SAFETY DATA SHEET

1. Identification

**Product identifier:** DIMETHYLFORMAMIDE

**Other means of identification**

**Product No.:** 9213, 5362, 9344, 4929, 9222, 9221, 9220

**Recommended use and restriction on use**

**Recommended use:** Not available.

**Restrictions on use:** Not known.

**Manufacturer/Importer/Supplier/Distributor information**

**Manufacturer**

**Company Name:** Avantor Performance Materials, Inc.

**Address:** 3477 Corporate Parkway, Suite 200

Center Valley, PA 18034

**Telephone:** Customer Service: 855-282-6867

**Fax:**

**Contact Person:** Environmental Health & Safety

**e-mail:** info@avantormaterials.com

**Emergency telephone number:**

24 Hour Emergency: 908-859-2151

Chemtrec: 800-424-9300

2. Hazard(s) identification

**Hazard classification**

**Physical hazards**

- Flammable liquids: Category 3

**Health hazards**

- Acute toxicity (Inhalation - vapor): Category 4
- Serious eye damage/eye irritation: Category 2A
- Toxic to reproduction: Category 1B
- Specific target organ toxicity - single exposure: Category 3
- Specific target organ toxicity - repeated exposure: Category 1

**Environmental hazards**

- Acute hazards to the aquatic environment: Category 3

**Label elements**

**Hazard symbol:**

**Signal word:** Danger
Hazard statement: Flammable liquid and vapor. Harmful if inhaled. Causes serious eye irritation. May damage fertility or the unborn child. May cause respiratory irritation. May cause drowsiness or dizziness. Causes damage to organs through prolonged or repeated exposure. Harmful to aquatic life.

Precautionary statement

Prevention: Keep away from heat/sparks/open flames/hot surfaces. No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wear protective gloves/protective clothing/eye protection/face protection. Use only outdoors or in a well-ventilated area. Wash thoroughly after handling. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Do not breathe dust or mists. Do not eat, drink or smoke when using this product.

Response: 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 eye irritation persists: Get medical advice/attention. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Call a POISON CENTER/doctor if you feel unwell.


Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: None.

3. Composition/information on ingredients

Substances

<table>
<thead>
<tr>
<th>Chemical identity</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>Content in percent (%)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIMETHYLFORMAMIDE</td>
<td></td>
<td>68-12-2</td>
<td>98 - 100%</td>
</tr>
</tbody>
</table>

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

General information: Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.

Ingestion: Rinse mouth. Call a POISON CENTER or doctor/physician if you feel unwell.

Inhalation: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
Skin contact: IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower. If skin irritation occurs: Get medical advice/attention.

Eye contact: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Most important symptoms/effects, acute and delayed

Symptoms: Narcotic effect. Respiratory tract irritation.

Indication of immediate medical attention and special treatment needed

Treatment: Treat symptomatically. Symptoms may be delayed.

5. Fire-fighting measures

General fire hazards: Flammable liquid and vapor.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: Water spray, foam, dry powder or carbon dioxide.

Unsuitable extinguishing media: Avoid water in straight hose stream; will scatter and spread fire.

Specific hazards arising from the chemical: Vapors may cause a flash fire or ignite explosively. Vapors may travel considerable distance to a source of ignition and flash back. Prevent buildup of vapors or gases to explosive concentrations. Heat may cause the containers to explode.

Special protective equipment and precautions for firefighters

Special fire fighting procedures: Use water spray to keep fire-exposed containers cool. Water may be ineffective in fighting the fire. Fight fire from a protected location. Move containers from fire area if you can do so without risk.

Special protective equipment for fire-fighters: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures: ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Keep unauthorized personnel away. Keep upwind. Use personal protective equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. See Section 8 of the MSDS for Personal Protective Equipment.

Methods and material for containment and cleaning up: Eliminate all ignition sources if safe to do so. Take precautionary measures against static discharges. Stop leak if possible without any risk. Use only non-sparking tools. Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. Dike far ahead of larger spill for later recovery and disposal.

Notification Procedures: Prevent entry into waterways, sewer, basements or confined areas. Inform authorities if large amounts are involved.
Environmental precautions: Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so.

7. Handling and storage

Precautions for safe handling: DO NOT handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Take precautionary measures against static discharges. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Use only non-sparking tools. Wear protective gloves/protective clothing/eye protection/face protection. Avoid contact with eyes, skin, and clothing. Use only with adequate ventilation. Wash hands thoroughly after handling.

Conditions for safe storage, including any incompatibilities: Keep away from food, drink and animal feeding stuffs. Keep container tightly closed in a cool, well-ventilated place. Ground container and transfer equipment to eliminate static electric sparks. Comply with all national, state, and local codes pertaining to the storage, handling, dispensing, and disposal of flammable liquids.

