1. PRODUCT AND COMPANY IDENTIFICATION

Product Name                  N,N-Dimethylformamide
Cat No.                        AC116220000; AC116220010; AC116220025; AC116220050; AC116220250
Synonyms                      DMF
Recommended Use               Laboratory chemicals

Company                        Acros Organics
Fisher Scientific              One Reagent Lane
Fair Lawn, NJ 07410             Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name         Emergency Telephone Number
Acros Organics                 Acros Organics
One Reagent Lane               Emergency Telephone Number: 800-ACROS-01
Fair Lawn, NJ 07410             For information in the US, call: 800-ACROS-01

Emergency Number, Europe: +32 14 57 52 99
Emergency Number, US: 201-796-7100

CHEMTREC Phone Number, US: 800-424-9300
CHEMTREC Phone Number, Europe: 703-527-3887

2. HAZARDS IDENTIFICATION

WARNING!
Flammable liquid and vapor. Harmful if absorbed through skin or if inhaled. May cause methemoglobinemia. Irritating to eyes and skin. Lachrymator (substance which increases the flow of tears). May cause central nervous system effects. May cause adverse liver effects. May cause adverse kidney effects. May cause harm to the unborn child.

Emergency Overview

Appearance Colorless
Physical State Liquid
odor rotten-egg like

Target Organs
Skin, Eyes, Respiratory system, Central nervous system (CNS), Blood, Liver, Kidney, spleen

Potential Health Effects
Acute Effects
Principle Routes of Exposure

Eyes
Irritating to eyes. Lachrymator (substance which increases the flow of tears).

Skin
Harmful in contact with skin. Irritating to skin.

Inhalation
Harmful by inhalation. May cause methemoglobinemia. Inhalation may cause central nervous system effects. May cause irritation of respiratory tract.

Ingestion
May be harmful if swallowed. May cause central nervous system effects. May cause adverse liver effects. May cause adverse kidney effects. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Chronic Effects
May cause harm to the unborn child. Experiments have shown reproductive toxicity effects on laboratory animals. May cause adverse liver effects. May cause adverse kidney effects.

See Section 11 for additional Toxicological information.

Aggravated Medical Conditions

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Haz/Non-haz</th>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethylformamide</td>
<td>68-12-2</td>
<td>&gt;95</td>
<td></td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

Eye Contact
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact
Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation
Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Immediate medical attention is required.

Ingestion
Do not induce vomiting. Call a physician or Poison Control Center immediately.

Notes to Physician
Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Flash Point
58°C / 136.4°F

Method
No information available.

Autoignition Temperature
445°C / 833°F

Explosion Limits
Upper
15.2 vol %
Lower
2.2 vol %

Suitable Extinguishing Media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Cool closed containers exposed to fire with water spray.
Unsuitable Extinguishing Media
No information available.

Hazardous Combustion Products
No information available.

Specific Hazards Arising from the Chemical
Flammable. Risk of ignition. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back.

Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions
Ensure adequate ventilation. Use personal protective equipment. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas. Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions
Should not be released into the environment.

Methods for Containment and Clean Up
Soak up with inert absorbent material. Keep in suitable and closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

7. HANDLING AND STORAGE

Handling
Use only under a chemical fume hood. Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Do not breathe vapors or spray mist. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. Use explosion-proof equipment. Take precautionary measures against static discharges.

Storage
Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Flammables area.
8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Measures
Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment.

