

## Chemical Safety Data Sheet MSDS / SDS

## Hexamethylphosphoramide

Revision Date:2024-06-08 Revision Number:1

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

**Product identifier**

Product name : Hexamethylphosphoramide  
CBnumber : CB1177006  
CAS : 680-31-9  
EINECS Number : 211-653-8  
Synonyms : HMPA,hexamethylphosphoramide

**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  
Address : Building 1, Huihuang International, Shangdi 10th Street, Haidian District, Beijing  
Telephone : 400-158-6606

## SECTION 2: Hazards identification

**Classification of the substance or mixture**

Germ cell mutagenicity, Category 1B  
Carcinogenicity, Category 1B

**Label elements****Pictogram(s)**

□

Signal word : Danger

**Hazard statement(s)**

H340 May cause genetic defects  
H350 May cause cancer

**Precautionary statement(s)**

P201 Obtain special instructions before use.  
P308+P313 IF exposed or concerned: Get medical advice/attention.

**Prevention**

P203 Obtain, read and follow all safety instructions before use.

P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection/...

#### **Response**

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**

no data available

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## SECTION 3: Composition/information on ingredients

### **Substance**

Product name	: Hexamethylphosphoramide
Synonyms	: HMPA, hexamethylphosphoramide
CAS	: 680-31-9
EC number	: 211-653-8
MF	: C <sub>6</sub> H <sub>18</sub> N <sub>3</sub> OP
MW	: 179.2

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## SECTION 4: First aid measures

### **Description of first aid measures**

#### **If inhaled**

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. Refer for medical attention .

### **Most important symptoms and effects, both acute and delayed**

Exposure Routes: inhalation, skin absorption, ingestion, skin and/or eye contact Symptoms: Irritation eyes, skin, respiratory system; dyspnea (breathing difficulty); abdominal pain; [potential occupational carcinogen] Target Organs: Eyes, skin, respiratory system, central nervous system, gastrointestinal tract (NIOSH, 2016)

### **Indication of any immediate medical attention and special treatment needed**

#### **Absorption, Distribution and Excretion**

Seventy percent of (32)p-labeled hexamethylphosphoramide given ip was excreted within 20 hr by rats & mice as (32)p.

hexamethylphosphoramide is excreted in milk of cows following its oral admin.

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## SECTION 5: Firefighting measures

### Extinguishing media

Fires involving this compound should be controlled using a dry chemical, carbon dioxide or Halon extinguisher. (NTP, 1992)

### Specific Hazards Arising from the Chemical

This chemical is combustible. (NTP, 1992)

### Advice for firefighters

Use water spray, powder, alcohol-resistant foam, carbon dioxide.

### NFPA 704



HEALTH 2 Intense or continued but not chronic exposure could cause temporary incapacitation or possible residual injury (e.g. [diethyl ether](#), ammonium phosphate, iodine)

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FIRE 1 Materials that require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur. Includes some finely divided suspended solids that do not require heating before ignition can occur. Flash point at or above 93.3 °C (200 °F). (e.g. [mineral oil](#), ammonia)

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REACT 0 Normally stable, even under fire exposure conditions, and is not reactive with water (e.g. helium, [N2](#))

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SPEC.

HAZ.

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## SECTION 6: Accidental release measures

### Personal precautions, protective equipment and emergency procedures

Personal protection: filter respirator for organic gases and vapours adapted to the airborne concentration of the substance. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb liquid in sand or inert absorbent. Then store and dispose of according to local regulations.

### Environmental precautions

Personal protection: self-contained breathing apparatus. 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

PRECAUTIONS FOR "CARCINOGENS": A high-efficiency particulate arrestor (HEPA) or charcoal filters can be used to minimize amt of carcinogen in exhausted air ventilated safety cabinets, lab hoods, glove boxes or animal rooms ... Filter housing that is designed so that used filters can be transferred into plastic bag without contaminating maintenance staff is avail commercially. Filters should be placed in plastic bags immediately after removal ... The plastic bag should be sealed immediately ... The sealed bag should be labelled properly ... Waste liquids ... should be placed or collected in proper containers for disposal. The lid should be secured & the bottles properly labelled. Once filled, bottles should be placed in plastic bag, so that outer surface ... is not contaminated ... The plastic bag should also be sealed & labelled. ... Broken glassware ... should be decontaminated by solvent extraction, by chemical destruction, or in specially designed incinerators. Chemical Carcinogens

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## SECTION 7: Handling and storage

### Precautions for safe handling

NO open flames. 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

Ventilation along the floor. PRECAUTIONS FOR "CARCINOGENS": Storage site should be as close as practical to lab in which carcinogens are to be used, so that only small quantities required for ... expt need to be carried. Carcinogens should be kept in only one section of cupboard, an explosion-proof refrigerator or freezer (depending on chemophysical properties ...) that bears appropriate label. An inventory ... should be kept, showing quantity of carcinogen & date it was acquired ... Facilities for dispensing ... should be contiguous to storage area. Chemical Carcinogens

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## SECTION 8: Exposure controls/personal protection

### Control parameters

#### Occupational Exposure limit values

TLV: (skin); A3 (confirmed animal carcinogen with unknown relevance to humans). MAK: skin absorption (H); carcinogen category: 2; germ cell mutagen group: 2

#### Biological limit values

no data available

### Exposure 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

#### Eye/face protection

Wear safety spectacles or face shield.

#### Skin protection

Protective gloves. Protective clothing.

#### Respiratory protection

Use ventilation, local exhaust or breathing protection.

