

Material Safety Data Sheet

Conforms to 93/112/EC and ISO 11014-1

Responsible Name MSDS Administrator

? Section 1. Chemical Product and Company Identification**Product Name** Dimethylformamide**Product no.** 20672 20673 20673A 20673B 1801790 1854480 1858588 1860099 1871020 1871030 1889621
1890261 1890513 1890550 NCI1020 NCI1030**Supplier** In USA:
Thermo Fisher Scientific
P.O. Box 117
Rockford, IL 61105
USA
815.968.0747 or
1.800.874.3723In Europe:
Perbio Science
Industriezone III
Industrielaan 27
9320 Erembodegem-Aalst
Belgium
Tel:+32 53 83 44 04
Fax:+32 53 83 76 38**Manufacturer** Pierce
3747 N. Meridian Road
P.O. Box 117
Rockford, IL 61105
USA
815.968.0747 or
1.800.874.3723
(815)968-7316 fax
www.thermo.com**In case of emergency** CHEMTREC:
800.424.9300
OUTSIDE US:
703.527.3887**Print date** 7/19/2007**Validation date** 7/19/2007**MSDS#** 3759**Synonyms** DIMETHYLFORMAMID (GERMAN); DIMETHYL FORMAMIDE; N,N-DIMETHYL FORMAMIDE;
DIMETILFORMAMIDE (ITALIAN); DIMETYLFORMAMIDU (CZECH); DMF; DMFA; DWUMETYLOFORMAMID
(POLISH); N-FORMYLDIMETHYLAMINE; NSC 5356; U-4224; FORMAMIDE, N,N-DIMETHYL-; N,N-DIMETHY
LMETHANIDE; N,N-DIMETHYLFORMAMIDE; N,N-Dimethyl formamide**Use of the substance/preparation** Refer to the instruction booklet for proper and intended use. Otherwise, contact supplier for specific applications.**Section 2. Composition, Information on Ingredients****Substance/preparation** : Substance

<u>Ingredient name</u>	<u>CAS number</u>	<u>%</u>	<u>EC number</u>	<u>Classification</u>
Dimethylformamide	68-12-2	98 - 100	200-679-5	Repr. Cat. 2; R61 Xn; R20/21 Xi; R36

Section 3. Hazards identification**United States** Review the most current and approved institutional guideline, protocol, standard operating procedure(s) and MSDS(s) for the proper handling of institutional materials/equipment associated with the use of this product.**Emergency overview** Warning!

☒ HARMFUL IF INHALED.
 CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION.
 CAUSES DAMAGE TO THE FOLLOWING ORGANS: KIDNEYS, LIVER,
 CARDIOVASCULAR SYSTEM, RESPIRATORY TRACT, EYES, EYE, LENS OR
 CORNEA.
 POSSIBLE CANCER HAZARD.
 MAY CAUSE CANCER BASED ON ANIMAL DATA.
 COMBUSTIBLE LIQUID AND VAPOR.
 VAPOR MAY CAUSE FIRE.

☒ Avoid contact with skin and clothing. Avoid breathing vapor or mist. Keep away from heat, sparks and flame. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Risk of cancer depends on duration and level of exposure.

Target organs ☒ Causes damage to the following organs: kidneys, liver, cardiovascular system, upper respiratory tract, eyes, eye, lens or cornea.**Routes of entry** Dermal contact. Eye contact. Inhalation. Ingestion.**Potential acute health effects****Eyes** Irritating to eyes.**Continued on Next Page**

<i>Skin</i>	Practically non-toxic in contact with skin. Irritating to skin.
<i>Inhalation</i>	Toxic by inhalation. Irritating to respiratory system.
<i>Ingestion</i>	Practically non-toxic if swallowed.
<i>Potential chronic health effects</i>	
<i>Carcinogenic effects</i>	CARCINOGENIC EFFECTS: Classified None. by NIOSH. A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC.
	MUTAGENIC EFFECTS: Classified SUSPECTED for human. Mutagenic for bacteria and/or yeast.
	TERATOGENIC EFFECTS: Classified SUSPECTED for human.
<i>Medical conditions aggravated by overexposure</i>	Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.
<i>Over-exposure signs/symptoms</i>	Not available.

