

MATERIAL SAFETY DATA SHEET

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Version 1.6

Section 1 - Product and Company Information

Product Name N,N-DIMETHYLFORMAMIDE, 99%
Product Number D158550
Brand ALDRICH

Company Sigma-Aldrich
Street Address 3050 Spruce Street
City, State, Zip, Country SAINT LOUIS MO 63103 US
Technical Phone: 314 771 5765
Emergency Phone: 414 273 3850 Ext. 5996
Fax: 800 325 5052

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
DIMETHYLFORMAMIDE	68-12-2	Yes

Formula C3H7NO
Synonyms Dimethylamid kyseliny mravenci (Czech) *
Dimethylformamid (German) * Dimethyl formamide *
N,N-Dimethyl formamide * Dimethylformamide
(ACGIH:OSHA) * N,N-Dimethylmethanamide *
Dimetilformamide (Italian) * Dimetylformamidu
(Czech) * DMF * DMFA * Dwumetyloformamid (Polish)
* N-Formyldimethylamine * NCI-C60913 * NSC 5356 *
U-4224
RTECS Number: LQ2100000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Toxic.

May cause harm to the unborn child. Harmful by inhalation and in contact with skin. Irritating to eyes and skin.

Combustible. Readily absorbed through skin. Target organ(s):
Liver. Kidneys.

HMIS RATING

HEALTH: 2*

FLAMMABILITY: 2

REACTIVITY: 0

NFPA RATING

HEALTH: 2

FLAMMABILITY: 2

REACTIVITY: 0

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician immediately.

INHALATION EXPOSURE

If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE

In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

EYE EXPOSURE

In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

FLASH POINT

136.4 °F 58 °C Method: closed cup

EXPLOSION LIMITS

Lower: 2.2 % Upper: 15.2 %

AUTOIGNITION TEMP

445 °C

FLAMMABILITY

N/A

EXTINGUISHING MEDIA

Suitable: Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING

Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL

Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)

Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves. Wear disposable coveralls and discard them after use.

METHODS FOR CLEANING UP

Cover with dry lime or soda ash, pick up, keep in a closed container, and hold for waste disposal. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING

User Exposure: Do not breathe vapor. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure.

STORAGE

Suitable: Keep tightly closed. Keep away from heat and open flame. Store in a cool dry place.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS

Use only in a chemical fume hood. Safety shower and eye bath.

PERSONAL PROTECTIVE EQUIPMENT

Respiratory: Government approved respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES

Wash thoroughly after handling. Wash contaminated clothing before reuse. Discard contaminated shoes.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	TWA	10 PPM
Remarks: Skin			
USA	MSHA Standard-air	TWA	10 PPM (30 MG/M3) (SKIN)
USA	OSHA.	PEL	8H TWA 10 PPM (30 MG/M3) (SKIN)
New Zealand OEL			
Remarks: check ACGIH TLV			
USA	NIOSH	TWA	10 PPM (SK)

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	10 MG/M3
Poland		NDSch	60 MG/M3
Poland		NDSP	-

Section 9 - Physical/Chemical Properties

Appearance Physical State: Liquid
 Color: Colorless
 Form: Clear liquid
 Odor: Fishy

Property	Value	At Temperature or Pressure
Molecular Weight	73.1 AMU	
pH	6.7	
BP/BP Range	153 - 155 °C	
MP/MP Range	-61 °C	
Freezing Point	N/A	
Vapor Pressure	2.7 mmHg	20 °C
Vapor Density	2.5 g/l	
Saturated Vapor Conc.	N/A	
SG/Density	0.948 g/cm3	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	

Partition Coefficient	Log Kow: -1.01	
Decomposition Temp.	N/A	
Flash Point	136.4 °F 58 °C	Method: closed cup
Explosion Limits	Lower: 2.2 % Upper: 15.2 %	
Flammability	N/A	
Autoignition Temp	445 °C	
Refractive Index	1.43	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	Solubility in Water: Miscible. Other Solvents: ALCOHOL, ETHER, ACETONE	

N/A = not available

Section 10 - Stability and Reactivity

STABILITY

Stable: Stable.

Materials to Avoid: Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Thermal decomposition may produce carbon monoxide, carbon dioxide, and nitrogen oxides.

HAZARDOUS POLYMERIZATION

Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE

Skin Contact: Causes skin irritation.

Skin Absorption: Readily absorbed through skin. Harmful if absorbed through skin.

Eye Contact: Causes eye irritation.

Inhalation: Harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.

Ingestion: May be harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)

Liver. Kidneys. Central nervous system. Cardiovascular system. Blood.

