GHS Classification

ID194 Benzene

CAS 71-43-2 Date Classified: Mar. 23, 2006 (Environmental Hazards: Feb. 10, 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 "liquid" according to GHS definition
3	Flammable aerosols	Not applicable	–	–	–	Not aerosol products
4	Oxidizing gases	Not applicable	–	–	–	Classified as "liquid" according to GHS definition
5	Gases under pressure	Not applicable	–	–	–	Classified as "liquid" according to GHS definition
6	Flammable liquids	Category 2	Flame	Danger	Highly flammable liquid and vapour	The flash point is −11degC (c.c.) (ICSC, 2004) and the boiling point is 80degC, which is classified into Category 2. Classified into Class 3 and Packing Group Ⅱ (UN#1114) (UN Recommendations on the Transport of Dangerous Goods)
7	Flammable solids	Not applicable	–	–	–	Classified as "liquid" according to GHS definition
8	Self-reactive substances and mixtures	Not applicable	–	–	–	Containing no chemical groups with explosive or self-reactive properties
9	Pyrophoric liquids	Not classified	–	–	–	Not pyrophoric when in contact with air at ordinary temperatures: the auto-ignition temperature is 498degC (ICSC, 2004)
10	Pyrophoric solids	Not applicable	–	–	–	Classified as "liquid" according to GHS definition
11	Self-heating substances and mixtures	Classification not possible	–	–	–	Test methods applicable to liquid substances are not available
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	–	–	–	Organic compounds containing no oxygen, fluorine and chlorine
14	Oxidizing solids	Not applicable	–	–	–	Classified as "liquid" according to GHS definition
15	Organic peroxides	Not applicable	–	–	–	Organic compounds containing no "-O-O-" structure
16	Corrosive to metals	Not classified	–	–	–	Classified into Class 3 (UN Recommendations on the Transport of Dangerous Goods, UN#1114)

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 1,620mg/kg calculated from the testing data of rat LD50 (oral route) of 810mg/kg (NICNAS (2001), IRIS (2002)), 3,000mg/kg, 3300mg/kg, and 4,900mg/kg, (EHC 150 (1993).
1	Acute toxicity (dermal)	Not classified	–	–	–	Based on the rabbit LD50 (dermal route) of over 8,200mg/kg (NICNAS (2001)).
1	Acute toxicity (inhalation: gas)	Not applicable	–	–	–	Due to the fact that the substance is "liquid" according to the GHS definition and inhalation of its gas is not expected.
1	Acute toxicity (inhalation: vapour)	Not classified	–	–	–	Based on the rat LC50 value of 14,000mg/L (based on a conversion factor (25degC) of 1mg/m3=0.313ppm), calculated from the testing data of rat LC50 (4-hour inhalation) of 44.66mg/L (EHC 150 (1993)), was lower than 90% of the saturated vapour concentration (124,000ppm (25degC)) under a saturated vapour pressure of 12.6kPa (25degC), the substance was considered as "vapour containing substantially no mist" and was classified based on standard values expressed in ppm.
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 description in the report on rabbit primary skin irritation tests (NICNAS (2001) and rabbit cumulative skin irritation tests (EHC 150 (1993)) as well as on EU Risk Phrase Xi; R36/38: Benzene is considered "irritating" to the skin.
3	Serious eye damage / eye irritation	Category 2A	Exclamation mark	Warning	Causes serious eye irritation	Based on the evidence of moderate eye irritation in rabbit eye irritation tests (EHC 150 (1993)), (NICNAS (2001)).
4	Respiratory/skin sensitization	Respiratory sensitization: Classification not possible Skin sensitization: Classification not possible	(Respiratory sensitization) – (Skin sensitization) –	(Respiratory sensitization) – (Skin sensitization)	(Respiratory sensitization) – (Skin sensitization) –	Respiratory sensitization: No data available Skin sensitization: based on the description in PATTY (4th, 1994): Benzene causes skin sensitization in guinea pigs, though the details of the test methods are unknown; the reliability of the test results has yet to be established (i.e., data are insufficient).
5	Germ cell mutagenicity	Category 2	Health hazard	Warning	Suspected of causing genetic defects	Based on negative data on multi-generation mutagenicity tests, the absence of data on germ cell mutagenicity tests in vivo, positive data on somatic cell mutagenicity tests in vivo, and the absence of data on germ cell genotoxicity tests in vivo, described in EHC 150 (1993), NTP-TR289 (1986).
6	Carcinogenicity	Category 1A	Health hazard	Danger	May cause cancer	Due to the fact that the substance is classified as Category K by NTP (2005), Group 1 by IARC (1987), Category A1 by ACGIH (2001), and Category A by EPA (2000).
7	Toxic to reproduction	Category 2	Health hazard	Warning	Suspected of damaging fertility or the unborn child	Based on evidence of toxicity to foetuses at dosing levels toxic to dams, described in NTP (1986), ATSDR (2005).
8	Specific target organs/systemic toxicity following single exposure	Category 1 (respiratory organs), Category 3 (narcotic effects)	Health hazard and Exclamation mark	Danger Warning	Causes damage to organs (respiratory organs) (Narcotic effects) May cause drowsiness or dizziness	Based on the human evidence including "irritation to the skin, nose, mouth and larynx; tracheitis, laryngitis, bronchitis, massive pulmonary hemorrhage" ((NICNAS (2001)), and the evidence from animal studies including "respiratory depression during anesthetization" (EHC 150 (1993)).

9	Specific target organs/systemic toxicity following repeated exposure	Category 1 (central nervous system, hematopoietic organs)	Health hazard	Danger	Causes damage to organs through prolonged or repeated exposure (central nervous system, hematopoietic organs)	Based on the human evidence including "bone marrow hypoplasia/hyperplasia, hypocytosis associated with normoblast," "blood toxicity," "fatal cases due to aplastic anemia" (EHC 150 (1993)), "transverse myelitis" (IRIS (2002)), "frequent headache, exhaustion, somnipathy, dysmnesia," "a decrease in white/red blood cell counts, an increase in mean cell volume" (NICNAS (2001)), and the evidence from animal studies including "a decrease in lymphocyte/red blood cell counts," "abnormal configuration of circulating erythrocytes and leukocytes," "a decrease in splenic nucleated cells, circulating erythrocytes and lymphocytes; a decrease in white blood cell count," "a decrease in bone marrow cellularity and bone marrow pluripotent cells" (EHC 150 (1993)), "a decrease in red blood cell, white blood cell and lymphocyte counts, a decrease in hematocrit value, an increase in mean cell volume" (IRIS (2002)). The effects on experimental animals were observed at dosing levels within the guidance value ranges for Category 1.
10	Aspiration hazard	Category 1	Health hazard	Danger	May be fatal if swallowed and enters airways	Based on the description in ICSC (J) (2003): "May cause aspiration and chemical pneumonia if swallowed." Based on the fact that benzene is a hydrocarbon and has a dynamic viscosity of 0.740mm2/s (25degC) (CERI calculated value).

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=5.3mg/L of the fish (Rainbow Trout) (EU-RAR, 2003).
11	Hazardous to the aquatic environment (chronic)	Category 2	Environment	-	Toxic to aquatic life with long lasting effects	Although acute toxicity was Category 2 and the bio-accumulation potential was low (log Kow=2.13(PHYSPROP Database, 2005)), since there was no rapidly degrading (the decomposition by BOD: 40%(Existing Chemical Safety Inspections Data)), it was classified into Category 2.