Europe

<i>Classification</i>	Repr. Cat. 2; R61 Xn; R20/21 Xi; R36
<i>Physical/chemical hazards</i>	Not applicable.
<i>Human health hazards</i>	Harmful by inhalation and in contact with skin. Irritating to eyes. May cause harm to the unborn child.
<i>Environmental hazards</i>	Not applicable.
See toxicological Information (section 11)	

+ Section 4. First aid measures

Notice to reader Get immediate medical attention.
Effects and symptoms

<i>Inhalation</i>	Hazardous in case of inhalation (lung irritant).
<i>Ingestion</i>	Hazardous in case of ingestion.
<i>Skin contact</i>	Hazardous in case of skin contact (irritant, permeator). Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.
<i>Eye contact</i>	Hazardous in case of eye contact (irritant).
<i>Aggravating conditions</i>	Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

First-Aid measures

<i>Inhalation</i>	If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
<i>Ingestion</i>	Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention if symptoms appear.
<i>Skin contact</i>	In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.
<i>Eye contact</i>	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.
<i>Notes to physician</i>	Not available.
<i>Protection of first-aiders</i>	Not available.

Section 5. Fire fighting measures

<i>Flammability of the product</i>	Flammable.
<i>Flash Points</i>	Closed cup: 57.778°C (136°F). Open cup: 67°C (152.6°F).
<i>Fire hazards in presence of various substances</i>	Extremely flammable in presence of open flames, sparks and static discharge.
<i>Fire fighting media and instructions</i>	Use an extinguishing agent suitable for surrounding fires.
<i>Protective clothing (fire)</i>	Be sure to use an approved/certified respirator or equivalent.

Continued on Next Page

Dimethylformamide

Page: 3/8

Special Remarks on Fire Hazards HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Vapor explosion hazard indoors, outdoors or in sewers. Some may polymerize (P) explosively when heated or involved in a fire. Runoff to sewer may create fire or explosion hazard. Containers may explode when heated. Many liquids are lighter than water.

Hazardous thermal decomposition products These products are carbon oxides (CO, CO₂), nitrogen oxides (NO, NO₂...).

Section 6. Accidental release measures

Personal precautions Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Environmental precautions and clean-up methods Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed.

Small spill and leak Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Section 7. Handling and storage

Handling Avoid contact with eyes, skin and clothing. Keep container closed. Use only with adequate ventilation. Avoid breathing vapor or mist. Wash thoroughly after handling.

Storage Keep container tightly closed. Keep container in a cool, well-ventilated area.

Intended Use Refer to the instruction booklet for proper and intended use. Otherwise, contact supplier for specific applications.

Packaging materials

Suitable / Not suitable Use original container.

Czech Republic - Storage code III

Section 8. Exposure Controls, Personal Protection

Engineering Controls Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective occupational exposure limits. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Exposure Limit Values

Ingredient Name

United States

Dimethylformamide

Occupational Exposure Limits

ACGIH (United States). Skin

TWA: 10 ppm

NIOSH (United States). Skin

TWA: 10 ppm

OSHA PEL (United States). Skin

TWA: 30 mg/m³ 8 hour(s).

MSHA (United States). Skin

TWA: 30 mg/m³

Sweden

Dimethylformamide

NGV: 10 ppm

KTV: 15 ppm

Denmark

Dimethylformamide

GV: 10 ppm

France

Dimethylformamide

VME: 10 ppm

Continued on Next Page

Netherlands

Dimethylformamide

MAC-TGG: 10 ppm

Germany

Dimethylformamide

MAK: 20 ppm

Finland

Dimethylformamide

TWA: 10 ppm
STEL: 20 ppm

United Kingdom (UK)

Dimethylformamide

TWA: 10 ppm
STEL: 20 ppm

Switzerland

Dimethylformamide

MAK-W: 10 ppm
KZG-W: 20 ppm

Belgium

Dimethylformamide

TWA: 10 ppm

Turkey

Dimethylformamide

NIOSH (United States). Skin
TWA: 10 ppm

Ireland

Dimethylformamide

OELV: 10 ppm
OELV: 20 ppm

Personal Protection

Eyes Splash goggles.**Body** Lab coat.**Hands** Gloves.**Respiratory** Respirator is not needed under normal and intended conditions of use, if exposures are kept below established limits.Protective Clothing
(Pictograms)

Section 9. Physical and chemical properties

Physical State Liquid. (Clear sparkling liquid.)**Color** Colorless. (Light.)**Odor** Amine like. Fish. (Slight.)**Molecular weight** 73.09 g/mole**Taste** Not available.**Molecular formula** C₃H₇NO**pH** 6.7 [Neutral.]**Boiling/condensation point** 153 to 155°C (307.4 to 311°F)**Melting/freezing point** -61°C (-77.8°F)**Specific Gravity** 0.944 (Water = 1)**Vapor pressure** 0.35991 kPa (2.7 mm Hg) (at 20°C)**Vapor density** 2.51 (Air = 1)**Odor threshold** 100 ppm**Evaporation rate** 0.17 compared to (n-BUTYL ACETATE=1)**LogK_{ow}** The product is more soluble in water; log(octanol/water) =-1.01**Dispersion properties** See solubility in water, methanol, diethyl ether, acetone.**Solubility** Soluble in cold water, hot water, methanol, diethyl ether, acetone.**Flash point** Closed cup: 57.778°C (136°F). Open cup: 67°C (152.6°F).**Explosion limits** Lower: 2.2% Upper: 15.2%

