

GHS Classification

ID430

Dioxins

CAS

Date Classified: Nov. 20, 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 (2,3,7,8-tetrachlorodibenzo-p-dioxin)
3 Flammable aerosols	Not applicable	—	—	—	Not aerosol products
4 Oxidizing gases	Not applicable	—	—	—	Classified as "solid" according to GHS definition (2,3,7,8-tetrachlorodibenzo-p-dioxin)
5 Gases under pressure	Not applicable	—	—	—	Classified as "solid" according to GHS definition (2,3,7,8-tetrachlorodibenzo-p-dioxin)
6 Flammable liquids	Not applicable	—	—	—	Classified as "solid" according to GHS definition (2,3,7,8-tetrachlorodibenzo-p-dioxin)
7 Flammable solids	Not classified	—	—	—	Classified into Division 6.1 (UN#2811 (ICSC (2004)), toxic, solid, organic, n.o.s.) (UN Recommendation on the Transport of Dangerous Goods)
8 Self-reactive substances and mixtures	Not applicable	—	—	—	Containing no chemical groups with explosive or self-reactive properties
9 Pyrophoric liquids	Not applicable	—	—	—	Classified as "solid" according to GHS definition (2,3,7,8-tetrachlorodibenzo-p-dioxin)
10 Pyrophoric solids	Not classified	—	—	—	Classified into Division 6.1 (UN#2811 (ICSC (2004)), toxic, solid, organic, n.o.s.) (UN Recommendation on the Transport of Dangerous Goods)
11 Self-heating substances and mixtures	Not classified	—	—	—	Classified into Division 6.1 (UN#2811 (ICSC (2004)), toxic, solid, organic, n.o.s.) (UN Recommendation on the Transport of Dangerous Goods)
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 (2,3,7,8-tetrachlorodibenzo-p-dioxin)
14 Oxidizing solids	Not applicable	—	—	—	Organic compounds containing chlorine and oxygen (but not fluorine), with the chlorine and 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	—	—	—	Test methods applicable to solid substances with melting point of >55degC are not available (melting point: 305–306degC, 2,3,7,8-tetrachlorodibenzo-p-dioxin, ICSC (2004)).

Health Hazards

Hazard class	Classification	symbol	signal word	hazard statement	Rational for the classification
1 Acute toxicity (oral)	Category 1	Skull and crossbones	Danger	Fatal if swallowed	Based on the rat LD50 (oral route) value of 0.022mg/kg representing the lower of the two testing data, 0.022mg/kg and 0.045mg/kg (PATTY (4th, 1999)) (tetrachlorodibenzodioxin).
1 Acute toxicity (dermal)	Category 1	Skull and crossbones	Danger	Fatal in contact with skin	Based on the rabbit LD50 (dermal route) value of 0.275mg/kg (PATTY (4th, 1999)) (tetrachlorodibenzodioxin).
1 Acute toxicity (inhalation: gas)	Not applicable	—	—	—	Due to the fact that the substance is a solid according to the GHS definition and inhalation of its gas is not expected.
1 Acute toxicity (inhalation: dust, mist)	Classification not possible	—	—	—	No data available
2 Skin corrosion / irritation	Classification not possible	—	—	—	No data available
3 Serious eye damage / eye irritation	Classification not possible	—	—	—	Classification not possible due to the insufficiency of data. As the human health effects (though not local toxic effects on the eye) of 2,3,3',4,4'-pentachlorobiphenyl, "most patients showed eye discharge and other severe ocular effects during the acute phase of the Yusho and Yu-Cheng syndrome. These effects include meibomian gland changes (enlargement, inflammation, hypersecretion of cheese-like material) and dark-colored pigmentation of the conjunctivae and eyelids."
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 negative data on multi-generation mutagenicity tests (dominant lethal tests), the absence of data on germ cell mutagenicity tests in vivo and germ cell genotoxicity tests in vivo, and positive data on somatic cell mutagenicity tests in vivo (chromosome aberration tests), described in ATSDR (1998), NTP DB (Access on August 2006), EHC 88 (1989) and IARC 69 (1997).
6 Carcinogenicity	Classification not possible	—	—	—	Classification not possible based on expert judgment since existing classification is available only for individual compounds of dioxins and not for "dioxins" as a whole. 2,3,7,8-Tetrachlorodibenzodioxin (CAS 1746-01-6) is classified as Category 1 (Group 1 by IARC (1997) and Category K by NTP (2005)), 1,2,3,7,8-pentachlorodibenzodioxin (CAS 40321-76-4) is "Not classified" (Category 3 by IARC (1997)), 1,2,3,6,7,8-hexachlorodibenzodioxin (CAS 57653-85-7) is classified as Category 2 (Category 3 by IARC (1997) and Category B2 by EPA (1991)), and 1,2,3,7,8,9-hexachlorodibenzodioxin (CAS 19408-74-3) is "Not classified" (Category 3 by IARC (1997) and Category B2 by EPA (1991)).