8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

<table>
<thead>
<tr>
<th>Chemical identity</th>
<th>Type</th>
<th>Exposure Limit values</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIMETHYLFORMAMIDE</td>
<td>TWA</td>
<td>10 ppm</td>
<td>US. ACGIH Threshold Limit Values (2011)</td>
</tr>
<tr>
<td></td>
<td>REL</td>
<td>10 ppm 30 mg/m³</td>
<td>US. NIOSH: Pocket Guide to Chemical Hazards (2010)</td>
</tr>
<tr>
<td></td>
<td>PEL</td>
<td>10 ppm 30 mg/m³</td>
<td>US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>10 ppm 30 mg/m³</td>
<td>US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)</td>
</tr>
</tbody>
</table>

Biological limit values

<table>
<thead>
<tr>
<th>Chemical identity</th>
<th>Exposure Limit values</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIMETHYLFORMAMIDE (N-Methylformamide; Sampling time: End of shift.)</td>
<td>15 mg/l (Urine)</td>
<td>ACGIH BEL (2011)</td>
</tr>
<tr>
<td>DIMETHYLFORMAMIDE (N-Acetyl-S-(N-methylcarbamoyl) cysteine; Sampling time: Prior to last shift of work week.)</td>
<td>40 mg/l (Urine)</td>
<td>ACGIH BEL (2011)</td>
</tr>
</tbody>
</table>

Appropriate engineering controls

No data available.

Individual protection measures, such as personal protective equipment

General information: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Eye/face protection: Wear safety glasses with side shields (or goggles).

Skin protection

Hand protection: Wear protective gloves.

Other: Wear suitable protective clothing.
Respiratory protection: In case of inadequate ventilation use suitable respirator.

Hygiene measures: Provide eyewash station and safety shower. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance
- Physical state: Liquid
- Form: Liquid
- Color: Colorless

Odor: Pungent, Amine-like odor

Odor threshold: No data available.

pH: 6.7 0.5 molar aqueous solution

Melting point/freezing point: -61 °C

Initial boiling point and boiling range: 153 °C (101.3 kPa)

Flash Point: 58 °C (Closed Cup)

Evaporation rate: No data available.

Flammability (solid, gas): Class II Combustible Liquid

Upper/lower limit on flammability or explosive limits
- Flammability limit - upper (%): 15.2 %(V)
- Flammability limit - lower (%): 2.2 %(V)
- Explosive limit - upper (%): No data available.
- Explosive limit - lower (%): No data available.

Vapor pressure: 0.50 kPa (25 °C)

Vapor density: 2.51 AIR=1

Relative density: 0.95 (20 °C) 4 °C

Solubility(ies)
- Solubility in water: Miscible with water.
- Solubility (other): No data available.

Partition coefficient (n-octanol/water): -1.01

Auto-ignition temperature: 445 °C

Decomposition temperature: > 350 °C Temperatures >350°C may cause decomp to form dimethylamine and carbon dioxide, with pressure developing in closed containers.

Viscosity: No data available.

Other information
- Molecular weight: 73.09 g/mol (C3H7NO)

10. Stability and reactivity

Reactivity: No dangerous reaction known under conditions of normal use.

Chemical stability: Material is stable under normal conditions.

Possibility of hazardous reactions: Hazardous polymerization does not occur.

Conditions to avoid: Heat, sparks, flames.

Hazardous decomposition products: Thermal decomposition may produce oxides of carbon and nitrogen. Amines.

11. Toxicological information

Information on likely routes of exposure

Ingestion: May be harmful if swallowed.

Inhalation: May cause irritation to the respiratory system.

Skin contact: Causes mild skin irritation.

Eye contact: Causes serious eye irritation.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral
Product: LD 50 (Rat): 2,800 mg/kg

Dermal
Product: LD 50 (Rabbit): 4,720 mg/kg

Inhalation
Product: LC 50 (Mouse, 2 h): 9.4 mg/l

Repeated dose toxicity
Product: No data available.

Skin corrosion/irritation
Product: Causes mild skin irritation.

Serious eye damage/eye irritation
Product: Causes serious eye irritation.

Respiratory or skin sensitization
Product: Not a skin sensitizer.

Carcinogenicity
Product: This substance has no evidence of carcinogenic properties.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:
No carcinogenic components identified

US. National Toxicology Program (NTP) Report on Carcinogens:
No carcinogenic components identified

No carcinogenic components identified

Germ cell mutagenicity

In vitro
Product: No mutagenic components identified

In vivo
Product: No mutagenic components identified

Reproductive toxicity
Product: May damage fertility or the unborn child.

Specific target organ toxicity - single exposure
Product: Narcotic effect., Respiratory tract irritation.

Specific target organ toxicity - repeated exposure
Product: Liver

Aspiration hazard
Product: Not classified

Other effects: None known.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish
Product: No data available.

Specified substance(s):
DIMETHYLFORMAMIDE LC 50 (Fathead minnow (Pimephales promelas), 96 h): 5,714 - 18,967 mg/l Mortality LC 50 (Bluegill (Lepomis macrochirus), 96 h): 6,700 - 7,500 mg/l Mortality

Aquatic invertebrates
Product: No data available.