Continued on Next Page



Section 10. Stability and reactivity

<i>Stability and Reactivity</i>	The product is stable.
<i>Conditions to avoid</i>	Not available.
<i>Materials to avoid</i>	Reactive with oxidizing agents.
<i>Hazardous polymerization</i>	Will not occur.
<i>Hazardous Decomposition Products</i>	Not available.



Section 11. Toxicological information

<i>Toxicity to Animals</i>	Dimethylformamide: ORAL (LD50): Acute: 2800 mg/kg [Rat]. 2900 mg/kg [Mouse]. 5000 mg/kg [Rabbit]. DERMAL (LD50): Acute: 4720 mg/kg [Rabbit]. 5000 mg/kg [Rat]. VAPOR (LC50): Acute: 9400 mg/m ³ 2 hour(s) [Mouse]. 3421 ppm 1 hour (s) [Rat]. 1948 ppm 4 hour(s) [Rat].
<i>Chronic Effects on Humans</i>	☑ CARCINOGENIC EFFECTS: Classified None. by NIOSH. A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Classified SUSPECTED for human. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Classified SUSPECTED for human. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [SUSPECTED]. Causes damage to the following organs: kidneys, liver, cardiovascular system, upper respiratory tract, eyes, eye, lens or cornea.
<i>Other Toxic Effects on Humans</i>	Hazardous in case of eye contact (irritant), of ingestion, of inhalation (lung irritant).
<i>Special Remarks on Toxicity to Animals</i>	Not available.
<i>Special Remarks on Chronic Effects on Humans</i>	Exposure can cause stomach pains, vomiting and diarrhea. Foetotoxic in animal. May cause allergic skin reactions with repeated exposure. Overexposure may cause serious liver disorders. Can cause gastrointestinal disturbances. Can cause CNS depression. Laboratory experiments have shown mutagenic effects.
<i>Special Remarks on Other Toxic Effects on Humans</i>	Exposure can cause nausea, headache and vomiting. May be fatal.
<i>Carcinogenicity</i>	No known significant effects or critical hazards.
<i>Mutagenicity</i>	No known significant effects or critical hazards.
<i>Reproductive toxicity</i>	May cause birth defects based on animal data.
<i><u>Over-exposure signs/symptoms</u></i>	
<i>Inhalation</i>	No known significant effects or critical hazards.
<i>Ingestion</i>	No known significant effects or critical hazards.
<i>Skin</i>	No known significant effects or critical hazards.
<i>Target organs</i>	☑ Causes damage to the following organs: kidneys, liver, cardiovascular system, upper respiratory tract, eyes, eye, lens or cornea.



Section 12. Ecological information

<i>Mobility</i>	Not available.
<i>Persistence/degradability</i>	Not available.
<i>Bioaccumulative potential</i>	Not available.
<i>Ecotoxicity</i>	Ecotoxicity in water: 9600 to 13100 mg/l [EC50], 48 hour(s) [Daphnia (Daphnia magna)]. 6700 to 7500 mg/l [LC50], 96 hour(s) [Fish (Blue Gill)]. 9000 to 13000 mg/l [LC50], 96 hour(s) [Fish (Trout)]. 10400 to 10800 mg/l [LC50], 96 hour(s) [Fish (Minnows)].

Continued on Next Page

Dimethylformamide

Page: 6/8

Germany water class VCI WGK: No products were found.

Ecotoxicity data

<u>Ingredient name</u>	<u>Species</u>	<u>Period</u>	<u>Result</u>
Dimethylformamide	Daphnia magna (EC50)	48 hour(s)	9600 to 13100 mg/l
	Blue Gill (LC50)	96 hour(s)	6700 to 7500 mg/l
	Trout (LC50)	96 hour(s)	9000 to 13000 mg/l
	Minnows (LC50)	96 hour(s)	10400 to 10800 mg/l

Other ecological information

Persistence/degradability

<u>Ingredient name</u>	<u>BOD₅</u>	<u>COD</u>
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<u>Ingredient name</u>	<u>Aquatic half-life</u>	<u>Photolysis</u>
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Bioaccumulative potential

<u>Ingredient name</u>	<u>LogP_{ow}</u>	<u>BCF</u>	
Dimethylformamide	-1.01	-	low

Mobility : Not available.

