

GHS Classification

ID69

CAS 50-00-0

Physical Hazards

Formaldehyde

Date Classified: Mar. 23, 2006 (Environmental Hazards: Feb. 10, 2006)

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

Hazard class	Classification	symbol	signal word	hazard statement	Rational for the classification
1 Explosives	Not applicable	-	-	-	Classified as "gas" according to GHS definition (gas). Containing no chemical groups with explosive properties (aqueous solution)
2 Flammable gases	Category 1 (gas), Not applicable (aqueous solution)	Flame	Danger	Extremely flammable gas	Based on the description in ICSC (2004): the lower explosion limit is 7vol%. There is no applicable substance listed in the UN Recommendations on the Transport of Dangerous Goods (gas). Classified as "liquid" according to GHS definition (aqueous solution)
3 Flammable aerosols	Not applicable	-	-	-	Not aerosol products
4 Oxidizing gases	Classification not possible (gas). Not applicable (aqueous solution)	-	-	-	No data available (gas). Classified as "liquid" according to GHS definition (aqueous solution)
5 Gases under pressure	Liquefied gas (gas), Not applicable (aqueous solution)	Gas cylinder	Warning	Contains gas under pressure; may explode if heated	Classified as "liquefied gas," based on the description in ICSC (2004) (boiling point: -20degC) and HSDB (2005) (critical temperature: 137.2-141.2degC). There is no applicable substance listed in the UN Recommendations on the Transport of Dangerous Goods (gas). Classified as "liquid" according to GHS definition (aqueous solution)
6 Flammable liquids	Not applicable (gas), Category 4 (aqueous solution, 37% formaldehyde solution), Classification not possible (aqueous solution, Solutions with unknown formaldehyde content)	-	Warning	Flammable liquid	Classified as "gas" according to GHS definition (gas) The flash point of 37% formaldehyde solution is 85degC (c.c.) (ICSC (2004)), which is classified into Category 4. Solutions with unknown formaldehyde content cannot be classified because the flash point of formaldehyde (aqueous solution) depends on its concentrations. Classified into Class 8 (UN#2209 Solutions with a concentration of 25 % by mass of more), or Class 3 and 8 (UN#1198 Flammable solutions (aqueous solutions)), according to the UN Recommendations on the Transport of Dangerous Goods.
7 Flammable solids	Not applicable	-	-	-	Classified as "gas" according to GHS definition (gas), or classified as "liquid" according to GHS definition (aqueous solution)
8 Self-reactive substances and mixtures	Not applicable	-	-	-	Classified as "gas" according to GHS definition (gas) Containing no chemical groups with explosive or self-reactive properties (aqueous solution)
9 Pyrophoric liquids	Not applicable (gas), Not classified (aqueous solution)	-	-	-	Classified as "gas" according to GHS definition (gas). The flash point of formaldehyde (gas) is 430degC (c.c.) (ICSC (2004)), not pyrophoric when in contact with air at ordinary temperature, and its solution not pyrophoric when in contact with air at ordinary temperature.
10 Pyrophoric solids	Not applicable	-	-	-	Classified as "gas" according to GHS definition (gas), or classified as "liquid" according to GHS definition (aqueous solution)
11 Self-heating substances and mixtures	Not applicable (gas) Classification not possible (aqueous solution)	-	-	-	Classified as "gas" according to GHS definition (gas). Test methods applicable to liquid substances are not available (aqueous solution)
12 Substances and mixtures, which in contact with water, emit flammable gases	Not applicable	-	-	-	Classified as "gas" according to GHS definition (gas). Containing no metals or metalloids (B, Si, P, Ge, As, Se, Sn, Sb, Te, Bi, Po, At) (aqueous solution)
13 Oxidizing liquids	Not applicable	-	-	-	Classified as "gas" according to GHS definition (gas). Organic compounds containing oxygen (but not fluorine and chlorine), with the oxygen bound to carbon and hydrogen (but not to other elements) (aqueous solution)
14 Oxidizing solids	Not applicable	-	-	-	Classified as "gas" according to GHS definition (gas), or classified as "liquid" according to GHS definition (aqueous solution)
15 Organic peroxides	Not applicable	-	-	-	Classified as "gas" according to GHS definition (gas) Organic compounds containing no "-O-O-" structure (aqueous solution)
16 Corrosive to metals	Classification not possible	-	-	-	Test methods applicable to gaseous substances are not available (gas). No data available. Corrosivity to metals remains uncertain, though classified as "corrosive substances" (as the classification based on UN Recommendations on the Transport of Dangerous Goods includes "skin corrosivity") (UN#1198 and 2209) (aqueous solution).

