1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name: <I>N,N</I>-Dimethylformamide

Product Number: 227056
Brand: Sigma-Aldrich
Index-No.: 616-001-00-X

CAS-No.: 68-12-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103 UNITED STATES

Telephone: +1 314 771-5765
Fax: +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone #: +1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 3), H226
Acute toxicity, Dermal (Category 4), H312
Eye irritation (Category 2A), H319
Reproductive toxicity (Category 1B), H360

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)
H226: Flammable liquid and vapour.
H312: Harmful in contact with skin.
H319 Causes serious eye irritation.
H360 May damage fertility or the unborn child.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ventilating/lighting equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
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.
P337 + P313 If eye irritation persists: Get medical advice/attention.
P363 Wash contaminated clothing before reuse.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.
P501 Dispose of contents/container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS
Rapidly absorbed through skin.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances
Synonyms: DMF

Formula: C<sub>3</sub>H<sub>7</sub>NO
Molecular weight: 73.09 g/mol
CAS-No.: 68-12-2
EC-No.: 200-679-5
Index-No.: 616-001-00-X

Hazardous components

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>N,N-Dimethylformamide</td>
<td>Flam. Liq. 3; Acute Tox. 4; Eye Irrit. 2A; Repr. 1B; H226, H312 + H332, H319, H360</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
**In case of skin contact**  
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**  
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**  
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 **Most important symptoms and effects, both acute and delayed**  
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 **Indication of any immediate medical attention and special treatment needed**  
No data available

5. **FIREFIGHTING MEASURES**

5.1 **Extinguishing media**

**Suitable extinguishing media**  
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 **Special hazards arising from the substance or mixture**

Carbon oxides, Nitrogen oxides (NOx)

5.3 **Advice for firefighters**

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 **Further information**

Use water spray to cool unopened containers.

6. **ACCIDENTAL RELEASE MEASURES**

6.1 **Personal precautions, protective equipment and emergency procedures**

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.  
For personal protection see section 8.

6.2 **Environmental precautions**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 **Methods and materials for containment and cleaning up**

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 **Reference to other sections**

For disposal see section 13.

7. **HANDLING AND STORAGE**

7.1 **Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.  
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.  
For precautions see section 2.2.

7.2 **Conditions for safe storage, including any incompatibilities**

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Handle and store under inert gas.  
Storage class (TRGS 510): 3: Flammable liquids

7.3 **Specific end use(s)**

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

**Components with workplace control parameters**

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>N,N-Dimethylformamide</td>
<td>68-12-2</td>
<td>TWA</td>
<td>10.000000 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Remarks</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liver damage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substances for which there is a Biological Exposure Index or Indices (see BEI® section)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not classifiable as a human carcinogen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Danger of cutaneous absorption</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TWA</td>
<td>10 ppm</td>
<td></td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TWA</td>
<td>10 ppm</td>
<td></td>
<td>USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30.000000 mg/m³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skin designation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The value in mg/m³ is approximate.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TWA</td>
<td>10 ppm</td>
<td></td>
<td>USA. NIOSH Recommended Exposure Limits</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30 mg/m³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potential for dermal absorption</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TWA</td>
<td>10 ppm</td>
<td></td>
<td>USA. NIOSH Recommended Exposure Limits</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30 mg/m³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skin designation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The value in mg/m³ is approximate.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEL</td>
<td>10 ppm</td>
<td></td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30 mg/m³</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Biological occupational exposure limits**

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Parameters</th>
<th>Value</th>
<th>Biological specimen</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>N,N-Dimethylformamide</td>
<td>68-12-2</td>
<td>Total N-Methylformamide</td>
<td>15.0000 mg/l</td>
<td>In urine</td>
<td>ACGIH - Biological Exposure Indices (BEI)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Remarks</strong></td>
<td></td>
<td></td>
<td></td>
<td>End of shift (As soon as possible after exposure ceases)</td>
<td></td>
</tr>
<tr>
<td>N-Acetyl-S-(N-methylcarbamoyl) cysteine</td>
<td></td>
<td></td>
<td>40.0000 mg/l</td>
<td>In urine</td>
<td>ACGIH - Biological Exposure Indices (BEI)</td>
</tr>
<tr>
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<td></td>
</tr>
</tbody>
</table>

### 8.2 Exposure controls

**Appropriate engineering controls**

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact
Material: Nature latex/chloroprene
Minimum layer thickness: 0.6 mm
Break through time: 65 min
Material tested:Lapren® (KCL 706 / Aldrich Z677558, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance
Form: liquid, clear
Colour: colourless

b) Odour
amine-like

c) Odour Threshold
No data available

d) pH
6.7

e) Melting point/freezing point
Melting point/range: -61 °C (-78 °F)

f) Initial boiling point and boiling range
153 °C (307 °F)

g) Flash point
58 °C (136 °F) - closed cup

h) Evaporation rate
No data available

i) Flammability (solid, gas)
No data available

j) Upper/lower flammability or
Upper explosion limit: 15.2 %(V)
Lower explosion limit: 2.2 %(V)
explosive limits

k) Vapour pressure
   3.60 hPa at 20 °C (68 °F)
   5.16 hPa at 25 °C (77 °F)