Exposure Guidelines

<table>
<thead>
<tr>
<th>Component</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TWA: 10 ppm</td>
<td>(Vacated) TWA: 10 ppm</td>
<td>IDLH: 500 ppm</td>
</tr>
<tr>
<td>Dimethylformamide</td>
<td></td>
<td>(Vacated) TWA: 30 mg/m³</td>
<td>TWA: 30 mg/m³</td>
</tr>
<tr>
<td></td>
<td>Skin</td>
<td>Skin</td>
<td>TWA: 10 ppm</td>
</tr>
<tr>
<td></td>
<td>TWA: 30 mg/m³</td>
<td>TWA: 10 ppm</td>
<td>TWA: 10 ppm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Quebec</th>
<th>Mexico OEL (TWA)</th>
<th>Ontario TWAEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethylformamide</td>
<td>TWA: 10 ppm</td>
<td>TWA: 10 ppm</td>
<td>TWA: 10 ppm</td>
</tr>
<tr>
<td></td>
<td>TWA: 30 mg/m³</td>
<td>TWA: 30 mg/m³</td>
<td>TWA: 30 mg/m³</td>
</tr>
<tr>
<td></td>
<td>Skin</td>
<td>STEL: 20 ppm</td>
<td>Skin</td>
</tr>
<tr>
<td></td>
<td>TWA: 30 mg/m³</td>
<td>STEL: 60 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

NIOSH IDLH: Immediately Dangerous to Life or Health

Personal Protective Equipment

Eye/face Protection
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection
Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection
Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State    Liquid
Appearance        Colorless
odor              rotten-egg like
Odor Threshold    No information available.
pH                6-8 20% aq.sol.
Vapor Pressure   4.9 mbar @ 20 °C
Vapor Density    2.5 (Air = 1.0)
Viscosity        0.8 mPa.s at 20 °C
Boiling Point/Range   153°C / 307.4°F
Melting Point/Range  -61°C / -77.8°F
Decomposition temperature °C 350
Flash Point       58°C / 136.4°F
Evaporation Rate  0.17 (Butyl Acetate = 1.0)
Specific Gravity  0.945
Solubility        Soluble in water
log Pow           No data available
Molecular Weight  73.09
Molecular Formula C3 H7 N O

10. STABILITY AND REACTIVITY

Stability        Stable under normal conditions.
**Conditions to Avoid**
Incompatible products. Heat, flames and sparks.

**Incompatible Materials**
Strong oxidizing agents, Halogens, Halogenated compounds

**Hazardous Decomposition Products**
Carbon monoxide (CO), Carbon dioxide (CO₂), Nitrogen oxides (NOₓ)

**Hazardous Polymerization**
Hazardous polymerization does not occur.

**Hazardous Reactions .**
None under normal processing.

### 11. TOXICOLOGICAL INFORMATION

#### Acute Toxicity

- **LC₅₀ Inhalation (DUST) VALUE**: 9400 mg/m³/24 (mouse)
- **LC₅₀ Inhalation (VAPOR) VALUE**: 3421 ppm/h (rat)

#### Component Information

<table>
<thead>
<tr>
<th>Component</th>
<th>LD₅₀ Oral (Rat)</th>
<th>LD₅₀ Dermal (Rat)</th>
<th>LC₅₀ Inhalation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethylformamide</td>
<td>200 mg/kg</td>
<td>3.2 g/kg</td>
<td>Not listed</td>
</tr>
</tbody>
</table>

#### Irritation
Irritating to eyes and skin

#### Toxicologically Synergistic Products
No information available.

#### Chronic Toxicity

**Carcinogenicity**
There are no known carcinogenic chemicals in this product

**Sensitization**
No information available.

**Mutagenic Effects**
Mutagenic effects have occurred in humans.

**Reproductive Effects**
Experiments have shown reproductive toxicity effects on laboratory animals.

**Developmental Effects**
May cause harm to the unborn child. Developmental effects have occurred in experimental animals.

**Teratogenicity**
Teratogenic effects have occurred in experimental animals.

**Other Adverse Effects**
See actual entry in RTECS for complete information.

#### Endocrine Disruptor Information

<table>
<thead>
<tr>
<th>Component</th>
<th>EU - Endocrine Disrupters Candidate List</th>
<th>EU - Endocrine Disruptors Evaluated Substances</th>
<th>Japan - Endocrine Disruptor Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethylformamide</td>
<td>Group III Chemical</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>
12. ECOLOGICAL INFORMATION

Ecotoxicity

<table>
<thead>
<tr>
<th>Component</th>
<th>Freshwater Algae</th>
<th>Freshwater Fish</th>
<th>Microtox</th>
<th>Water Flea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethylformamide</td>
<td>EC50 = 7500 mg/L/96h</td>
<td>Pimephales promelas: LC50 = 10.6 g/L/96h</td>
<td>EC50 = 2000 mg/L/5 min</td>
<td>EC50 = 7500 mg/L/48h</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Onchorhynchus mykiss: LC50 = 9.8 g/L/96h</td>
<td>EC50 = 570 mg/L/240 h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lepomis macrochirus: LC50 = 6.3 g/L/96h</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Persistence and Degradability
Readily biodegradable.

