

GHS Classification

ID419

2,4-Dinitrophenol

CAS 51-28-5

Date Classified: Aug. 22, 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	Division 1.1	Bomb explosion	Danger	Explosive; mass explosion	The substance contains nitro groups, with its oxygen budget calculated at -78. The kick-off temperature is 189degC, while the decomposition energy is 144kJ/g (Bretherick (J) (5th,1998)), which is classified as "Explosive." Classified as Division 1.1 since the substance is assigned to Division 1.1D (UN#0076 Dinitrophenol (dry or wetted with <15% water by weight)) by the UN Recommendations on the Transport of Dangerous Goods.
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	—	—	—	Classification not possible due to lack of data, though flammable according to ICSC (2004). Classified into Division 1.1D and Division 6.1 (UN#0076 Dinitrophenol (dry or wetted with <15% water by weight)) (UN Recommendations on the Transport of Dangerous Goods).
8 Self-reactive substances and mixtures	Not applicable	—	—	—	Classified as "explosives". Classified into Division 1.1D and Division 6.1 (UN#0076 Dinitrophenol (dry or wetted with <15% water by weight)) (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	—	—	—	Classified into Division 1.1D and Division 6.1 (UN#0076 Dinitrophenol (dry or wetted with <15% water by weight)) (UN Recommendations on the Transport of Dangerous Goods).
11 Self-heating substances and mixtures	Classification not possible	—	—	—	Test methods applicable to liquid substances are not available (melting point: 112degC (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 classified	—	—	—	Organic compounds containing oxygen bound to elements other than carbon and hydrogen. Classified into Division 1.1D and Division 6.1 (UN#0076 Dinitrophenol (dry or wetted with <15% water by weight)) (UN Recommendations on the Transport of Dangerous Goods).
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 are not available

Health Hazards

Hazard class	Classification	symbol	signal word	hazard statement	Rational for the classification
1 Acute toxicity (oral)	Category 2	Skull and crossbones	Danger	Fatal if swallowed	Based on the LD50 value of 32mg/kg calculated from the testing data of rat LD50 (oral route) of 30mg/kg (CERI Hazard Data 99-9 (2000)), 49mg/kg and 51mg/kg (Report by the Ministry of Health, Labour and Welfare (2001)).
1 Acute toxicity (dermal)	Category 1	Skull and crossbones	Danger	Fatal in contact with skin	Based on the rat LD50 (dermal route) value of 25mg/kg (CERI Hazard Data 99-9 (2000)).
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	—	—	—	No data available
2 Skin corrosion / irritation	Category 2	Exclamation mark	Warning	Causes skin irritation	The substance is classified into Category 2 from the viewpoint of safety, based on the description in the report on guinea pig skin irritation tests (ATSDR (1995)): "moderately irritating," though the results of rabbit skin irritation tests suggest the substance is "mildly irritating" (CERI Hazard Data 99-9 (2000)).
3 Serious eye damage / eye irritation	Classification not possible	—	—	—	No data available
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: Classification not possible due to the insufficiency of data
5 Germ cell mutagenicity	Category 2	Health hazard	Warning	Suspected of causing genetic defects	Based on the absence of data on multi-generation mutagenicity tests, 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 (1995) and NTP DB (Access on April 2006).
6 Carcinogenicity	Classification not possible	—	—	—	Classification not possible based on expert judgment in the absence of existing classification, though ATSDR (1995) presents some toxicity data.
7 Toxic to reproduction	Category 2	Health hazard	Warning	Suspected of damaging fertility or the unborn child	Based on the evidence of significant increases in the number of pups stillborn or dying during lactation observed in rat teratogenic studies, described in MOE Risk Assessment vol. 3 (2004) and ATSDR (1995), though no data are available on parental toxicity.
8 Specific target organs/systemic toxicity following single exposure	Category 1 (nervous system, kidneys)	Health hazard	Danger	Causes damage to organs (nervous system, kidneys)	Based on the evidence from animal studies: "crawling observed in both sexes" (Report by the Ministry of Health, Labour and Welfare (2001)), "displayed very mild tubular necrosis" (ATSDR (1995)).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 (cardiovascular system, blood system, visual organ, nervous system, kidneys, liver, gastrointestinal tract) Category 2 (testes)	Health hazard	Danger	Causes damage to organs through prolonged or repeated exposure (cardiovascular system, blood system, visual organ, nervous system, kidneys, liver, gastrointestinal tract) May cause damage to organs through prolonged or repeated exposure (testes)	Based on the human evidence: "blood effects including hemolytic anemia, neutropenia and eosinophilia were detected as key effects following exposure to 2,4-dinitrophenol" (CERI Hazard Data 99-9 (2000)), "over 100 anecdotal cases of cataracts resulting from therapeutic use of 2,4-dinitrophenol were reviewed" (IRIS (1987)), "necrosis of hepatocytes and hemorrhage were found in the liver; destruction of the epithelium lining the renal tubules with hemorrhage into the glomeruli was found in the kidneys; myocarditis was considered to be the cause of death," "the small intestine contained numerous focal hemorrhagic necroses, severe fatty changes and hemorrhagic nephritis were found; the patient complained of weakness and malaise, became delirious and occasionally euphoric, and showed diminished knee-jerk reflex; a fatal case of agranulocytosis occurred" (ATSDR (1995)). Also based on the evidence from animal studies including "pathological changes in the liver and kidneys, and testicular atrophy were noted" (CERI Hazard Data 99-9 (2000)), "reduced locomotor activity, salivation and calcification of the renal cortico-medullary junctions were observed" (MOE Risk Assessment vol. 3 (2004)). The effects on experimental animals were observed at dosing levels within the guidance value ranges for Categories 1 and 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 1	Environment	Warning	Very toxic to aquatic life	It was classified into Category 1 from 96 hours LC50=0.09mg/L of the fish (Rainbow Trout) (ECETOC TR91 (2003) and others.).
11 Hazardous to the aquatic environment (chronic)	Category 1	Environment	Warning	Very toxic to aquatic life with long lasting effects	Although acute toxicity is Category 1 and bio-accumulation is low (BCF=0.7(Existing Chemical Safety Inspections Data.)), since there was no rapidly degrading (the decomposition by BOD: 0%(Existing Chemical Safety Inspections Data)), it was classified into Category 1.