

GHS Classification

ID203

Maleic anhydride

CAS 108-31-6

Date Classified: Dec. 19, 2006 (Environmental Hazards: Mar. 31, 2006)

Physical Hazards

Reference Manual: GHS Classification Manual (Feb. 10, 2006)

Hazard class	Classification	symbol	signal word	hazard statement	Rational for the classification
1 Explosives	Not applicable	—	—	—	Containing no chemical groups with explosive properties
2 Flammable gases	Not applicable	—	—	—	Classified as "solid" according to GHS definition
3 Flammable aerosols	Not applicable	—	—	—	Not aerosol products
4 Oxidizing gases	Not applicable	—	—	—	Classified as "solid" according to GHS definition
5 Gases under pressure	Not applicable	—	—	—	Classified as "solid" according to GHS definition
6 Flammable liquids	Not applicable	—	—	—	Classified as "solid" according to GHS definition
7 Flammable solids	Not classified	—	—	—	Classified as "flammable" by ICSC (2004). Classified into Class 8 (UN#2215 (solid), UN#2215 (molten)) (UN Recommendations on the Transport of Dangerous Goods)
8 Self-reactive substances and mixtures	Not classified	—	—	—	Containing unsaturated bonds, with decomposition heat of 0.92kJ/g at temperatures in the range of 260 to 370degC according to Bretherick (J) (5th,1998). Classified into Division 6.1 and Class 8 (UN#2215 (solid), UN#2215 (molten)) (UN Recommendations on the Transport of Dangerous Goods)
9 Pyrophoric liquids	Not applicable	—	—	—	Classified as "solid" according to GHS definition
10 Pyrophoric solids	Not classified	—	—	—	Not pyrophoric when in contact with air at ordinary temperatures: the auto-ignition temperature is 477degC (ICSC, 2004).
11 Self-heating substances and mixtures	Classification not possible	—	—	—	Test methods applicable to liquid substances are not available (melting point: 53degC (ICSC, 2004), test temperature: 140degC).
12 Substances and mixtures, which in contact with water, emit flammable gases	Not applicable	—	—	—	Containing no metals or metalloids (B, Si, P, Ge, As, Se, Sn, Sb, Te, Bi, Po, At)
13 Oxidizing liquids	Not applicable	—	—	—	Classified as "solid" according to GHS definition
14 Oxidizing solids	Not applicable	—	—	—	Organic compounds containing oxygen (but not fluorine and chlorine), with the oxygen bound to carbon and hydrogen (but not to other elements)
15 Organic peroxides	Not applicable	—	—	—	Organic compounds containing no "—O—O—" structure
16 Corrosive to metals	Classification not possible	—	—	—	Cannot be classified due to lack of data. Classified into "Corrosive Substances" by the UN Recommendations on the Transport of Dangerous Goods. However, the category includes skin corrosivity, and it is unclear whether the substance is classified as "metal" corrosive (UN#2215 (solid), UN#2215 (molten)).

Health Hazards

Hazard class	Classification	symbol	signal word	hazard statement	Rational for the classification
1 Acute toxicity (oral)	Category 4	Exclamation mark	Warning	Harmful if swallowed	Based on the LD50 value of 555mg/kg, calculated from the testing data of rat LD50 (oral route) of 850mg/kg (ACGIH (7th, 2001)), 235mg/kg (female), 400mg/kg, 409mg/kg (male), 495mg/kg, 824mg/kg, 840mg/kg, 900mg/kg, 1,100mg/kg and >1,050mg/kg (DFGOT vol.4 (1992)).
1 Acute toxicity (dermal)	Category 3	Skull and crossbones	Danger	Toxic in contact with skin	Based on the rat LD50 (dermal route) value of 610mg/kg (CERI Hazard Data 2001-4 (2002)) and rabbit LD50 value of 2,620mg/kg (DFGOT vol.4 (1992)).
1 Acute toxicity (inhalation: gas)	Not applicable	—	—	—	Due to the fact that the substance is "solid" according to the GHS definition and inhalation of its gas is not expected.
1 Acute toxicity (inhalation: dust, mist)	Classification not possible	Skull and crossbones	Danger	Fatal if inhaled	No data available
2 Skin corrosion / irritation	Category 1A-1C	Corrosion	Danger	Causes severe skin burns and eye damage	Because the rat LC50 (4-hour inhalation) value of 38ppm (0.16mg/L when the conversion factor of 1ppm = 4.08mg/m3 was applied) (CERI Hazard Data 2001-4 (2002)) exceeded the saturated vapour concentration (0.069ppm) under a saturated vapour pressure of 0.007Pa (20degC), the substance was considered as "dust exposure" and was classified into Category 2.
3 Serious eye damage / eye irritation	Category 1	Corrosion	Danger	Causes serious eye damage	Based on the description in the report on rabbit skin irritation tests (DFGOT Vol.4 (1992)): "application of wet powder with water caused necrosis" (though the results are not those of 4-hour application). The substance should be placed in Category 1A from the viewpoint of safety if further subclassification is needed.
4 Respiratory/skin sensitization	Respiratory sensitization: Category 1 Skin sensitization: Category 1	(Respiratory sensitization) Health hazard (Skin sensitization) Exclamation mark	(Respiratory sensitization) Danger (Skin sensitization) Warning	(Respiratory sensitization) May cause allergy or asthma symptoms or breathing difficulties if inhaled (Skin sensitization) May cause an allergic skin reaction	Respiratory sensitization: Due to the fact that the substance is reported as a "Respiratory sensitization Substance" by the ad hoc committee of the Japanese Society of Occupational Allergy (2004). Skin sensitization: Based on the description in the report on Maximization tests on guinea pigs (CERI Hazard Data 2001-4 (2002)): "sensitization: positive." Also due to the fact that the substance is reported as a "Skin Sensitizing Substance" by the ad hoc committee of the Japanese Society of Occupational Allergy (2004).
5 Germ cell mutagenicity	Not classified	—	—	—	Based on the absence of data on multi-generation mutagenicity tests and germ cell mutagenicity tests in vivo, and negative data on somatic cell mutagenicity tests in vivo (chromosome aberration tests), described in CERI Hazard Data 2001-4 (2002), ACGIH (7th, 2001), DFGOT vol.4 (1992) and NTP DB (Access on Mar., 2006).
6 Carcinogenicity	Not classified	—	—	—	Due to the fact that the substance is classified as Category A4 by ACGIH (2001).
7 Toxic to reproduction	Not classified	—	—	—	Based on no evidence of adverse effects on reproduction and development up to dose levels producing parental toxicity, described in CERI Hazard Data 2001-4 (2002), ACGIH (7th, 2001) and DFGOT vol.4 (1992).

