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**** MATERIAL SAFETY DATA SHEET ****

N,N-Dimethylformamide, 99%
95221

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: N,N-Dimethylformamide, 99%

Catalog Numbers: AC116220000, AC116220010, AC116220025, AC116220250

Synonyms: N,N-Dimethylmethanamide; DMF; DMFA.

Company Identification (Europe): Acros Organics BVBA
Janssen Pharmaceuticalalaan 3a
2440 Geel, BelgiumCompany Identification (USA): Acros Organics
One Reagent Lane
Fairlawn, NJ 07410

For information in North America, call: 800-ACROS-01

For information in Europe, call: 0032(0) 14575211

For emergencies in the US, call CHEMTRIC: 800-424-9300

For emergencies in Europe, call: 0032(0) 14575299

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
68-12-2	N,N-Dimethylformamide	99	200-679-5

Hazard Symbols: T
Risk Phrases: 20/21 36 61

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: 57 deg C.
 Warning! Combustible liquid and vapor. Causes respiratory tract irritation. This substance has caused adverse reproductive and fetal effects in animals. May cause liver and kidney damage. Causes eye and skin irritation. May cause digestive tract irritation with nausea, vomiting and diarrhea. Potential cancer hazard.

Target Organs: Kidneys, liver.

Potential Health Effects

Eye: Causes eye irritation.

Skin: Causes skin irritation.

Ingestion:

May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause kidney damage. May cause liver damage.

Inhalation:

Causes respiratory tract irritation.

Chronic:

Possible cancer hazard based on tests with laboratory animals. Prolonged or repeated skin contact may cause dermatitis. May cause reproductive and fetal effects.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

Skin:

Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

Ingestion:

Call a poison control center. If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.

Inhalation:

Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Get medical aid. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

Notes to Physician:

Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will burn if involved in a fire. Use water spray to keep fire-exposed

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containers cool. Combustible Liquid. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Containers may explode when heated.

Extinguishing Media:

Use water spray to cool fire-exposed containers. Use agent most appropriate to extinguish fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.

Autoignition Temperature: 445 deg C (833.00 deg F)

Flash Point: 57 deg C (134.60 deg F)

Explosion Limits, lower: 2.2

Explosion Limits, upper: 15.2

NFPA Rating: (estimated) Health: 2; Flammability: 2; Instability: 0

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:

Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Do not flush into a sewer. Clean up spills immediately, observing precautions in the Protective Equipment section. Scoop up with a nonsparking tool, then place into a suitable container for disposal. Remove all sources of ignition. Provide ventilation.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:

Wash thoroughly after handling. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Do not breathe dust, vapor, mist, or gas. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Avoid contact with heat, sparks and flame. Avoid ingestion and inhalation. Do not ingest or inhale. Use with adequate ventilation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage:

Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
N,N-Dimethylformamide	10 ppm; skin - potential for cutaneous absorption	10 ppm TWA; 30 mg/m ³ TWA 500 ppmIDLH	10 ppm TWA; 30 mg/m ³ TWA

OSHA Vacated PELs:

N,N-Dimethylformamide:
10 ppm TWA; 30 mg/m³ TWA

Personal Protective Equipment

Eyes: 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: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:

Liquid

Color: clear, colorless

Odor: faint, amine odor.

pH: 6 - 8 @ 20% aq.sol.

Vapor Pressure: 4.9 mbar @ 20 C

Vapor Density: 2.5 (air=1)

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Evaporation Rate: 0.17 (butylacetate=1)
Viscosity: 0.8 mPas @ 20 C
Boiling Point: 153 deg C
Freezing/Melting Point: 61 deg C
Decomposition Temperature: Not available.
Solubility in water: Completely soluble in water.
Specific Gravity/Density: 0.9450
Molecular Formula: C3H7NO
Molecular Weight: 73.0551

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions.
Conditions to Avoid: Mechanical shock, incompatible materials, ignition sources, excess heat, temperatures above 55°C.
Incompatibilities with Other Materials: Carbontetrachloride, violent reaction with halogens, iron, oxidizing materials, chlorinated hydrocarbons, isocyanates, nitrates, organic materials, phenols, ammonia, anhydrides.
Hazardous Decomposition Products: Carbon monoxide, oxides of nitrogen, irritating and toxic fumes and gases, carbon dioxide.
Hazardous Polymerization: Will not occur.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#: CAS# 68-12-2: LQ2100000
LD50/LC50:

CAS# 68-12-2: Inhalation, mouse: LC50 = 9400 mg/m³/2H; Oral, mouse: LD50 = 2900 mg/kg; Oral, rabbit: LD50 = 5 gm/kg; Oral, rat: LD50 = 2800 mg/kg; Skin, rabbit: LD50 = 4720 mg/kg.

