

SAFETY DATA SHEETS

According to the UN GHS revision 9

Version: 1.0
Creation Date: July 15, 2019
Revision Date: July 15, 2019

SECTION 1: Identification

1.1 GHS Product identifier

Product name Maleic anhydride

1.2 Other means of identification

Product number -
Other names Toxic anhydride; dihydro-2,5-dioxofuran; BM-10

1.3 Recommended use of the chemical and restrictions on use

Identified uses Industrial and scientific research use.
Uses advised against no data available

1.4 Supplier's details

Company Shanghai Yien Chemical Technology Co., Ltd
Address Building 6, 28 Yingong Road, Fengxian District, Shanghai
Chemical Industry Zone, Shanghai, 201400, China
Telephone +86-400-133-2688

1.5 Emergency phone number

Emergency phone number +86-400-133-2688
Service hours Monday to Friday, 9am-5pm (Standard time zone: UTC/GMT +8 hours).

SECTION 2: Hazard identification

2.1 Classification of the substance or mixture

Acute toxicity - Category 4, Oral
Skin corrosion, Sub-category 1B
Serious eye damage, Category 1
Skin sensitization, Sub-category 1A
Respiratory sensitization, Category 1
Specific target organ toxicity – repeated exposure, Category 1

2.2 GHS label elements, including precautionary statements

Pictogram(s)



Signal word Danger
Hazard statement(s) H302 Harmful if swallowed

H314 Causes severe skin burns and eye damage
 H317 May cause an allergic skin reaction
 H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled
 H372 Causes damage to organs through prolonged or repeated exposure

Precautionary statement(s)

Prevention

P264 Wash ... thoroughly after handling.
 P270 Do not eat, drink or smoke when using this product.
 P260 Do not breathe dust/fume/gas/mist/vapours/spray.
 P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection/...
 P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
 P272 Contaminated work clothing should not be allowed out of the workplace.
 P284 [In case of inadequate ventilation] wear respiratory protection.

Response

P301+P317 IF SWALLOWED: Get medical help.
 P330 Rinse mouth.
 P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
 P363 Wash contaminated clothing before reuse.
 P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
 P316 Get emergency medical help immediately.
 P321 Specific treatment (see ... on this label).
 P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 P305+P354+P338 IF IN EYES: Immediately rinse with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 P317 Get medical help.
 P302+P352 IF ON SKIN: Wash with plenty of water/...
 P333+P317 If skin irritation or rash occurs: Get medical help.
 P362+P364 Take off contaminated clothing and wash it before reuse.
 P342+P316 If experiencing respiratory symptoms: Get emergency medical help immediately.
 P319 Get medical help if you feel unwell.

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.

2.3 Other hazards which do not result in classification

no data available

SECTION 3: Composition/information on ingredients

3.1 Substances

Chemical name	Common names and synonyms	CAS number	EC number	Concentration
Maleic anhydride	Maleic anhydride	108-31-6	203-571-6	100%

SECTION 4: First-aid measures

4.1 Description of necessary first-aid measures

If inhaled

Fresh air, rest. Half-upright position. Refer for medical attention.

Following skin contact

First rinse with plenty of water for at least 15 minutes, then remove contaminated clothes and rinse again.

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. Give one or two glasses of water to drink. Do NOT induce vomiting. Refer for medical attention .

4.2 Most important symptoms/effects, acute and delayed

Inhalation causes coughing, sneezing, throat irritation. Skin contact causes irritation and redness. Vapors cause severe eye irritation; photophobia and double vision may occur. (USCG, 1999)

4.3 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: Fire-fighting measures

5.1 Suitable extinguishing media

Wear self-contained breathing apparatus for firefighting if necessary.

5.2 Specific hazards arising from the chemical

Behavior in Fire: When heated above 300°F in the presence of various materials may generate heat and carbon dioxide. Will explode if confined. (USCG, 1999)

5.3 Special protective actions for fire-fighters

Use water spray, alcohol-resistant foam, carbon dioxide. NO powder.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal protection: face shield, thermal gloves, chemical protection suit and particulate filter respirator adapted to the airborne concentration of the substance. See Notes. Sweep spilled substance into covered containers.

6.2 Environmental precautions

Personal protection: face shield, thermal gloves, chemical protection suit and particulate filter respirator adapted to the airborne concentration of the substance. See Notes. Sweep spilled substance into covered containers.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

NO open flames. Closed system, dust explosion-proof electrical equipment and lighting. Prevent deposition of dust. 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.

7.2 Conditions for safe storage, including any incompatibilities

Dry. Separated from strong oxidants, strong bases and food and feedstuffs. Keep container tightly closed in a dry and well-ventilated place. Moisture sensitive. Storage class (TRGS 510): Non-combustible, corrosive hazardous materials

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure limit values

MAK: 0.081 mg/m³, 0.02 ppm; peak limitation category: I(1); sensitization of respiratory tract and skin (SAH); pregnancy risk group: C

Biological limit values

no data available

8.2 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.

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

Eye/face protection

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

Skin protection

See Notes. Protective clothing.

