1. PRODUCT AND COMPANY IDENTIFICATION

Product name: N,N-Dimethylformamide
Product Number: D4551
Brand: DMF
Supplier: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA
Telephone: +1 800-325-5632
Fax: +1 800-325-5052
Emergency Phone # (For both supplier and manufacturer): (314) 776-6655
Preparation Information: Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-9506

2. HAZARDS IDENTIFICATION

Emergency Overview
OSHA Hazards
Combustible Liquid, Harmful by skin absorption, Irritant, Teratogen
Target Organs
Liver, Kidney, Central nervous system, Cardiovascular system, Blood
Other hazards which do not result in classification
Rapidly absorbed through skin.

GHS Classification
Flammable liquids (Category 3)
Acute toxicity, Oral (Category 5)
Acute toxicity, Inhalation (Category 3)
Acute toxicity, Dermal (Category 4)
Skin irritation (Category 3)
Eye irritation (Category 2A)
Reproductive toxicity (Category 1B)

GHS Label elements, including precautionary statements
Pictogram
Signal word: Danger
Hazard statement(s)
H226 Flammable liquid and vapour.
H303 May be harmful if swallowed.
H312 Harmful in contact with skin.
H316 Causes severe skin irritation.
H331 Causes serious eye irritation.
H333 Toxic if inhaled.
H340 May damage fertility or the unborn child.

Precautionary statement(s)
P201 Obtain special instructions before use.
P261 Avoid breathing dusts/ fumes/ gas/ mist/ vapours/ spray.
P280 Wear protective gloves/ protective clothing.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P311 Call a POISON CENTER or doctor/ physician.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: DMF
Formula: C9H14N0
Molecular Weight: 73.09 g/mol

<table>
<thead>
<tr>
<th>Component</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>N,N-Dimethylformamide</td>
<td>Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)</td>
</tr>
<tr>
<td>CAS-No.</td>
<td>68-12-2</td>
</tr>
<tr>
<td>EC-No.</td>
<td>200-079-5</td>
</tr>
<tr>
<td>Index-No.</td>
<td>616-001-00-X</td>
</tr>
<tr>
<td>Registration number</td>
<td>01-21194755525-32-XXXX</td>
</tr>
</tbody>
</table>

4. 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. Take victim immediately to hospital. 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.

5. FIREFIGHTING MEASURES

Conditions of flammability
Flammable in the presence of a source of ignition when the temperature is above the flash point. Keep away from heat/sparks/open flame/hot surface. No smoking.
**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for firefighters**
Wear self contained breathing apparatus for fire fighting if necessary.

**Hazardous combustion products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides, nitrogen oxides (NOx)

**Further information**
Use water spray to cool unopened containers.

### 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
Wear respiratory protection. 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.

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

**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).

### 7. HANDLING AND STORAGE

**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.

**Conditions for safe storage**
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.

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Components with workplace control parameters**

<table>
<thead>
<tr>
<th>Components</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 ppm</td>
<td>USA, ACGIH Threshold Limit Values (TLV)</td>
</tr>
</tbody>
</table>

**Remarks**
Liver damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen Danger of cutaneous absorption

<table>
<thead>
<tr>
<th>TWA</th>
<th>10 ppm</th>
<th>USA, OSHA - TABLE 2.1 Limits for Air Contaminants - 1910.1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 mg/m³</td>
<td>USA, Occupational Exposure Limits (OSHA) - Table 2.1 Limits for Air Contaminants</td>
<td></td>
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</tbody>
</table>

**Skin notation**

<table>
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<tr>
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</table>

**Skin designation**
The value in mg/m³ is approximate.

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</tr>
</tbody>
</table>

**Potential for dermal absorption**

### 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**
Form: liquid, clear
Colour: colourless

**Safety data**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>6.7</td>
</tr>
<tr>
<td>Melting point</td>
<td>61 °C (±78 °F)</td>
</tr>
<tr>
<td>Boiling point</td>
<td>103 °C (217 °F)</td>
</tr>
<tr>
<td>Flash point</td>
<td>58 °C (136 °F)</td>
</tr>
<tr>
<td>Ignition temperature</td>
<td>445 °C (833 °F)</td>
</tr>
<tr>
<td>Lower explosion point</td>
<td>1.5 % (V)</td>
</tr>
<tr>
<td>Upper explosion point</td>
<td>15.2 % (V)</td>
</tr>
</tbody>
</table>