Bioaccumulation/ Accumulation
No information available

Mobility

<table>
<thead>
<tr>
<th>Component</th>
<th>log Pow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethylformamide</td>
<td>-1.028</td>
</tr>
</tbody>
</table>

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods
Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. TRANSPORT INFORMATION

DOT
UN-No: UN2265
Proper Shipping Name: N,N-DIMETHYLFORMAMIDE
Hazard Class: 3
Packing Group: III

TDG
UN-No: UN2265
Proper Shipping Name: N,N-DIMETHYLFORMAMIDE
Hazard Class: 3
Packing Group: III

IATA
UN-No: UN2265
Proper Shipping Name: N,N-Dimethylformamide
Hazard Class: 3
Packing Group: III
14. TRANSPORT INFORMATION

IMDG/IMO

<table>
<thead>
<tr>
<th>UN-No</th>
<th>UN2265</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper Shipping Name</td>
<td>N,N-Dimethylformamide</td>
</tr>
<tr>
<td>Hazard Class</td>
<td>3</td>
</tr>
<tr>
<td>Packing Group</td>
<td>III</td>
</tr>
</tbody>
</table>

15. REGULATORY INFORMATION

International Inventories

<table>
<thead>
<tr>
<th>Component</th>
<th>TSCA</th>
<th>DSL</th>
<th>NDSL</th>
<th>EINECS</th>
<th>ELINCS</th>
<th>NLP</th>
<th>PICCS</th>
<th>ENCS</th>
<th>AICS</th>
<th>CHINA</th>
<th>KECL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethylformamide</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>200-679-5</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>KE-11411</td>
<td>X</td>
</tr>
</tbody>
</table>

Legend:
- X - Listed
- E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
- F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
- N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
- P - Indicates a commenced PMN substance
- R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
- S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
- T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
- XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
- Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
- Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
<th>SARA 313 - Threshold Values %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethylformamide</td>
<td>68-12-2</td>
<td>&gt;95</td>
<td>1.0</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazardous Categorization
- Acute Health Hazard: No
- Chronic Health Hazard: No
- Fire Hazard: Yes
- Sudden Release of Pressure Hazard: No
- Reactive Hazard: No

Clean Water Act
Not applicable
Clean Air Act

<table>
<thead>
<tr>
<th>Component</th>
<th>HAPS Data</th>
<th>Class 1 Ozone Depleters</th>
<th>Class 2 Ozone Depleters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethylformamide</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OSHA
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

<table>
<thead>
<tr>
<th>Component</th>
<th>Hazardous Substances RQs</th>
<th>CERCLA EHS RQs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethylformamide</td>
<td>100 lb</td>
<td>-</td>
</tr>
</tbody>
</table>

California Proposition 65
This product does not contain any Proposition 65 chemicals.

State Right-to-Know

<table>
<thead>
<tr>
<th>Component</th>
<th>Massachusetts</th>
<th>New Jersey</th>
<th>Pennsylvania</th>
<th>Illinois</th>
<th>Rhode Island</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethylformamide</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

U.S. Department of Transportation
Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade
Moderate risk, Grade 2

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
B3  Combustible liquid
D1B  Toxic materials
D2A Very toxic materials
D2B  Toxic materials
16. OTHER INFORMATION

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Tel: (412) 490-8929

Creation Date
03-Sep-2009

Print Date
22-Sep-2009

Revision Summary
“***”, and red text indicates revision

Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS