



Safety Data Sheet

1. PRODUCT IDENTIFICATION

Name	Dimethylformamide
Synonyms	N,N-dimethylformamide, n-formyldimethylamine, DMF
CAS#	68-12-2
Europe EC#	200-679-5
Product Uses	solvent for liquids & gases; organic synthesis, mfg. of polyacrylic fibres, etc

EMERGENCY INFORMATION

Canada Call CANUTEC (collect) (613) 996-6666
U.S.A. Call CHEMTREC (800) 424-9300

2. HAZARDS

GHS Class (Category)	<i>flammable</i> (3)	<i>eye irritant</i> (2A)	<i>reproductive</i> (2B)	<i>STOT</i> (3)	<i>acute skin</i> (4)	<i>acute inhal.</i> (4)
Signal Words	WARNING	WARNING	DANGER	WARNING	WARNING	WARNING
Hazard Statements	<i>flammable liquid & vapour</i> (H226)	<i>causes serious eye irritation</i> (H319)	<i>may damage fertility or the unborn child</i> (H360)	<i>may cause respiratory tract irritation</i> (H335)	<i>harmful in contact with skin</i> (H312)	<i>harmful on inhalation</i> (H331)



GHS Precautionary Statements for Labelling

P210	Keep away from heat, sparks, open flames and hot surfaces. No smoking.
P240	Ground or bond container and receiving equipment.
P262	Do not get in eyes, on skin or on clothing.
P264	Wash thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P280	Wear eye protection, protective gloves and clothing of butyl.
P313 & P333	If skin irritation or rash occurs, get medical advice/attention.

Canada – WHMIS
Key:

B 3, D 2B
B 2 – Flash Point <38°C, **B 3** – Flash Point >38°C & <93°C
D 1 – Immediately Toxic, **D 2** – Chronic Toxicity
C – Oxidising Substance, **E** – Corrosive, **F** – Reactive Substance



3. COMPOSITION

	%	TWAEV / TLV ppm / mg/m ³	LD ₅₀ (mg/kg) ORAL	LD ₅₀ (mg/kg) SKIN	LC ₅₀ ppm INHALATION
N,N-dimethylformamide	100%	10 / 30 (skin)	2000	3160	1925

Please ensure that this SDS is given to, and explained to people using this product.

4. FIRST AID

- SKIN: Wash with plenty of water. Remove contaminated clothing and do not reuse until thoroughly laundered.
- EYES: Wash eyes with plenty of water, holding eyelids open. Seek medical assistance promptly if there is irritation.
- INHALATION: Remove from contaminated area promptly. **CAUTION: Rescuer must not endanger himself!** If breathing stops, administer artificial respiration and seek medical aid promptly.
- INGESTION: Give plenty of water to dilute product. Do not induce vomiting (NOTE below). Keep victim quiet. If vomiting occurs, lower victim's head below hips to prevent inhalation of vomited material. Seek medical help promptly.

Inadvertent inhalation of vomited material may seriously damage the lungs. The danger of this is greater than the risk of poisoning through absorption of this relatively low-toxicity substance. The stomach should only be emptied under medical supervision, and after the installation of an airway to protect the lungs.

5. FIRE FIGHTING & FLAMMABILITY

- Flash Point 58°C / 136°F (closed cup)
- Autoignition Temperature 435°C / 815°F¹; also 445°C / 833°F
- Flammable Limits 2.2% – 15.2%
- Combustion Products carbon monoxide, nitrogen oxides, dimethylamine
- Firefighting Precautions foam, dry chemical, water fog or spray, product floats on water – water jet spreads flames; firefighters must wear SCBA
- Static Charge Accumulation cannot accumulate a static charge on agitation or pumping

6. ACCIDENTAL RELEASE MEASURES

- Leak Precaution dyke to control spillage and prevent environmental contamination
- Handling Spill ventilate contaminated area; recover free liquid with suitable pumps; absorb residue on an inert sorbent, sweep & pick up using plastic or aluminium shovel, & store in closed containers for recycling or disposal

7. HANDLING & STORAGE

Store in a cool, dry environment, away from sources of ignition, heat, oxidising agents & substances listed in part 10. The flash point is quite high, but protection from sparks is prudent. Empty containers may contain a flammable or explosive vapour. Ensure that containers, empty or full, are tightly sealed unless in use.

Avoid generating or breathing product vapour. If vapour forms in use, install adequate exhaust ventilation. If dealing with a spill, and ventilation is impossible or impractical, wear a suitable respirator with organic vapour cartridge.

Never cut, drill, weld or grind on or near this container. Avoid contact with skin and wash work clothes frequently. An eye bath and safety shower must be available near the workplace.

8. EXPOSURE CONTROL & PERSONAL PROTECTION

- | | | | |
|---------------|--|--------------|------------|
| Ontario TWAEV | 10ppm / 30mg/m ³ (skin) | Ontario STEV | not listed |
| ACGIH TLV | 10ppm / 30mg/m ³ (skin) | ACGIH STEL | not listed |
| OSHA PEL | 10ppm / 30mg/m ³ (skin) | OSHA STEL | not listed |
| Ventilation | mechanical ventilation may be required to control airborne titre | | |
| Hands | butyl rubber gloves recommended – <i>other types may also protect; consult supplier to confirm suitability</i> | | |
| Eyes | safety glasses with side shields – <i>always protect the eyes</i> | | |
| Clothing | wear impermeable (above) apron, boots, & long sleeves if there is any danger of splashing | | |

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9. PHYSICAL PROPERTIES

Odour & Appearance	clear, colourless to slightly yellow, hygroscopic liquid with fishy odour
Odour Threshold	0.05ppm
Vapour Pressure	2.7mmHg / 0.36kPa (20°C / 68°F)
Evaporation Rate (<i>Butyl Acetate</i> = 1)	0.17
Vapour Density (air = 1)	2.5
Boiling Range	153°C / 307°F
Freezing Point	-61°C / -78°F
Specific Gravity	0.95 (20/20°C)
Water Solubility	complete
Also soluble in	alcohol, ether, acetone, benzene
Log P _{O/W} (Octanol/H ₂ O partition)	-0.85
Viscosity	0.8centipoise (20°C / 68°F)
pH	6.7 (0.5 molar solution in water) – <i>very slightly acidic</i>
Conversion Factor	1ppm = 3.04mg/m ³
Molecular Weight	73grams per mole

10. REACTIVITY

Dangerously Reactive With	strong oxidising agents, carbon tetrachloride (with iron), hot solutions of sodium tetrahydroborate, sodium metal, chlorine, bromine,
Also Reactive With	cynauric chloride, triethylaluminum, sodium hydride, 2,4,6-trichloro-1,3,5-triazine
Stability	stable; will not polymerize; <i>however</i> , polymerizes methylene bisphenyl diisocyanate violently
Decomposes in Presence of	begins above 350°C / 660°F
Decomposition Products	none apart from Hazardous Combustion Products
Sensitive to Mechanical Impact	no

11. TOXICITY**Effects, Acute Exposure**

Skin Contact	may be slightly irritating (<i>conflicting evidence</i> ¹)
Skin Absorption	yes; no toxic effects are likely by this route
Eye Contact	irritating (7 of 9 reports) ¹ ; severely irritating (2 of 9 reports) ¹ , may cause reversible damage ¹ ; vapour may irritate eyes ¹
Inhalation	strongly irritating; may cause chemical burns in lungs (<i>low vapour pressure reduces risk</i>)
Ingestion	strongly irritating to mouth, throat and stomach; facial flushing, nausea, vomiting, dizziness may occur
LD ₅₀ (oral)	2000, 3010 ¹ , 4000, 4320 & 7170mg/kg (rat), 2900 & 3750mg/kg (mouse), 5000mg/kg (rabbit)
LD ₅₀ (skin)	5000mg/kg (rabbit), >3160mg/kg (rat) ¹ – <i>one of 4 rats died at this dose</i>
LC ₅₀ (inhalation)	1925 ¹ & 3420ppm (rat), 3100 & 3300ppm (mouse),

Effects, Chronic Exposure

General	prolonged exposure may cause dermatitis
Sensitising	not a sensitiser in humans or animals
Carcinogen/Tumorigen	not considered a tumorigen or a carcinogen in humans or animals
Reproductive Effect	no known effect in humans; reduced fertility in mice on ingestion (<i>NOAEL <1000mg/kg in drinking water</i>) ¹ teratogen in rabbits on inhalation (<i>NOAEL 150mg/m³, day 7 to 19 post-insemination</i>) ¹ embryotoxic in rabbits on dermal application (<i>NOAEL 200mg/kg/day, day 6 to 18 post-insemination</i>) ¹
Mutagen	no known effect on humans or animals
Synergistic With	not known

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12. ECOLOGICAL INFORMATION

Bioaccumulation	water soluble – not a bioaccumulator
Biodegradation	biodegrades readily & rapidly in sewage treatment facilities; 95% in 7 days ¹ , 100% in 3-6 days & 21 days ¹
Abiotic Degradation	reacts with atmospheric hydroxyl radicals; estimated ½-life in air is 22 hours
Mobility in soil, water	water soluble; moves readily in soil and water
Aquatic Toxicity	
LC ₅₀ (Fish, 96hr)	>7100mg/litre (Lepomis macrochirus), >9800mg/litre (Oncorhynchus mykiss & Salmo gairdneri), 10,500mg/litre (Pimephelas promelas), 8366mg/litre (Salvelinus fontinalis)
EC ₅₀ (Crustacea, 48hr)	7500, 14,400 & 15,700mg/litre (Daphnia magna)
EC ₅₀ (Algae)	890mg/litre (Chlorella pyrenoidosa), >500mg/litre (Scenedesmus subspicatus)
EC ₅₀ (Bacteria)	2000 & 20,000mg/litre (Photobacterium phosphoreum), 570mg/litre (Anabena inaequalis)

13. DISPOSAL

Waste Disposal	do not flush to sewer , recycle solvent if possible; may be incinerated in approved facility; rapid biodegradation suggests that biodestruction could be an effective means of disposal
Containers	Drums should be reused. Recondition and pressure test by a licensed reconditioner prior to re-use. Pails must be vented and thoroughly dried prior to crushing and recycling. IBCs (intermediate bulk containers): polyethylene bottle must be pressure tested & recertified at 30 months. Replace at 60 months (5yrs). Steel containers must be inspected, pressure tested & recertified every 5 years. <i>Never cut, drill, weld or grind on or near this container, even if empty</i>

14. TRANSPORT CLASSIFICATION

<i>Canada TDG</i>	PIN	UN - 2265
AND	Shipping Name	N,N-Dimethylformamide
<i>U.S.A. 49 CFR</i>	Class & Packing Group	3 (III)
Marine Pollutant		not a marine pollutant
ERAP Required		NO



15. REGULATIONS

Canada DSL	on inventory
U.S.A. TSCA	on inventory
Europe EINECS	on inventory

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15. REGULATIONS, cont'd

U.S.A. Regulations:

Immediately Dangerous to Life or Health: 500 ppm

OSHA Standards: Permissible Exposure Limit: Table Z-1 8-hr Time-Weighted Avg: 10 ppm (30 mg/cu m). Skin Designation.

NIOSH Recommendations: Recommended Exposure Limit: 10 Hour Time-Weighted Average: 10 ppm (30 mg/cu m), skin.

Threshold Limit Values: 8 hr Time Weighted Avg (TWA): 10 ppm, skin. Excursion Limit Recommendation: Excursions in worker exposure levels may exceed 3 times the TLV-TWA for no more than a total of 30 minutes during a work day, and under no circumstances should they exceed 5 times the TLV-TWA, provided that the TLV-TWA is not exceeded. A4; Not classifiable as a human carcinogen. Biological Exposure Index (BEI): Determinant: N-methylformamide in urine; Sampling Time: end of shift; BEI: 15 mg/L. Biological Exposure Index (BEI): Determinant: N-acetyl-S-(N-methylcarbamoyl) cysteine in urine; Sampling Time: prior to last shift of workweek; BEI: 40 mg/L. Notation: The biological determinant is an indicator of exposure to the chemical, but the quantitative interpretation of the measurement is ambiguous. These determinants should be used as a screening test if a quantitative test is not practical, or as a confirmatory test if the quantitative test is not specific and the origin of the determinant is in question.

Atmospheric Standards: This action promulgates standards of performance for equipment leaks of Volatile Organic Compounds (VOC) in the Synthetic Organic Chemical Manufacturing Industry (SOCMI). The intended effect of these standards is to require all newly constructed, modified, and reconstructed SOCMI process units to use the best demonstrated system of continuous emission reduction for equipment leaks of VOC, considering costs, non air quality health and environmental impact and energy requirements. N,N-Dimethylformamide is produced, as an intermediate or a final product, by process units covered under this subpart. Listed as a hazardous air pollutant (HAP) generally known or suspected to cause serious health problems. The Clean Air Act, as amended in 1990, directs EPA to set standards requiring major sources to sharply reduce routine emissions of toxic pollutants. EPA is required to establish and phase in specific performance based standards for all air emission sources that emit one or more of the listed pollutants. N,N-Dimethyl formamide is included on this list.

State Drinking Water Guidelines: Florida 700 ug/L, Maine 700 ug/L

CERCLA Reportable Quantities: Persons in charge of vessels or facilities are required to notify the National Response Center (NRC) immediately, when there is a release of this designated hazardous substance, in an amount equal to or greater than its reportable quantity of 100 lb or 45.4 kg. The toll free number of the NRC is (800) 424-8802. The rule for determining when notification is required is stated in 40 CFR 302.4 (section IV.D.3.b).

TSCA Requirements: Pursuant to section 8(d) of TSCA, EPA promulgated a model Health and Safety Data Reporting Rule. The section 8(d) model rule requires manufacturers, importers, and processors of listed chemical substances and mixtures to submit to EPA copies and lists of unpublished health and safety studies. N,N-Dimethylformamide is included on this list. Effective date: 4/13/89; Sunset date: 12/19/95.

FDA Requirements: Dimethylformamide is an indirect food additive for use only as a component of adhesives.

16. OTHER INFORMATION

Prepared for Megaloid Laboratories by Peter Bursztyn, (705) 734-1577

Data from RTECS, HSDB (Haz. Substance Data Base), Cheminfo (CCOHS), IUCLID Datasheets (ESIS – European Chem. Substance Info. System), & others.

Preparation Date: January 2003 Revision Date: January 2006, January 2009, January 2012, January 2015

(1) European Chemicals Agency (ECHA) dossier for N,N-Dimethylformamide: <http://apps.echa.europa.eu/registered/data/dossiers/DISS-9d955330-d528-6c83-e044-00144f67d249/DISS-9d955330-d528-6c83-e044-00144f67d249.html>

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