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. Exposure can cause: Stomach pains, vomiting, diarrhea. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

TOXICITY DATA

Skin

Rabbit

4,720 mg/kg

LD50

Oral

Rat

2,800 mg/kg

LD50

6 HR

Inhalation

Rat
6,000 ppm

Oral
Rat
2800 mg/kg
LD50

Intraperitoneal
Rat
1400 MG/KG
LD50
Remarks: Behavioral:Somnolence (general depressed activity).
Behavioral:Muscle weakness. Nutritional and Gross
Metabolic:Weight loss or decreased weight gain.

Subcutaneous
Rat
3800 MG/KG
LD50

Intravenous
Rat
2 GM/KG
LD50

Oral
Mouse
2900 mg/kg
LD50

Inhalation
Mouse
9,400 mg/m3
LC50
Remarks: Behavioral:Convulsions or effect on seizure threshold.
Behavioral:Muscle weakness. Lungs, Thorax, or
Respiration:Dyspnea.

Intraperitoneal
Mouse
650 MG/KG
LD50

Subcutaneous
Mouse
4500 MG/KG
LD50

Intravenous
Mouse
2500 MG/KG
LD50

Intramuscular
Mouse
3900 MG/KG
LD50

Intravenous
Dog
470 MG/KG

LD50

Intraperitoneal

Cat

500 MG/KG

LD50

Remarks: Liver:Other changes. Kidney, Ureter, Bladder:Other changes in urine composition. Blood:Changes in cell count (unspecified).

Oral

Rabbit

5000 mg/kg

LD50

Skin

Rabbit

4720 mg/kg

LD50

Intraperitoneal

Rabbit

1 GM/KG

LD50

Remarks: Liver:Other changes. Kidney, Ureter, Bladder:Other changes in urine composition. Blood:Changes in cell count (unspecified).

Intravenous

Rabbit

1800 MG/KG

LD50

Intravenous

Guinea pig

1050 MG/KG

LD50

IRRITATION DATA

Skin

Human

100 %

24H

Remarks: Mild irritation effect

Eyes

Rabbit

100 mg

Remarks: Rinsed

CHRONIC EXPOSURE - CARCINOGEN

Result: 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 CARCINOGEN LIST

Rating: Group 3

ACGIH CARCINOGEN LIST

Rating: A4

CHRONIC EXPOSURE - TERATOGEN

Result: May cause congenital malformation in the fetus.

Species: Rat

Dose: 5330 UL/KG

Route of Application: Oral

Exposure Time: (6-15D PREG)

Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Musculoskeletal system.

Species: Rat

Dose: 300 PPM/6H

Route of Application: Inhalation

Exposure Time: (6-15D PREG)

Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Rat

Dose: 3600 MG/KG

Route of Application: Skin

Exposure Time: (11-13D PREG)

Result: Effects on Embryo or Fetus: Fetal death.

Species: Rat

Dose: 7552 MG/KG

Route of Application: Skin

Exposure Time: (6-15D PREG)

Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Other effects to embryo.

Species: Mouse

Dose: 1820 MG/KG

Route of Application: Oral

Exposure Time: (6-15D PREG)

Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Mouse

Dose: 15120 MG/KG

Route of Application: Intraperitoneal

Exposure Time: (1-14D PREG)

Result: Specific Developmental Abnormalities: Musculoskeletal system. Specific Developmental Abnormalities: Craniofacial (including nose and tongue). Specific Developmental Abnormalities: Other developmental abnormalities.

Species: Rabbit

Dose: 2600 MG/KG

Route of Application: Oral

Exposure Time: (6-18D PREG)

Result: Specific Developmental Abnormalities: Central nervous system. Specific Developmental Abnormalities: Body wall. Specific Developmental Abnormalities: Musculoskeletal system.

Species: Rabbit

Dose: 2600 MG/KG

Route of Application: Oral

Exposure Time: (6-18D PREG)

Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Rabbit

Dose: 450 PPM/6H

Route of Application: Inhalation

Exposure Time: (7-19D PREG)

Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Body wall. Specific Developmental Abnormalities: Musculoskeletal system.

Species: Rabbit

Dose: 5200 MG/KG

Route of Application: Skin

Exposure Time: (6-18D PREG)

Result: Effects on Embryo or Fetus: Other effects to embryo.

CHRONIC EXPOSURE - MUTAGEN

Species: Human

Route: Inhalation

Dose: 12300 UG/M3/Y

Mutation test: Cytogenetic analysis

Species: Human

Dose: 100 NMOL/L

Cell Type: lymphocyte

Mutation test: Cytogenetic analysis

Species: Rat

Route: Inhalation

Dose: 10700 UG/M3

Mutation test: Dominant lethal test

Species: Mouse

Route: Intraperitoneal

Dose: 500 UG/KG

Exposure Time: 24H

Mutation test: Micronucleus test

Species: Mouse

Route: Intraperitoneal

Dose: 40 UMOL/KG

Mutation test: Cytogenetic analysis

Species: Mouse

Dose: 5 GM/L

Cell Type: lymphocyte

Mutation test: Mutation in mammalian somatic cells.