8	Specific target organs/systemic toxicity following single exposure	Category 1 (respiratory organs, gastrointestinal tract), Category 2 (liver)	Health hazard	Danger Warning	Causes damage to organs (respiratory organs, gastrointestinal tract) May cause damage to organs (liver)	Based on the human evidence: "In a case of inadvertent inhalation exposure, the patient exhibited burning sensation in the eye and throat, coughing, dyspnea and vomiting immediately after inhalation of fumes. Gasping and rale occurred next morning. The patient was diagnosed with bronchial asthma" (CERI Hazard Data 2001-4 (2002)). Also based on the evidence from animal studies: "some deaths from bronchial pneumonia were observed in inhalation studies" (CERI Hazard Data 2001-4 (2002)), "oral administration caused hemorrhage of the liver and lung," "inflammation of the gastrointestinal tract (dermal route)" (DFGOT vol.4 (1992)). The effects on experimental animals were observed at dosing levels within the guidance value ranges for Categories 1 and 2.
9	Specific target organs/systemic toxicity following repeated exposure	Category 1 (respiratory organs, blood system) Category 2 (kidneys, liver, spleen)	Health hazard	Danger Warning	Causes damage to organs through prolonged or repeated exposure (respiratory organs, blood system) May cause damage to organs through prolonged or repeated exposure (kidneys, liver,	Based on the human evidence: "In one case, a worker who was occupationally exposed to maleic anhydride exhibited pulmonary edema," "irritation of the upper respiratory tract" (ACGIH (7th, 2001)), "stridor and short of breath," "coughing, irritation/burning sensation in the pharynx, photosensitivity and asthma" (CERI Hazard Data 2001-4 (2002)), "asthma and hemolytic anemia" (DFGOT vol.11 (1998)), and the evidence from animal studies including "inflammation and hyperplasia of the nasal tissues" (ACGIH (7th, 2001)), "renal tubular dilatation and epithelial degeneration," "reduced RBC/ hematocrit levels," "alveolar hemorrhage" (CERI Hazard Data 2001-4 (2002)), "parenchymal atrophy of the liver/kidney/spleen" (HSDB (2005)), "adverse effects on the blood system" (IRIS (1988)). The effects on experimental animals were observed at dosing levels within the guidance value ranges for Categories 1 and 2. The effects on the kidneys, liver and spleen were observed at dosing levels within the guidance value ranges for Category 1. However, these effects are classified into Category 2 since the priority rating of the referenced study (HSDB) is 2.
10	Aspiration hazard	Classification not possible	—	—	—	No data available

Environmental Hazards

Hazard class	Classification	symbol	signal word	hazard statement	Rational for the classification
11 Hazardous to the aquatic environment (acute)	Category 3	-	-	Harmful to aquatic life	It was classified into Category 3 from 72 hours ErC50=29mg/L of the algae (Scenedesmus) (CERI/NITE Hazard Assessment Report (preliminary version), 2006).
11 Hazardous to the aquatic environment (chronic)	Not classified	-	-	-	Since there was rapidly degrading (the decomposition by TOC: 85%(Existing Chemical Safety Inspections Data)) and the bio-accumulation was low (log Kow=1.62(PHYSROP Database, 2005)), it was classified into Not classified.