Other adverse effects : No known significant effects or critical hazards.



Section 13. Disposal considerations

Waste Stream Not available.

Methods of disposal The generation of waste should be avoided or minimized wherever possible. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

European waste catalogue (EWC) Not available.

Hazardous waste The classification of the product may meet the criteria for a hazardous waste

Denmark – Carcinogenic waste Not available.

Denmark - Waste card number Not available.

Denmark - Waste group Not available.

Sweden - thermoset plastic waste Not available.

Sweden - Waste group Not available.

Austria - Waste catalogue Not available.

Norway - Waste number Not available.

Norway - Hazardous waste The classification of the product may meet the criteria for a hazardous waste

Switzerland - Waste code Not available.



Section 14. Transport information

Contact the supplier for all information regarding the proper transportation method for this material.

Continued on Next Page



Section 15. Regulatory information

Label Requirements (Europe)

R61- May cause harm to the unborn child. R20/21- Harmful by inhalation and in contact with skin.
 R36- Irritating to eyes.
 S53- Avoid exposure - obtain special instructions before use. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

**Toxic**

HCS Classification

Combustible liquid
Toxic material
Irritating material
Carcinogen
Target organ effects

U.S. Federal Regulations TSCA 8(b) inventory: Dimethylformamide

SARA 302/304/311/312 extremely hazardous substances: No products were found.
 SARA 302/304 emergency planning and notification: No products were found.
 SARA 302/304/311/312 hazardous chemicals: Dimethylformamide
 SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Dimethylformamide: Fire hazard, Immediate (Acute) Health Hazard
 Clean Water Act (CWA) 307: No products were found.
 Clean Water Act (CWA) 311: No products were found.
 Clean air act (CAA) 112 accidental release prevention: No products were found.
 Clean air act (CAA) 112 regulated flammable substances: No products were found.
 Clean air act (CAA) 112 regulated toxic substances: No products were found.

SARA 313

Form R - Reporting requirements

<u>Product name</u>	<u>CAS number</u>	<u>Concentration</u>
Dimethylformamide	68-12-2	98 - 100

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations

New York release reporting list: Dimethylformamide
 Pennsylvania RTK: Dimethylformamide: (generic environmental hazard)
 Minnesota: Dimethylformamide
 Massachusetts RTK: Dimethylformamide
 New Jersey: Dimethylformamide

WHMIS (Canada)

Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
 Class D-2A: Material causing other toxic effects (VERY TOXIC).
 Class D-2B: Material causing other toxic effects (TOXIC).

CEPA DSL: Dimethylformamide

International Regulations

EINECS

Not available.

DSCL (EEC)

R61- May cause harm to the unborn child.
 R20/21- Harmful by inhalation and in contact with skin.
 R36- Irritating to eyes.

International Lists

Continued on Next Page

Australia (NICNAS): Dimethylformamide

Germany water class: Dimethylformamide

Japan (METI): Dimethylformamide

Korea (TCCL): Dimethylformamide

Philippines (RA6969): Dimethylformamide

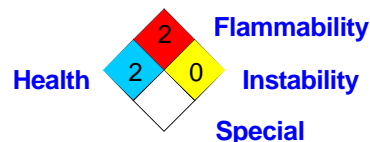
State Regulations New York release reporting list: Dimethylformamide
 Pennsylvania RTK: Dimethylformamide: (generic environmental hazard)
 Minnesota: Dimethylformamide
 Massachusetts RTK: Dimethylformamide
 New Jersey: Dimethylformamide

Section 16. Other information

Hazardous Material
Information System
(U.S.A.)

Health	*	2
Fire hazard		2
Reactivity		0
Personal protection		C

National Fire Protection
Association (U.S.A.)



References Not available.

History of Document Changes Any information changes since last document version are marked with a triangle symbol.

Full text of R phrases referred to in sections 2 and 3 - Europe
 R61- May cause harm to the unborn child.
 R20/21- Harmful by inhalation and in contact with skin.
 R36- Irritating to eyes.

Full text of classifications referred to in sections 2 and 3 - Europe
 Repr. Cat.2 - Toxic for reproduction Category 2
 Xn - Harmful
 Xi - Irritant

Intended Use Refer to the instruction booklet for proper and intended use. Otherwise, contact supplier for specific applications.

Validated by MSDS Administrator on 7/19/2007.

Verified by MSDS Administrator.

Date of previous issue 10/19/2006

Printed 7/19/2007.

Version

0.06

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.