

GHS Classification

ID151

Styrene

CAS 100-42-5

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 3	Flame	Warning	Flammable liquid and vapour	The flash point is 31 degC (c.c.) (ICSC, 1999) which is classified into Category 3. Those containing stabilizers are classified into Class 3 and Packing Group III (UN#2055) (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	Classification not possible	-	-	-	Classification not possible due to lack of data, though containing unsaturated bonds. Those containing stabilizers are classified into Class 3 (UN Recommendations on the Transport of Dangerous Goods, UN#2055)
9 Pyrophoric liquids	Not classified	-	-	-	Not pyrophoric when in contact with air at ordinary temperatures; the auto-ignition temperature is 490degC (ICSC, 1999)
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	Classification not possible	-	-	-	No data available Those containing stabilizers are classified into Class 3 (UN Recommendations on the Transport of Dangerous Goods, UN#2055)

Health Hazards

Hazard class	Classification	symbol	signal word	hazard statement	Rational for the classification
1 Acute toxicity (oral)	Category 5	-	Warning	May be harmful if swallowed	Based on the rat LD50 (oral route) of 5,000mg/kg (CERI-NITE Hazard Assessment No.52 (2004)).
1 Acute toxicity (dermal)	Classification not possible	-	-	-	No data available
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)	Category 4	Exclamation mark	Warning	Harmful if inhaled	Based on the LC50 value (4 hours) of 2,770ppm, calculated from the testing data of rat LC50 (4-hour inhalation of vapour) of 11.7mg/L, 11.9mg/L (4 hours) (CERI-NITE Hazard Assessment No.52 (2004)), was lower than 90% of the saturated vapour concentration (6,600ppm) under a saturated vapour pressure of 0.67kPa (CERI Hazard Data 96-46 (1998)), 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 evidence of "moderate irritation" from rabbit skin irritation tests.
3 Serious eye damage / eye irritation	Category 2A	Exclamation mark	Warning	Causes serious eye irritation	Based on the description in the report on human epidemiological studies and rabbit eye irritation tests (CERI-NITE Hazard Assessment No.52 (2004): "moderate irritation (for seven days)."
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: No data available
5 Germ cell mutagenicity	Category 2	Health hazard	Warning	Suspected of causing genetic defects	Based on the absence of data on germ cell multi-generation mutagenicity/mutagenicity tests in vivo, positive data on somatic cell mutagenicity tests in vivo (chromosome aberration tests, micronucleus tests), and the absence of data on germ cell genotoxicity tests in vivo (As for positive data on DNA single-strand break analysis (No.36) of the brain, liver, kidneys, lungs and testes of a mouse, an analysis was conducted exclusively on germ cells - the results of which are considered "ambiguous" by experts.), described in ACGIH (7th, 2001) and CERI-NITE Hazard Assessment No.52 (2004)
6 Carcinogenicity	Category 2	Health hazard	Warning	Suspected of causing cancer	Due to the fact that the substance is classified as Group 2B by IARC (2002).
7 Toxic to reproduction	Category 1B	Health hazard	Danger	May damage fertility or the unborn child	Based on the description in CERI-NITE Hazard Assessment No.52 (2004): Three-generation reproduction studies in rats suggest a decrease in the survival rates of F1 and F2 newborns at dose levels not toxic to F0; Developmental toxicity and lactational administration studies in rats suggest brain serotonin depletion, a delay in righting/auditory reflexes and many other behavioral abnormalities in offspring at dosing levels not toxic to dams.

8	Specific target organs/systemic toxicity following single exposure	Category 1 (central nervous system) Category 3 (respiratory tract irritation)	Health hazard and Exclamation mark	Danger Warning	Causes damage to organs (central nervous system) (respiratory tract irritation) May cause respiratory tract	Based on the human evidence including "eye/nose irritation, effects on the central nervous systems" (EHC 26 (1993)), (CERI Hazard Data 96-46 (1998)).
9	Specific target organs/systemic toxicity following repeated exposure	Category 1 (respiratory organs, nervous system, blood system, liver)	Health hazard	Danger	Causes damage to organs through prolonged or repeated exposure (respiratory organs, nervous system, blood system, liver)	Based on the human evidence including "valid conclusions can be drawn neither from human cases nor from epidemiological studies because the unknown amount of exposure and the possibility of multiple exposure involving other substances" "Styrene causes 1) irritation to the eyes, skin, nose and larynx, 2) respiratory effects such as obstructive pulmonary disease and chronic bronchitis, 3) dizziness, headache, exhaustion and confusion, 4) adverse effects on the central nervous system (insomnia), the mental/nervous function (a delay in reaction time, debilitating linguistic memory, etc.), the visual and auditory senses, the blood systems (an increase in lymphocyte count, a decrease in platelet count, etc.) and the liver (an increase in AST/GGT/ALT activity, etc.)" described in CERI-NITE Hazard Assessment No.52 (2004). There is also a description in CERI-NITE Hazard Assessment No.52 (2004) of the evidence from animal studies including "vacuolation of the epidermal cells of the nasal/tunica mucous membrane, exfoliated cells, pyknosis, a decrease in SVC (sensory nerve conduction velocity), hepatocyte necrosis."
10	Aspiration hazard	Category 1	Health hazard	Danger	May be fatal if swallowed and enters airways	Based on the fact that styrene is a hydrocarbon and has a dynamic viscosity of 0.772 mm ² /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=4.02mg/L of the fish (Fathead Minnows) (CERI/NITE Hazard Assessment Report (2004) and others.).
11 Hazardous to the aquatic environment (chronic)	Not classified	-	-	-	Since there was rapidly degrading (the decomposition by BOD: 100% (Existing Chemical Safety Inspections Data)) and the bio-accumulation was low (log Kow=2.95 (PHYSPROP Database, 2005)), it was classified into Not classified.