Chemical Safety Data Sheet MSDS / SDS

N,N-dimethylformamide SDS

Revision Date:2024-04-25 Revision Number:1

SECTION 1: Identification of the substance/mixture and of the company/undertaking

Product identifier

Product name: N,N-dimethylformamide

CAS: 68-12-2

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

Relevant identified uses: For R&D use only. Not for medicinal, household or other use.

Uses advised against: none

Company Identification

Company: Chemicalbook.in

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SECTION 2: Hazards identification

Classification of the substance or mixture

Acute toxicity - Category 4, Dermal
Eye irritation, Category 2

Acute toxicity - Category 4, Inhalation
Reproductive toxicity, Category 1B

GHS label elements, including precautionary statements

Pictogram(s)

Signal word Danger

Hazard statement(s)

H312 Harmful in contact with skin
H319 Causes serious eye irritation
H332 Harmful if inhaled

Precautionary statement(s)

Prevention

P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection/...
P264 Wash ... thoroughly after handling.
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P271 Use only outdoors or in a well-ventilated area.
P203 Obtain, read and follow all safety instructions before use.

Response

P302+P352 IF ON SKIN: Wash with plenty of water/...
P317 Get medical help.
P321 Specific treatment (see ... on this label).
P362+P364 Take off contaminated clothing and wash it before reuse.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P318 IF exposed or concerned, get medical advice.

Storage

P405 Store locked up.

Disposal

P501 Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in classification

no data available

SECTION 3: Composition/information on ingredients

Substance

Chemical name:	N,N-dimethylformamide
Common names and synonyms:	N,N-dimethylformamide
CAS number:	68-12-2
EC number:	200-679-5
Concentration:	100%

SECTION 4: First aid measures

Description of necessary first-aid measures

If inhaled

Fresh air, rest. Refer for medical attention.

Following skin contact

Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention .

Following eye contact

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

Following ingestion

Rinse mouth. Do NOT induce vomiting. Refer for medical attention .

Most important symptoms/effects, acute and delayed

Irritation of eyes, skin and nose. May cause nausea. (USCG, 1999)

Indication of immediate medical attention and special treatment needed, if necessary

Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR as necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention. Organic acids and related compounds

SECTION 5: Firefighting measures

Suitable extinguishing media

Wear self contained breathing apparatus for fire fighting if necessary.

Specific hazards arising from the chemical

Special Hazards of Combustion Products: Vapors are irritating (USCG, 1999)

Special protective actions for fire-fighters

Use water spray, powder, alcohol-resistant foam, carbon dioxide. In case of fire: keep drums, etc., cool by spraying with water.

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures

Personal protection: complete protective clothing including self-contained breathing apparatus. Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations.

Environmental precautions

Personal protection: complete protective clothing including self-contained breathing apparatus. Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations.

Methods and materials for containment and cleaning up

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.

SECTION 7: Handling and storage

Precautions for safe handling

NO open flames, NO sparks and NO smoking. NO contact with oxidizing agents. Above 58°C use a closed system and ventilation. Handling in a well ventilated place. Wear suitable protective clothing. Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Use non-sparking tools. Prevent fire caused by electrostatic discharge steam.

Conditions for safe storage, including any incompatibilities

Separated from incompatible materials. See Chemical Dangers.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.

SECTION 8: Exposure controls/personal protection

Control parameters

Occupational Exposure limit values

TLV: 5 ppm as TWA; (skin); A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued.MAK: 15 mg/m3, 5 ppm; peak limitation category: II(2); skin absorption (H); carcinogen category: 4; pregnancy risk group: B.EU-OEL: 15 mg/m3, 5 ppm as TWA; 30 mg/m3, 10 ppm as STEL; (skin)

Biological limit values

no data available

Appropriate engineering controls

Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Set up emergency exits and the risk-elimination area.

Individual protection measures, such as personal protective equipment (PPE)

Eye/face protection

Wear safety goggles or eye protection in combination with breathing protection.

Skin protection

Barrier cream. Protective gloves. Protective clothing.

Respiratory protection

Use ventilation, local exhaust or breathing protection.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties and safety characteristics

Physical state:	Liquid.
Colour:	Colourless.
Odour:	Fishy odor
Melting point/freezing point:	-61.4 - -61 °C.
Boiling point or initial boiling point and boiling range:	152 - 153 °C. Atm. press.: 1 013 hPa.
Flammability:	Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.
Lower and upper explosion limit/flammability limit:	Lower flammable limit: 2.2% by volume at 212 deg F (100 deg C); Upper flammable limit: 15.2% by volume
Flash point:	57.5 °C. Atm. press.: 1 013.25 hPa.
Auto-ignition temperature:	435 °C. Atm. press.: 1 013.25 hPa.
Decomposition temperature:	no data available
pH:	pH = 6.7 (0.5 molar solution in water)

Kinematic viscosity:	dynamic viscosity (in mPa s) = 0.79 - 0.805. Temperature:25.0°C.
Solubility:	Miscible with water
Partition coefficient n-octanol/water:	log Pow = -1.01.
Vapour pressure:	3.08 hPa. Temperature:20 °C.
Density and/or relative density:	0.94 - 0.95. Temperature:20 °C.
Relative vapour density:	2.5 (vs air)
Particle characteristics:	no data available

SECTION 10: Stability and reactivity

Reactivity

Decomposes on heating. This produces toxic fumes including nitrogen oxides. Reacts violently with strong oxidants, halogens, halogenated hydrocarbons and nitrates. Attacks some plastics and rubber.

Chemical stability

DMF is stable. It is hygroscopic and easily absorbs water form a humid atmosphere and should therefore be kept under dry nitrogen. High purity DMF, required for acrylic fibers, is best stored in aluminum tanks. DMF dose not change under light or oxygen and does not polymerize spontaneously. Temperatures >350 deg C may cause decomposition to form dimethylamine and carbon dioxide, with pressure developing in closed containers.

Possibility of hazardous reactions

CombustibleN,N-DIMETHYLFORMAMIDE may react violently with a broad range of chemicals, e.g.: alkaline metals (sodium, potassium), azides, hydrides (sodium borohydride, lithium aluminum hydride), bromine, chlorine, carbon tetrachloride, hexachlorocyclohexane, phosphorus pentaoxide, triethylaluminum, magnesium nitrate, organic nitrates. Forms explosive mixtures with lithium azide [Bretherick, 5th ed., 1995, p. 453]. Oxidation by chromium trioxide or potassium permanganate may lead to explosion [Pal B. C. et al., Chem. Eng. News, 1981, 59, p. 47].

Conditions to avoid

no data available

Incompatible materials

Can react vigorously with oxidizing agents, halogenated hydrocarbons, & inorg nitrates.

Hazardous decomposition products

When heated to decomposition it emits toxic fumes of /nitrogen oxides/.

SECTION 11: Toxicological information

Acute toxicity

Oral: LD50 - rat (male/female) - 3 010 mg/kg bw. Remarks:Conversion in mg/kg is based on the density: d= 0.94 g/cm3.

Inhalation: LC50 - rat (male/female) - > 5.85 mg/L air.

Dermal: lethal dose - rat (male/female) - > 3 160 mg/kg bw.

Skin corrosion/irritation

no data available

Serious eye damage/irritation

no data available

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

Evaluation: There is inadequate evidence in humans for the carcinogenicity of dimethylformamide. There is evidence suggesting

the lack of carcinogenicity of dimethylformamide in experimental animals. Overall evaluation: Dimethylformamide is not classifiable as to its carcinogenicity in humans (Group 3).

Reproductive toxicity

Only one study is available on the reproductive effects of dimethylformamide in humans. This study reported an increased rate of spontaneous abortion among pregnant women occupationally exposed to dimethylformamide. However, these results cannot be attributed solely to dimethylformamide, as these women were exposed to a number of additional chemicals. Dimethylformamide is embryotoxic in animals; reduced implantation efficiency, decreased mean fetal weight, and increased abortions have been reported in rats exposed by inhalation. In rabbits exposed to dimethylformamide by gavage (experimentally placing the chemical in the stomach), decreased mean fetal weight and increased percentage of malformed live fetuses per litter and increased percentage of litters with malformed fetuses were observed in the high-dose group.

STOT-single exposure

The substance is irritating to the eyes and respiratory tract. The substance may cause effects on the liver. This may result in tissue lesions. The effects may be delayed. Medical observation is indicated. See Notes. If swallowed the substance easily enters the airways and could result in aspiration pneumonitis.

STOT-repeated exposure

The substance may have effects on the liver. This may result in impaired functions. Tumours have been detected in experimental animals but may not be relevant to humans. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

Aspiration hazard

A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

SECTION 12: Ecological information

Toxicity

Toxicity to fish: LC50 - Lepomis macrochirus - 7 100 mg/L - 96 h.

Toxicity to daphnia and other aquatic invertebrates: EC50 - Daphnia magna - 13 100 mg/L - 48 h.

Toxicity to algae: EC50 - Desmodesmus subspicatus (previous name: Scenedesmus subspicatus) - > 1 000 mg/L - 72 h.

Toxicity to microorganisms: EC50 - Vibrio fisheri - 12 300 - 17 500 mg/L - 5 min.

Persistence and degradability

AEROBIC: Aerobic unacclimated and acclimated river die-away tests showed that N,N-dimethylformamide at an initial concentration of 30 mg/L completely disappeared within 6 and 3 days, respectively(1). However, 24 to 48 hours was required before any degradation was observed among unacclimated samples(1). N,N-Dimethylformamide, present at 100 mg/L, reached 4.4% of its theoretical BOD in 2 weeks using an activated sludge inoculum at 30 mg/L in the Japanese MITI test(2). Aerobic grab sample data for N,N-dimethylformamide in sea water showed a mineralization rate of <3% in 24 hours for initial concentration of 10 ug/L and 100 ug/L(3). However, 20% of N,N-dimethylformamide at a concentration of 0.1 ug/L was mineralized in 24 hrs(3). All samples were adjusted to sterilized controls(3). Aqueous screening test data demonstrated that dimethylformamide was easily removed by sewage treatment facilities upon acclimation(4). Wastewater from a polyimide synthesis operation at Kansas City, MO contained N,N-dimethylformamide at a concentration of 65,500 mg/L before entering a bench scale biological treatment system(5). At feed rates of 90 lb/day/1000 cu ft, effluent from the biological reactor contained N,N-dimethylformamide at a concentration of <10 mg/L(5). The concentration of N,N-dimethylformamide in the reactor sludge was not documented(5).

Bioaccumulative potential

BCFs of 0.3-1.2 and 0.3-0.8 were reported in carp (Cyprinus carpio) when exposed to 2 and 20 ppm of N,N-dimethylformamide over a 2-week period, respectively(1). According to a classification scheme(2), these BCFs suggest the potential for bioconcentration in aquatic organisms is low(SRC).

Mobility in soil

Using a structure estimation method based on molecular connectivity indices(1), the Koc of N,N-dimethylformamide can be estimated to be 1(SRC). According to a classification scheme(2), this estimated Koc value suggests that N,N-dimethylformamide is expected to have very high mobility in soil.

Other adverse effects

no data available

SECTION 13: Disposal considerations

Disposal methods

Product

The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

Contaminated packaging

Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

SECTION 14: Transport information

UN Number

ADR/RID: UN2265 (For reference only, please check.)
IMDG: UN2265 (For reference only, please check.)
IATA: UN2265 (For reference only, please check.)

UN Proper Shipping Name

ADR/RID: N,N-DIMETHYLFORMAMIDE (For reference only, please check.)
IMDG: N,N-DIMETHYLFORMAMIDE (For reference only, please check.)
IATA: N,N-DIMETHYLFORMAMIDE (For reference only, please check.)

Transport hazard class(es)

ADR/RID: 3 (For reference only, please check.)
IMDG: 3 (For reference only, please check.)
IATA: 3 (For reference only, please check.)

Packing group, if applicable

ADR/RID: III (For reference only, please check.)
IMDG: III (For reference only, please check.)
IATA: III (For reference only, please check.)

Environmental hazards

ADR/RID: No
IMDG: No
IATA: No

Special precautions for user

no data available

Transport in bulk according to IMO instruments

no data available

SECTION 15: Regulatory information

Safety, health and environmental regulations specific for the product in question

European Inventory of Existing Commercial Chemical Substances (EINECS)

Listed.

EC Inventory

Listed.

United States Toxic Substances Control Act (TSCA) Inventory

Listed.

China Catalog of Hazardous chemicals 2015

Listed.

New Zealand Inventory of Chemicals (NZIoC)

Listed.

(PICCS)

Listed.

Vietnam National Chemical Inventory

Listed.

IECSC)

Listed.

Korea Existing Chemicals List (KECL)

Listed.

SECTION 16: Other information

Abbreviations and acronyms

CAS: Chemical Abstracts Service

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road

RID: Regulation concerning the International Carriage of Dangerous Goods by Rail

IMDG: International Maritime Dangerous Goods

IATA: International Air Transportation Association

TWA: Time Weighted Average

STEL: Short term exposure limit

LC50: Lethal Concentration 50%

LD50: Lethal Dose 50%

EC50: Effective Concentration 50%

References

IPCS - The International Chemical Safety Cards (ICSC), website: http://www.ilo.org/dyn/icsc/showcard.home

HSDB - Hazardous Substances Data Bank, website: https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm

IARC - International Agency for Research on Cancer, website: http://www.iarc.fr/

eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en

CAMEO Chemicals, website: http://cameochemicals.noaa.gov/search/simple

ChemIDplus, website: http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp

ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: http://www.phmsa.dot.gov/hazmat/library/erg

Germany GESTIS-database on hazard substance, website: http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp

ECHA - European Chemicals Agency, website: https://echa.europa.eu/

Other Information

The symptoms of poisoning do not become manifest until a few hours or even days have passed. Use of alcoholic beverages enhances the harmful effect.

Disclaimer: 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. We as supplier shall not be held liable for any