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 605mg/kg calculated from the testing data of rat LD50 (oral route) of 600mg/kg (SIDS (2002)), 700mg/kg (SIDS (2002)) and 800mg/kg (SIDS (2002)).
1 Acute toxicity (dermal)	Category 3	Skull and crossbones	Danger	Toxic in contact with skin	Based on the testing data of rabbit LD50 (dermal route) of 270mg/kg (EHC 89 (1989)).
1 Acute toxicity (inhalation: gas)	Category 2	Skull and crossbones	Danger	Fatal if inhaled	Based on the testing data of rat LC50 (inhalation of gas) of 480ppm (SIDS (2002)).
1 Acute toxicity (inhalation: dust, mist)	Classification not possible	-	-	-	No data available
2 Skin corrosion / irritation	Category 2	Exclamation mark	Warning	Causes skin irritation	Based on the testing data of rabbit skin irritation tests (EHC 89 (1989)): "mild to moderate" and data on human health effects (EHC 89 (1989)).
3 Serious eye damage / eye irritation	Category 2A	Exclamation mark	Warning	Causes serious eye irritation	Based on epidemiological cases (EHC 89 (1989)) the results of animal eye irritation tests (SIDS (2002), EHC 89 (1989)) (moderate irritation).

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 allergic or asthmatic symptoms or breathing difficulties if inhaled (Skin sensitization) May cause allergic skin reaction	Respiratory sensitization: Based on the testing data of IgE specific immune responses of guinea pigs (CICAD 40 (2002)) (positive), data on human health effects (EHC 89 (1989)) and the classification by the Japan Society for Occupational Health. Skin sensitization: epidemiological cases (EHC 89 (1989), CERI-NITE Hazard Assessment No.71 (2005)) and the classification by the Japan Society for Occupational Health and the Japanese Society for Contact Dermatitis.
5	Germ cell mutagenicity	Category 2	Health hazard	Warning	Suspected of causing genetic defects	Based on the negative data on germ cell mutagenicity tests in vivo (chromosome aberration tests in the spermatocytes of mice), positive data on somatic cell mutagenicity tests in vivo (micronucleus and chromosome aberration tests) (exclusively for gastrointestinal/alveolar cells exposed directly to formaldehyde), and absence of data on germ cell genotoxicity tests in vivo, described in CERI-NITE Hazard Assessment No.71 (2005) and SIDS (2004). Some dominant lethal studies in rats show slightly positive (ambiguous), which is not taken into account, because they are not considered valid for evaluation purposes.
6	Carcinogenicity	Category 1A	Health hazard	Danger	Suspected of causing cancer	Due to the fact that the substance is classified as Group 1 (carcinogenic to humans) by IARC (2005).
7	Toxic to reproduction	Classification not possible	-	-	-	Insufficient data available
8	Specific target organs/systemic toxicity following single exposure	Category 1 (nervous system, respiratory organs)	Health hazard	Danger	Causes damage to organs (nervous system, respiratory organs)	Based on the human evidence including "irritation to the respiratory tract ACGIH" (7th, 2001), "irritation to the respiratory tract, a decrease in the sensitivity of the nasal and palatine nerve, adverse effects on the hypothalamus" (CERI-NITE Hazard Assessment No.71 (2005)), and the evidence from animal studies including "irritation to the respiratory tract, general convulsions (muscles, etc.), pulmonary edema" (SIDS (2004)).
9	Specific target organs/systemic toxicity following repeated exposure	Category 1 (respiratory organs, central nervous system)	Health hazard	Danger	Causes damage to organs through prolonged or repeated exposure (respiratory organs, central nervous system)	In epidemiological study, respiratory effects caused by irritation and effects on the central nervous system were reported (ECETOC TR1 (1979)). In animal experiment, squamous metaplasia in the nasal tissues, squamous metaplasia in the larynx, inflammation in the tracheal lumen, body weight loss, metaplasia of the bronchial epithelium, dyspnea, restlessness, hunched posture and death were reported (CERI Hazard Data Book (1997)). Based on these effects, the respiratory organs and centralnervous system are considered to be the target organs. And these effects were observed within the guidance values for Category 1 in the repeated-dose study. Therefore, the substance was classified as Category 1 (respiratory organs, central nervous system).
10	Aspiration hazard	Classification not possible	-	-	-	Due to the fact that formaldehyde is a gas at ordinary temperatures and no data are available on the inhalation toxicity of formalin (formaldehyde solution) to the respiratory organs.

Environmental Hazards

Hazard class	Classification	symbol	signal word	hazard statement	Rational for the classification
11 Hazardous to the aquatic environment (acute)	Category 2	-	-	Toxic to aquatic life	It was classified into Category 2 from 96 hours LC50=1.8mg/L of the fish (Morone Saxatilis) (CICAD40 (2002) and others.).
11 Hazardous to the aquatic environment (chronic)	Not classified	-	-	-	Since there was rapidly degrading (the decomposition by BOD: 91% (Existing Chemical Safety Inspections Data)) and the bio-accumulation was low (log Kow=0.35 (PHYSPROP Database, 2005)), it was classified into Not classified.