Carcinogenicity:

ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Group 3 carcinogen

Epidemiology:

Experimental reproductive effects have been reported.

Teratogenicity:

No information available.

Reproductive Effects:

Similar compounds have shown reproductive effects.

Neurotoxicity:

No information available.

Mutagenicity:

Reported non-mutagenic in a large number of assays using whole animals, cultured mammalian cells, yeast and bacteria; including dominant lethal tests in rats, micronucleus test and sperm abnormality test.

Other Studies:

See actual entry in RTECS for complete information.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:

Damage to fish: Gold oland test: 18 hrs LC50: 500 mg/l

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.

RCRA U-Series: None listed.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT

Shipping Name: N,N-DIMETHYLFORMAMIDE
Hazard Class: 3
UN Number: UN2265

Packing Group: III

Canadian TDG

No information available.

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA

CAS# 68-12-2 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 68-12-2: Effective Date: 4/13/89; Sunset Date: 12/19/95
Chemical Test Rules

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None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

SARA CERCLA Hazardous Substances and corresponding RQs
CAS# 68-12-2: 100 lb final RQ; 45.4 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TQO.
SARA Codes

CAS # 68-12-2: acute, flammable.

Section 313

This material contains N,N-Dimethylformamide (CAS# 68-12-2, 99%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.

Clean Air Act:

CAS# 68-12-2 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depleters.

This material does not contain any Class 2 Ozone depleters.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.

None of the chemicals in this product are listed as Priority Pollutants under the CWA.

None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

N,N-Dimethylformamide can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California No Significant Risk Level:

None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: T

Risk Phrases:

R 20/21 Harmful by inhalation and in contact with skin.

R 36 Irritating to eyes.

R 61 May cause harm to the unborn child.

Safety Phrases:

S 53 Avoid exposure - obtain special instructions before use.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)

CAS# 68-12-2: 1

United Kingdom Occupational Exposure Limits

CAS# 68-12-2: OES-United Kingdom, TWA 10 ppm TWA; 30 mg/m³ TWA

CAS# 68-12-2: OES-United Kingdom, STEL 20 ppm STEL; 61 mg/m³ STEL

United Kingdom Maximum Exposure Limits

Canada

CAS# 68-12-2 is listed on Canada's DSL List.

This product has a WHMIS classification of B3, D2B.

CAS# 68-12-2 is listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 68-12-2: OEL-AUSTRALIA:TWA 10 ppm (30 mg/m³);Skin

OEL-BELGIUM: 10 ppm (30 mg/m³);Skin

OEL-CZECHOSLOVAKIA:TWA 30 mg/m³;STEL 60 mg/m³

OEL-DENMARK:TWA 10 ppm (30 mg/m³);Skin

OEL-FINLAND:TWA 10 ppm (30 mg/m³);STEL 20 ppm (60 mg/m³);Skin

OEL-FRANCE:TWA 10 ppm (30 mg/m³);Skin

OEL-GERMANY:TWA 20 ppm (60 mg/m³);Skin

OEL-HUNGARY:TWA 10 mg/m³;STEL 20 mg/m³;Skin

OEL-JAPAN:TWA 10 ppm (30 mg/m³);Skin

OEL-THE NETHERLANDS:TWA 10 ppm (30 mg/m³);Skin

OEL-THE PHILIPPINES:TWA 10 ppm (30 mg/m³);Skin

OEL-POLAND:TWA 10 mg/m³

OEL-RUSSIA:TWA 10 ppm;STEL 10 mg/m³;Skin

OEL-SWEDEN:TWA 10 ppm (30 mg/m³);STEL 15 ppm (45 mg/m³);Skin

OEL-SWITZERLAND:TWA 10 ppm (30 mg/m³);STEL 20 ppm;Skin

OEL-TURKEY:TWA 10 ppm (30 mg/m³);Skin

OEL-UNITED KINGDOM:TWA 10 ppm (30 mg/m³);STEL 20 ppm;Skin

OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV

OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 2/17/1999 Revision #3 Date: 12/03/2002

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to

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such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