7	Toxic to reproduction	Category 1B	Health hazard	Danger	May damage fertility or the unborn child	Based on the evidence of cleft palate in the pups at non-parentally toxic doses in mouse teratogenicity studies, described in EHC 88 (1989), ATSDR (1998) and IARC 15 (1977).
8	Specific target organs/systemic toxicity following single exposure	Category 1 (respiratory organs, nervous system, cardiovascular system, skin, skin appendage, liver, bladder, kidneys, adrenal, gastrointestinal tract, testes, blood system, thymus gland, visual organ, marrow)	Health hazard	Danger	Causes damage to organs (respiratory organs, nervous system, cardiovascular system, skin, skin appendage, liver, bladder, kidneys, adrenal, gastrointestinal tract, testes, blood system, thymus gland, visual organ, marrow)	Based on the human evidence including "bronchitis and laryngitis, hemorrhagic pneumonia, peripheral neuropathy, chloracne" (ATSDR (1998)), "cardiomyopathy" (EHC 88 (1989)), and the evidence from animal studies including "epithelial hyperplasia in the renal pelvis, inflamed eyelids, facial hair loss with acneform lesions, moderate to severe ileitis characterized by hyperplasia of the mucosal epithelium with hemorrhaging and necrosis," (ATSDR (1998)), "adrenal hemorrhages and moderate atrophy of the zona glomerulosa were seen; changes in the spermatogenic epithelium were observed; central congestion with occasional degeneration of hepatocytes; hemolysis and hyperproteinemia were found; retro-orbital hemorrhages with exophthalmus and hemorrhages with detachment of the retina were seen; bone marrow atrophy, hyperplasia of the renal pelvis extending into the ureter and involving the urinary bladder mucosa; loss of toe and finger nails; hyperkeratosis of the skin; atrophy of the thymus with reduced lymphocyte counts." (EHC 88 (1989)). The effects on experimental animals were observed at dosing levels within the guidance value ranges for Category 1.
9	Specific target organs/systemic toxicity following repeated exposure	Category 1 (skin, liver, bladder, visual organ, nervous system, auditory organ, respiratory organs, blood system, gastrointestinal tract, kidneys, thyroid gland, thymus gland, ovary, marrow, adrenal, pancreas, cardiovascular system, spleen)	Health hazard	Danger	Causes damage to organs through prolonged or repeated exposure (skin, liver, bladder, visual organ, nervous system, auditory organ, respiratory organs, blood system, gastrointestinal tract, kidneys, thyroid gland, thymus gland, ovary, marrow, adrenal, pancreas, cardiovascular system, spleen)	Based on the human evidence including "chloracne and neurological symptoms; liver biopsies revealed mild steatosis, periportal fibrosis; hemorrhagic cystitis and focal pyelonephritis" (ATSDR 1998), "ocular manifestations, numbness of the limbs, feeling of weakness, muscular spasms, hearing difficulties, and a persistent bronchitis" (EHC 88 (1989)), and the evidence from animal studies including "anemia, leukopenia, atrophy of ovary, hypocellularity of the bone marrow, liver necrosis, bile duct hyperplasia and edema, atrophy of spleen and thymus, and gastrointestinal hemorrhages" (EHC 88 (1998)), "adrenal cortic atrophy/hyperplasia, cardiomyopathy, mesenteric arteritis, nephropathy, hyperplasia of thyroid gland follicular cells; persistent inflammation of the pancreas" (NTP TR 521 (2006)). The effects on experimental animals were observed at dosing levels within the guidance value ranges for Category 1.
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 1	Environment	Warning	Very toxic to aquatic life	It was classified into Category 1 from 72 hours LC50=0.0135microg/L(the fish (<i>Oryzias latipes</i>)) of 2,3,7,8-tetrachlorodibenzodioxin was 0.0135microg/L (AQUIRE (2003)).
11 Hazardous to the aquatic environment (chronic)	Category 1	Environment	Warning	Very toxic to aquatic life with long lasting effects	Since acute toxicity was Category 1 and there was no rapidly degrading (the half life is 550-590 days in the water including bottom material (EHC88 (1989))), and there was the bio-accumulation (BCF=86000(rainbow trout) (AQUIRE (2003))), it was classified into Category 1.