Respiratory protection

Use local exhaust or breathing protection.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties and safety characteristics

Physical state	Solid. Needles or lumps or pellets.
Colour	Colorless or white.
Odour	Pungent odor
Melting point/freezing point	51.2 - 53.1 °C.
Boiling point or initial boiling point and boiling range	Ca. 185 °C. Atm. press.:101 kPa.
Flammability	Combustible Solid, but may be difficult to ignite.
Lower and upper explosion limit/flammability limit	Flammable limits: 1.4% by volume (Lower) 7.1% by volume (Upper)
Flash point	103 °C.
Auto-ignition temperature	477 °C.
Decomposition temperature	no data available
pH	2.42.;2.62.;3.
Kinematic viscosity	dynamic viscosity (in mPa s) = 0.61. Temperature:60.0°C.;dynamic viscosity (in mPa s) = 1.07.

	Temperature:90.0°C.;dynamic viscosity (in mPa s) = 0.6. Temperature:150.0°C.
Solubility	Soluble; decomposes in hot solvent (NTP, 1992)
Partition coefficient n-octanol/water	log Pow = -2.36. Temperature:19.8 °C.;log Pow = -2.78. Temperature:19.8 °C.;log Pow = -2.68. Temperature:19.8 °C.
Vapour pressure	15.1 Pa. Temperature:22 °C.;37.7 Pa. Temperature:30 °C.;108 Pa. Temperature:40 °C.
Density and/or relative density	1.48 g/cm ³ . Temperature:20 °C.;1.3 g/cm ³ . Temperature:60 °C.;3.38.
Relative vapour density	3.4 (vs air)
Particle characteristics	no data available

SECTION 10: Stability and reactivity

10.1 Reactivity

The solution in water is a medium strong acid. Reacts with strong bases and strong oxidants.

10.2 Chemical stability

Stable under normal laboratory storage conditions.

10.3 Possibility of hazardous reactions

Great care must be taken with the molten and vapor as material in this state is flammable. The material is a combustible solid. MALEIC ANHYDRIDE react vigorously on contact with oxidizing materials. Reacts exothermically with water or steam. Undergoes violent exothermic decomposition reactions, producing carbon dioxide, in the presence of strong bases (sodium hydroxide, potassium hydroxide, calcium hydroxide), alkali metals (lithium, sodium, potassium), aliphatic amines (dimethylamine, trimethylamine), aromatic amines (pyridine, quinoline) at temperatures above 150° C [Vogler, C. A. et al., J. Chem. Eng. Data, 1963, 8, p. 620]. A 0.1% solution of pyridine (or other tertiary amine) in maleic anhydride at 185°C gives an exothermic decomposition with rapid evolution of gas [Chem Eng. News 42(8); 41 1964]. Maleic anhydride is known as an excellent dienophile in the Diels-Alder reaction to produce phthalate ester derivatives. These reactions can be extremely violent, as in the case of 1-methylsilacyclopentadiene [J. Organomet., Chem., 1979, 179, c19]. Maleic anhydride undergoes a potentially explosive exothermic Diels-Alder reaction with 1-methylsilacyclopenta-2,4-diene at 150C [Barton, T. J., J. Organomet. Chem., 1979, 179, C19], and is considered an excellent dieneophile for Diels-Alder reactions [Felthouse, Timothy R. et al. "Maleic Anhydride, Maleic Acid, and Fumaric Acid." Kirk-Othmer Encyclopedia of Chemical Technology. John Wiley & Sons, Inc. 2005].

10.4 Conditions to avoid

no data available

10.5 Incompatible materials

Incompatible with alkali metals, caustics, and amines at greater than 150 deg F.

10.6 Hazardous decomposition products

Maleic anhydride decomposes exothermically, evolving carbon dioxide in the presence of dimethylamine, triethylamine, pyridine, or quinoline at temperatures above 150 deg C.

SECTION 11: Toxicological information

Acute toxicity

- Oral: LD50 - rat (male/female) - 1 090 mg/kg bw.
- Inhalation: no data available
- Dermal: LD50 - rabbit (female) - 2 620 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

A4; Not classifiable as a human carcinogen.

Reproductive toxicity

No information is available on the reproductive or developmental effects of maleic anhydride in humans. No teratogenic or fetotoxic effects were observed in the offspring of rats exposed via gavage or diet.

STOT-single exposure

The substance is severely irritating to the eyes, skin and respiratory tract. Inhalation may cause asthma-like reactions.

STOT-repeated exposure

Repeated or prolonged contact may cause skin sensitization. Repeated or prolonged inhalation may cause asthma.

Aspiration hazard

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

SECTION 12: Ecological information

12.1 Toxicity

- Toxicity to fish: LC50 - *Oncorhynchus mykiss* (previous name: *Salmo gairdneri*) - 75 mg/L - 96 h.
- Toxicity to daphnia and other aquatic invertebrates: EC50 - *Daphnia magna* - 330 mg/L - 48 h.
- Toxicity to algae: EC50 - *Pseudokirchneriella subcapitata* (previous names: *Raphidocelis subcapitata*, *Selenastrum capricornutum*) - > 150 mg/L - 72 h.
- Toxicity to microorganisms: EC10 - *Pseudomonas putida* - 44.6 mg/L - 18 h.