## Thermal hazards

no data available

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## SECTION 9: Physical and chemical properties

### Information on basic physicochemical properties

Physical state	liquid
Colour	Colorless to light yellow liquid
Odour	AROMATIC ODOR
Melting point/freezing point	186°C(lit.)
Boiling point or initial boiling point and boiling range	230-232°C/740mmHg(lit.)
Flammability	Class IIIB Combustible Liquid: Fl.P. at or above 200°F.
Lower and upper explosion limit/flammability limit	no data available
Flash point	144°C
Auto-ignition temperature	no data available
Decomposition temperature	no data available
pH	no data available
Kinematic viscosity	no data available
Solubility	Chloroform (Soluble), Methanol (Slightly)
Partition coefficient n-octanol/water	no data available
Vapour pressure	0.07 mm Hg ( 25 °C)
Density and/or relative density	1.03g/mL at 25°C(lit.)
Relative vapour density	6.18 (vs air)
Particle characteristics	no data available

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## SECTION 10: Stability and reactivity

### Reactivity

NIOSH considers hexamethyl phosphoramidate to be a potential occupational carcinogen.

Decomposes on heating and on burning. This produces toxic fumes including phosphorus oxides and nitrogen oxides.

### Chemical stability

Reacts upon heating with organic acids to form the dimethylamide of the organic acid

### Possibility of hazardous reactions

HEXAMETHYLPHOSPHORAMIDE may react with strong oxidizing agents and strong acids (NTP, 1992). Susceptible to formation of highly toxic and flammable phosphine gas in the presence of strong reducing agents such as hydrides. Partial oxidation by oxidizing agents may result in the release of toxic phosphorus oxides.

### Conditions to avoid

no data available

### **Incompatible materials**

Oxidizers, strong acids, chemically active metals (e.g., potassium, sodium, magnesium, zinc).

### **Hazardous decomposition products**

When heated to decomposition it emits very toxic fume of /phosphine, phosphorus oxides and nitrogen oxides/.

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## **SECTION 11: Toxicological information**

### **Acute toxicity**

- Oral: no data available
- Inhalation: no data available
- Dermal: no data available

### **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: No epidemiological data relevant to the carcinogenicity of hexamethylphosphoramide were available. There is sufficient evidence in experimental animals for the carcinogenicity of hexamethylphosphoramide. Overall evaluation: Hexamethylphosphoramide is possibly carcinogenic to humans (Group 2B).

### **Reproductive toxicity**

No information is available on the reproductive or developmental effects of hexamethylphosphoramide in humans. Animal studies have reported reproductive effects, including reduced fertility, a reduction in sperm count, and significantly reduced testicular weights from oral exposure to hexamethylphosphoramide.

### **STOT-single exposure**

Exposure to high concentrations could cause effects on the nervous system, kidneys and respiratory tract.

### **STOT-repeated exposure**

The substance may have effects on the respiratory tract, kidneys and testes. This substance is possibly carcinogenic to humans. May cause genetic damage in humans.

### **Aspiration hazard**

No indication can be given about the rate at which a harmful concentration of this substance in the air is reached on evaporation at 20°C.

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## SECTION 12: Ecological information

### Toxicity

Toxicity to fish: no data available

Toxicity to daphnia and other aquatic invertebrates: no data available

Toxicity to algae: no data available

Toxicity to microorganisms: no data available

### Persistence and degradability

no data available

### Bioaccumulative potential

Based on a measured log Kow of 0.28(2) and a regression derived equation(1), the bioconcentration factor (BCF) can be estimated to be about 0.96(SRC). This BCF value suggests that hexamethylphosphoramide may not bioconcentrate in aquatic organisms(SRC).

### Mobility in soil

Based on a measured log Kow of 0.28(2), the Koc for hexamethylphosphoramide can be estimated to be 34 using a recommended regression derived equation(1,SRC). This Koc value suggests that hexamethylphosphoramide has very high mobility in soil and may leach(3).

### Other adverse effects

no data available

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## 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.

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## SECTION 14: Transport information

### UN Number

ADR/RID: Not dangerous goods. (For reference only, please check.)

IMDG: Not dangerous goods. (For reference only, please check.)

IATA: Not dangerous goods. (For reference only, please check.)

### **UN Proper Shipping Name**

ADR/RID: Not dangerous goods. (For reference only, please check.)

IMDG: Not dangerous goods. (For reference only, please check.)

IATA: Not dangerous goods. (For reference only, please check.)

### **Transport hazard class(es)**

ADR/RID: Not dangerous goods. (For reference only, please check.)

IMDG: Not dangerous goods. (For reference only, please check.)

IATA: Not dangerous goods. (For reference only, please check.)

### **Packing group, if applicable**

ADR/RID: Not dangerous goods. (For reference only, please check.)

IMDG: Not dangerous goods. (For reference only, please check.)

IATA: Not dangerous goods. (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

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## 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**

Not Listed.

#### **New Zealand Inventory of Chemicals (NZIoC)**

Listed.

#### **PICCS**

Not Listed.

#### **Vietnam National Chemical Inventory**

Not Listed.



## IECSC

Listed.

## Korea Existing Chemicals List (KECL)

Listed.

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# 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](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

Depending on the degree of exposure, periodic medical examination is suggested. See ICSC 0695.

### Disclaimer:

The information in this MSDS is only applicable to the specified product, unless otherwise specified, it is not applicable to the mixture of this product and other substances. This MSDS only provides information on the safety of the product for those who have received the appropriate professional training for the user of the product. Users of this MSDS must make independent judgments on the applicability of this SDS. The authors of this MSDS will not be held responsible for any harm caused by the use of this MSDS.