l) Vapour density
   2.52 - (Air = 1.0)

m) Relative density
   0.944 g/mL

n) Water solubility
   completely miscible

o) Partition coefficient: n-octanol/water
   log Pow: -1.01

p) Auto-ignition temperature
   No data available

q) Decomposition temperature
   No data available

r) Viscosity
   No data available

s) Explosive properties
   No data available

t) Oxidizing properties
   No data available

9.2 Other safety information
   Relative vapour density
   2.52 - (Air = 1.0)

10. STABILITY AND REACTIVITY

10.1 Reactivity
   No data available

10.2 Chemical stability
   Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
   No data available

10.4 Conditions to avoid
   Heat, flames and sparks.

10.5 Incompatible materials
   Strong oxidizing agents

10.6 Hazardous decomposition products
   Hazardous decomposition products formed under fire conditions.
   - Carbon oxides, Nitrogen oxides (NOx)
   Other decomposition products - No data available
   In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

   Acute toxicity
   LD50 Oral - Rat - male and female - 3,010 mg/kg
   (OECD Test Guideline 401)
   LD50 Dermal - Rabbit - 1,500 mg/kg
   Remarks: (IUCLID)

   Skin corrosion/irritation
   Skin - Rabbit
   Result: No skin irritation
   Remarks: (IUCLID)

   Serious eye damage/eye irritation
   Eyes - Rabbit
   Result: Eye irritation
Remarks: (IUCLID)

Respiratory or skin sensitisation
Sensitisation test: - Guinea pig
Result: negative
Remarks: (Lit.)
Sensitisation test: - Mouse
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
Ames test
Salmonella typhimurium
Result: negative
(ECHA)

Carcinogenicity
Carcinogenicity - Did not show carcinogenic effects in animal experiments. (Lit.)

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (N,N-Dimethylformamide)
NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA’s list of regulated carcinogens.

Reproductive toxicity
May damage the unborn child.

Specific target organ toxicity - single exposure
Acute oral toxicity - Gastrointestinal disturbance, Nausea, Vomiting
Acute inhalation toxicity - Possible damages; mucosal irritations

Specific target organ toxicity - repeated exposure

Aspiration hazard

Additional Information
Repeated dose toxicity - Rat - male and female - Oral - 28 d - No observed adverse effect level - 238 mg/kg - Lowest observed adverse effect level - 475 mg/kg
Subacute toxicity
RTECS: LQ2100000

Warning: intolerance for alcohol can occur up to 4 days after dimethylformamide exposure. N,N-dimethylformamide is considered to be a potent liver toxin., Vomiting, Diarrhoea, Abdominal pain, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

After absorption:
Headache, Dizziness, Drowsiness
Damage to:
Kidney, Liver
This substance should be handled with particular care.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish
flow-through test LC50 - Lepomis macrochirus (Bluegill sunfish) - 7,100 mg/l - 96 h (N,N-Dimethylformamide)
(US-EPA)
Toxicity to daphnia and other aquatic invertebrates
static test EC50 - Daphnia magna (Water flea) - 13,100 mg/l - 48 h (N,N-Dimethylformamide) (OECD Test Guideline 202)
Toxicity to algae
static test EC50 - Desmodesmus subspicatus (green algae) - > 1,000 mg/l - 72 h (N,N-Dimethylformamide) (DIN 38412)
Toxicity to bacteria
static test EC50 - Vibrio fischeri - 12,300 - 17,500 mg/l - 5 min (N,N-Dimethylformamide) Remarks: (External MSDS)

12.2 Persistence and degradability
Biodegradability aerobic - Exposure time 21 d (N,N-Dimethylformamide)
Result: 100 % - Readily biodegradable. (OECD Test Guideline 301E)
Biochemical Oxygen Demand (BOD) 900 mg/g (N,N-Dimethylformamide)
Remarks: (Lit.)
Theoretical oxygen demand 1,863 mg/g (N,N-Dimethylformamide)
Remarks: (Lit.)

12.3 Bioaccumulative potential
Bioaccumulation Cyprinus carpio (Carp) - 56 d (N,N-Dimethylformamide)
Bioconcentration factor (BCF): 0.3 - 1.2 (OECD Test Guideline 305C)
Remarks: Does not significantly accumulate in organisms.

12.4 Mobility in soil

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
Stability in water - ca.50 d (N,N-Dimethylformamide)
Test substance: Water
Remarks: reaction with hydroxyl radicals (calculated) (Lit.)

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods
Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2265 Class: 3 Packing group: III
Proper shipping name: N,N-Dimethylformamide
Reportable Quantity (RQ) : 100 lbs

Poison Inhalation Hazard: No

IMDG
15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>68-12-2</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>CAS-No.</th>
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<tbody>
<tr>
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</tbody>
</table>

Pennsylvania Right To Know Components

<table>
<thead>
<tr>
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<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>68-12-2</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H226 Flammable liquid and vapour.
H312 Harmful in contact with skin.
H312 + H332 Harmful in contact with skin or if inhaled.
H319 Causes serious eye irritation.
H360 May damage fertility or the unborn child.

Further information
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Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.3 Revision Date: 07/13/2018 Print Date: 08/08/2019