Specified substance(s):
DIMETHYLFORMAMIDE EC 50 (Water flea (Daphnia magna), 21 d): 3,721 mg/l Intoxication EC 50 (Water flea (Daphnia magna), 48 h): 12.5 - 14.4 mg/l Intoxication LC 50 (Water flea (Daphnia magna), 48 h): 13,260 - 15,920 mg/l Mortality

Chronic hazards to the aquatic environment:

Fish
Product: No data available.

Aquatic invertebrates
Product: No data available.

Toxicity to Aquatic Plants
Product: No data available.

Persistence and degradability

Biodegradation
Product: The product is expected to be biodegradable.

BOD/COD ratio
Product: No data available.

Bioaccumulative potential

Bioconcentration factor (BCF)
Product: No data available on bioaccumulation.

Partition coefficient n-octanol / water (log Kow)
Product: Log Kow: -1.01

Mobility in soil:
The product is partly soluble in water. May spread in the aquatic environment.
13. Disposal considerations

General information: This product is highly flammable. Don't use fire to cut empty container after use.

Disposal instructions: Discharge, treatment, or disposal may be subject to national, state, or local laws. Since emptied containers retain product residue, follow label warnings even after container is emptied.

Contaminated packaging: Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

**DOT**
- UN number: UN 2265
- UN proper shipping name: N,N-Dimethylformamide
  - Transport hazard class(es): 3
  - Label(s): 3
  - Packing group: III
  - Marine Pollutant: No

**IMDG**
- UN number: UN 2265
- UN proper shipping name: N,N-DIMETHYLFORMAMIDE
  - Transport hazard class(es): 3
  - Label(s): 3
  - EmS No.: F-E, S-D
  - Packing group: III
  - Marine Pollutant: No

**IATA**
- UN number: UN 2265
- Proper Shipping Name: N,N-Dimethylformamide
  - Transport hazard class(es): 3
  - Label(s): 3
  - Marine Pollutant: No
  - Packing group: III

15. Regulatory information

US federal regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
  None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):
- DIMETHYLFORMAMIDE Reportable quantity: 100 lbs.
Superfund amendments and reauthorization act of 1986 (SARA)

Hazard categories

- X Acute (Immediate)
- X Chronic (Delayed)
- X Fire
- Reactive
- Pressure Generating

SARA 302 Extremely hazardous substance
None present or none present in regulated quantities.

SARA 304 Emergency release notification

<table>
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<tr>
<th>Chemical identity</th>
<th>RQ</th>
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<tbody>
<tr>
<td>DIMETHYLFORMAMIDE</td>
<td>100 lbs.</td>
</tr>
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</table>

SARA 311/312 Hazardous chemical

<table>
<thead>
<tr>
<th>Chemical identity</th>
<th>Threshold Planning Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIMETHYLFORMAMIDE</td>
<td>500 lbs</td>
</tr>
</tbody>
</table>

SARA 313 (TRI reporting)

<table>
<thead>
<tr>
<th>Chemical identity</th>
<th>Reporting threshold for other users</th>
<th>Reporting threshold for manufacturing and processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIMETHYLFORMAMIDE</td>
<td>10000 lbs</td>
<td>25000 lbs</td>
</tr>
</tbody>
</table>

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)
None present or none present in regulated quantities.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):
None present or none present in regulated quantities.

US state regulations

US. California Proposition 65
No ingredient regulated by CA Prop 65 present.

US. New Jersey Worker and Community Right-to-Know Act
DIMETHYLFORMAMIDE Listed

US. Massachusetts RTK - Substance List
DIMETHYLFORMAMIDE Listed

US. Pennsylvania RTK - Hazardous Substances
DIMETHYLFORMAMIDE Listed

US. Rhode Island RTK
DIMETHYLFORMAMIDE Listed
Inventory Status:

- Australia AICS: On or in compliance with the inventory
- Canada DSL Inventory List: On or in compliance with the inventory
- EU EINECS List: On or in compliance with the inventory
- EU ELINCS List: Not in compliance with the inventory.
- Japan (ENCS) List: On or in compliance with the inventory
- EU No Longer Polymers List: Not in compliance with the inventory.
- China Inv. Existing Chemical Substances: On or in compliance with the inventory
- Korea Existing Chemicals Inv. (KECI): On or in compliance with the inventory
- Canada NDSL Inventory: Not in compliance with the inventory
- Philippines PICCS: On or in compliance with the inventory
- US TSCA Inventory: On or in compliance with the inventory
- New Zealand Inventory of Chemicals: On or in compliance with the inventory
- Switzerland Consolidated Inventory: Not in compliance with the inventory
- Japan ISHL Listing: On or in compliance with the inventory
- Japan Pharmacopoeia Listing: Not in compliance with the inventory

16. Other information, including date of preparation or last revision

NFPA Hazard ID

Flammability
Health
Reactivity
Special hazard.

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe

Issue date: 06-11-2014
Revision date: No data available.
Version #: 1.1
Further information: No data available.
Disclaimer:

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