**Hand 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.

**Material: Butylrubber (KCL 697 / Aldrich Z677647, Size M)**

**Material:**
Nature latex/chloroprene
Minimum layer thickness: 0.6 mm
Break through time: 30 min

**Material tested:**
Lapren® (KCL 706 / Aldrich Z677559, Size M)

**Data source:**
KCL GmbH, D-38124 Eichenzell, phone +49 (0)6639 677300, 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.

**Eye 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 and 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.

**Hygiene measures**
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.
Vapour pressure 3.60 hPa (2.70 mmHg) at 20 °C (68 °F)
5.16 hPa (3.87 mmHg) at 25 °C (77 °F)
Density 0.944 g/mL
Water solubility completely miscible
Partition coefficient: log Pow: -1.01
n-octanol/water
Relative vapour density 2.52
- (AR = 1.0)
Odour amine-like
Odour Threshold no data available
Evaporation rate no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.
Possibility of hazardous reactions
no data available
Conditions to avoid
Heat, flames and sparks.
Materials to avoid
Strong oxidizing agents
Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, nitrogen oxides (NOx)
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity
Oral LD50 LD50 Oral - rat - 2,800 mg/kg
Inhalation LC50 LC50 Inhalation - rat - 4 h - 9 - 15 mg/L
Dermal LD50 LD50 Dermal - rabbit - 1,500 mg/kg
Other information on acute toxicity
no data available
Skin corrosion/irritation
Skin - Human - Mild skin irritation - 24 h
Serious eye damage/eye irritation
Eyes - rabbit - Moderate eye irritation
Respiratory or skin sensitisation
no data available
Germ cell mutagenicity
Genotoxicity in vitro - mouse - lymphocyte
Mutation in mammalian somatic cells
Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

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 identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity
May cause congenital malformation in the fetus.
Presumed human reproductive toxicant

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available
Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available
Aspiration hazard
no data available

Potential health effects
Inhalation May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion May be harmful if swallowed.
Skin Causes skin irritation.
Eyes Causes eye irritation.

Signs and Symptoms of Exposure
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.

Synergistic effects
no data available

Additional Information
RTECS: LQ2100000

12. ECOLOGICAL INFORMATION

Toxicity
Toxicity to fish LC50 - Oncorhynchus mykiss (rainbow trout) - 9,000 - 13,000 mg/L - 96 h
LC50 - Lepomis macrochirus (Blugill) - 6,700 - 7,500 mg/L - 96 h
LC50 - Pimephales promelas (fathead minnow) - 10,400 - 10,800 mg/L - 96 h
LC50 - Oncorhynchus mykiss (rainbow trout) - 9,800 mg/L - 96 h
LC50 - Lepomis macrochirus (Blugill) - 6,300 mg/L - 96 h
LC50 - Pimephales promelas (fathead minnow) - 10,600 mg/L - 96 h

Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - 9,600 - 13,100 mg/L - 48 h
EC50 - Daphnia magna (Water flea) - 15,700 mg/L - 48 h
Toxicity to algae: LC50 - Desmodesmus subspicatus (green algae) - > 500 mg/l - 96 h

Persistence and degradability
Biodegradability: Result: > 90% - Readily biodegradable.

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
no data available

13. DISPOSAL CONSIDERATIONS

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
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 2265 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: N,N-DIMETHYLFORMAMIDE
Marine pollutant: No

IATA
UN number: 2265 Class: 3 Packing group: III
Proper shipping name: N,N-Dimethylformamide

15. REGULATORY INFORMATION

OSHA Hazards
Combustible Liquid, Harmful by skin absorption., Irritant, Teratogen

SARA 302 Components
SARA 302: 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:

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

Massachusetts Right To Know Components

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Pennsylvania Right To Know Components

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New Jersey Right To Know Components

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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

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.