---|---|---|
| Fish | N,N-Dimethylacetamide | LC50 13300 ㎎/ℓ 96 hr Other species (Gambusia affinis) |
| Crustacea | N,N-Dimethylacetamide | LC50 966 ㎎/ℓ 96 hr Other species (Americamysis bahia) |
| Algae | N,N-Dimethylacetamide | EC50 > 500 ㎎/ℓ 72 hr Other species (Desmodesmus subspicatus, German Industrial Standard DIN 38412, Part 9) |

B. Persistence and degradability

| | | |
|---|---|---|
| Persistence | N,N-Dimethylacetamide | log Kow -0.77 |
| Degradability | N,N-Dimethylacetamide | Not available |

C. Bioaccumulative potential

| | | |
|---|---|---|
| Bioaccumulative | N,N-Dimethylacetamide | Not available |
| Biodegradability | N,N-Dimethylacetamide | Not available |

D. Mobility in soil

| | |
|---|---|
| N,N-Dimethylacetamide | 01 9.31 Koc |

E. Other adverse effects

| | |
|---|---|
| N,N-Dimethylacetamide | Algae: NOECDesmodesmus subspicatus > 62.5 mg/L, LOEC = 125 mg/L 72hr German Industrial Standard DIN 38412, Part 9 |

## 13. Disposal Considerations

A. Disposal methods

Not available

B. Precautions for disposal

Dispose of contents and containers in accordance with applicable regulations.

## 14. Transport Information

A. UN Number

No UN classification for hazardous materials.

B. UN Proper Shipping Name

Not applicable.

C. Transport hazard class(es)

Not applicable.

D. Packing group (if applicable)

Not applicable.

E. Marine pollutant

Data not available.

F. Special precautions for user related to transport or transport equipment

Emergency measures in case of fire:

Not applicable.

Emergency measures in case of spillage:

Not applicable.

## 15. Regulatory Information

A. Regulations under the Occupational Safety and Health Act

Substance subject to workplace environment measurement (measurement cycle: every 6 months)

Hazardous substance under control

Substance subject to special health examination (examination cycle: every 6 months)

Specially controlled substance

Substance with established exposure limits

B. Regulations under the Chemical Substances Control Act

Toxic substance

| Chemical Substance Name | CAS Number or Identifier |
|---|---|
| N,N-Dimethylacetamide | 127-19-5 |

Registered Existing Chemical Substance

| Registration No | 04-1912-00835 |
|---|---|

| | |
|---|---|
| Restricted substance | Not applicable. |
| Prohibited substance | Not applicable. |
| Pollutant release and transfer register (PRTR) substance | Not applicable. |
| Accident precaution substance | Not applicable. |

C. Regulations under the Hazardous Materials Safety Control Act

Class 4, Group 2 Petroleum (Water-soluble), 2000L

D. Regulations under the Waste Control Act

Not applicable.

E. Other domestic and international regulations

Domestic regulations No data available

International regulations:

| | |
|---|---|
| U.S. Regulatory Information(OSHA) | Not applicable. |
| U.S. Regulatory Information(CERCLA) | Not applicable. |
| U.S. Regulatory Information(EPCRA 302) | Not applicable. |
| U.S. Regulatory Information(EPCRA 304) | Not applicable. |
| U.S. Regulatory Information(EPCRA 313) | Not applicable. |
| U.S. Regulatory Information (Rotterdam Convention Substances) | Not applicable. |
| U.S. Regulatory Information (Stockholm Convention Substances) | Not applicable. |
| U.S. Regulatory Information (Montreal Protocol Substances) | Not applicable. |
| EU Classification Information (Final Classification Results) | Repr. 1B<br>Acute Tox. 4 *<br>Acute Tox. 4 * |
| EU Classification Information (Hazard Statements) | H360D ***<br>H332<br>H312 |
| EU Classification Information (Precautionary Statements) | Not applicable. |

## 16. Other Information

A. Source of Data

HSDB (Appearance)

HSDB (Odor)

HSDB (Melting/Freezing Point)

HSDB (Initial Boiling Point and Boiling Range)

ICSC (Flash Point)

ICSC (Upper/Lower Flammability or Explosive Limits)

ECHA (Vapor Pressure)

ECHA (Solubility)

ICSC (Vapor Density)

ICSC (Specific Gravity)

ICSC (Partition Coefficient n-octanol/water (Kow))

ICSC (Auto-ignition Temperature)

ECHA (Viscosity)

ChemIDPlus (Molecular Weight)

ECHA (Oral, Dermal, Inhalation Toxicity)

ECHA (Skin Corrosion/Irritation, Serious Eye Damage/Irritation, Skin Sensitization, Germ Cell Mutagenicity)

ECHA (Reproductive Toxicity, Specific Target Organ Toxicity (Repeated Exposure))

ECHA (Aquatic Toxicity – Fish, Crustacean, Algae, Persistence)

ECHA (Soil Mobility, r. Other Adverse Effects)

B. Date of first issue

2019-12-31

C. Number of revisions and Date of last revision

| | | | |
|---|---|---|---|
| Number of revisions : | 2 | Date of last revision : | 2022-05-02 |

D. Others

○ The prepared Material Safety Data Sheet (MSDS) is based on the MSDS provided by the Korea Occupational Safety and Health Agency (KOSHA), with some edits and modifications.