12.2 Persistence and degradability

AEROBIC: Maleic anhydride, present at 100 mg/L, reached 54.8% of its theoretical BOD in 2 weeks using an activated sludge inoculum at 30 mg/L and the Japanese MITI test(1). Using OECD Guideline 301B (Ready Biodegradability: CO₂ Evolution Test), maleic anhydride was found to be readily biodegradable with CO₂ evolution rates of 61.6% after 4 days and 93.2% after 11 days(2); it was noted that maleic anhydride hydrolyzes under the test conditions and, as a result, maleic acid is believed to be the test material investigated in the study(2). Another OECD Guideline 301B test determined >90% CO₂ evolution within 25 days(2). Using OECD Guideline 301E (Ready Biodegradability: Modified OECD Screening Test) and a non-adapted activated sludge inoculum, maleic anhydride was found to be readily biodegradable with a 73-81% removal after 28 days(2). The TOC and COD-Mn of maleic anhydride, present at 170 mg/L in industrial wastewater, was reduced by 98% and 99%, respectively, after 1 day of acclimation with an activated sludge inoculum from a waste water treatment plant(3). In one report 99% removal was achieved in 4 hr by activated sludge(4). Others report 40-60% theoretical BOD in 5 days with sewage inoculum(5,6). The data suggest that maleic anhydride is expected to biodegrade rapidly(SRC); however, maleic anhydride hydrolyzes rapidly in water forming maleic acid with hydrolysis half-lives of 3.32 and 0.37 minutes at 0 and 25.1 deg C, respectively(7). Therefore, the available biodegradation rates are expected to correspond primarily to maleic acid(SRC).

12.3 Bioaccumulative potential

An estimated BCF of 5 was calculated in fish for maleic anhydride(SRC), using an estimated log Kow of 1.62(1) and a regression-derived equation(1). According to a classification scheme(2), this BCF suggests the potential for bioconcentration in aquatic organisms is low(SRC). In addition, maleic anhydride hydrolyzes rapidly in water forming maleic acid with hydrolysis half-lives of 3.32 and 0.37 minutes at 0 and 25.1 deg C respectively(3). Bioconcentration of maleic anhydride in aquatic organisms is unlikely due its rapid hydrolysis(SRC).

12.4 Mobility in soil

Using a structure estimation method based on molecular connectivity indices(1), the Koc of maleic anhydride can be estimated to be 1(SRC). According to a classification scheme(2), this estimated Koc value suggests that maleic anhydride is expected to have very high mobility in soil. However, maleic anhydride hydrolyzes rapidly in water forming maleic acid with hydrolysis half-lives of 3.32 and 0.37 minutes at 0 and 25.1 deg C respectively(3). Therefore, potential leaching in soil is expected to be dominated by degradation to maleic acid(SRC).

12.5 Other adverse effects

no data available

SECTION 13: Disposal considerations

13.1 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

14.1 UN Number

ADR/RID: UN2215 (For reference only, please check.)

IMDG: UN2215 (For reference only, please check.)

IATA: UN2215 (For reference only, please check.)

14.2 UN Proper Shipping Name

ADR/RID: MALEIC ANHYDRIDE (For reference only, please check.)

IMDG: MALEIC ANHYDRIDE (For reference only, please check.)

IATA: MALEIC ANHYDRIDE (For reference only, please check.)

14.3 Transport hazard class(es)

ADR/RID: 8 (For reference only, please check.)

IMDG: 8 (For reference only, please check.)

IATA: 8 (For reference only, please check.)

14.4 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.)

14.5 Environmental hazards

ADR/RID: No

IMDG: No

IATA: No

14.6 Special precautions for user

no data available

14.7 Transport in bulk according to IMO instruments

no data available

SECTION 15: Regulatory information

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

Chemical name	Common names and synonyms	CAS number	EC number
Maleic anhydride	Maleic anhydride	108-31-6	203-571-6
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.
Philippines Inventory of Chemicals and Chemical Substances (PICCS)			Listed.
Vietnam National Chemical Inventory			Listed.
Chinese Chemical Inventory of Existing Chemical Substances (China IECSC)			Listed.
Korea Existing Chemicals List (KECL)			Listed.

SECTION 16: Other information

Information on revision

Creation Date July 15, 2019

Revision Date July 15, 2019

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

Reacts violently with fire extinguishing agents such as powder. Depending on the degree of exposure, periodic medical examination is suggested. The symptoms of asthma often do not

become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Anyone who has shown symptoms of asthma due to this substance should avoid all further contact with this substance. Maleic anhydride is transported also as hot liquid (70°C); contact of the skin should be avoided. The odour warning when the exposure limit value is exceeded is insufficient.

Any questions regarding this SDS, Please send your inquiry to sds@xixisys.com

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 damage resulting from handling or from contact with the above product.