Species: Mouse

Dose: 4250 UG/KG

Cell Type: S. typhimurium

Mutation test: Host-mediated assay

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat

Dose: 5030 MG/KG

Route of Application: Oral

Exposure Time: (6-15D PREG)

Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Extra embryonic structures (e.g., placenta, umbilical cord). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Rat

Dose: 800 PPM/6H

Route of Application: Inhalation

Exposure Time: (13W PRE)

Result: Maternal Effects: Other effects. Endocrine: Effect on menstrual cycle.

Species: Rat

Dose: 50 PPM/6H

Route of Application: Inhalation

Exposure Time: (13W MALE)

Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count).

Species: Rat

Dose: 4 MG/M3/4H

Route of Application: Inhalation

Exposure Time: (1-19D PREG)

Result: Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

Species: Rat

Dose: 600 MG/M3/24H

Route of Application: Inhalation

Exposure Time: (1-19D PREG)

Result: Effects on Newborn: Behavioral.

Species: Rat

Dose: 287 PPM/6H

Route of Application: Inhalation

Exposure Time: (0-19D PREG)

Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Extra embryonic structures (e.g., placenta, umbilical cord). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Rat

Dose: 20 GM/KG

Route of Application: Skin

Exposure Time: (6-15D PREG)

Result: Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea). Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Rat

Dose: 20 GM/KG

Route of Application: Skin

Exposure Time: (1-20D PREG)

Result: Effects on Fertility: Female fertility index (e.g., #

females pregnant per # sperm positive females; # females pregnant per # females mated). Effects on Newborn: Delayed effects.

Species: Mouse
Dose: 200 PPM/6H
Route of Application: Inhalation
Exposure Time: (13W PRE)
Result: Maternal Effects: Other effects. Endocrine: Effect on menstrual cycle.

Species: Mouse
Dose: 2100 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (11D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Rabbit
Dose: 450 PPM/8H
Route of Application: Inhalation
Exposure Time: (7-19D PREG)
Result: Maternal Effects: Other effects. Specific Developmental Abnormalities: Musculoskeletal system. Specific Developmental Abnormalities: Gastrointestinal system.

Section 12 - Ecological Information

No data available.

ACUTE ECOTOXICITY TESTS

Test Type: EC50 Daphnia
Species: Daphnia magna
Time: 48 h
Value: 9,600 - 13,100 mg/l

Test Type: LC50 Fish
Species: Lepomis macrochirus (Bluegill)
Time: 96 h
Value: 6,700 - 7,500 mg/l

Test Type: LC50 Fish
Species: Onchorhynchus mykiss (Rainbow trout)
Time: 96 h
Value: 9,000 - 13,000 mg/l

Test Type: LC50 Fish
Species: Pimephales promelas (Fathead minnow)
Time: 96 h
Value: 10,400 - 10,800 mg/l

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION

This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT

Proper Shipping Name: N,N-Dimethylformamide
UN#: 2265
Class: 3
Packing Group: Packing Group III
Hazard Label: Flammable liquid
PIH: Not PIH

IATA

Proper Shipping Name: N,N-Dimethylformamide
IATA UN Number: 2265
Hazard Class: 3
Packing Group: III

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION

Symbol of Danger: T
Indication of Danger: Toxic.
R: 61 20/21 36
Risk Statements: May cause harm to the unborn child. Harmful by inhalation and in contact with skin. Irritating to eyes.
S: 53 45
Safety Statements: Restricted to professional users. Attention - Avoid exposure - obtain special instructions before use. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

US CLASSIFICATION AND LABEL TEXT

Indication of Danger: Toxic.
Risk Statements: May cause harm to the unborn child. Harmful by inhalation and in contact with skin. Irritating to eyes and skin.
Safety Statements: In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
Wear suitable protective clothing, gloves, and eye/face protection. Do not breathe vapor.
US Statements: Combustible. Readily absorbed through skin.
Target organ(s): Liver. Kidneys.

UNITED STATES REGULATORY INFORMATION

SARA LISTED: Yes
DEMINIMIS: 1 %
NOTES: This product is subject to SARA section 313 reporting requirements.
TSCA INVENTORY ITEM: Yes

CANADA REGULATORY INFORMATION

WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

Section 16 - Other Information

DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

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

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