

GHS Classification

ID413

Dinitrotoluene

CAS 25321-14-6

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	Not classified	—	—	—	Due to a lack of data on the risk on temperature and decomposition energy through the substance contains nitro groups with its oxygen budget calculated at -114, 2,6-DNT, 3,4-DNT and 2,4-DNT may explode if heated according to ICSC (2004). Classified as Division 6.1 (UN#3454 (solid) and 1600 (molten)) (UN Recommendations on the Transport of Dangerous Goods), Commercial 2,4-DNT, which contains about 20% of 2,6-DNT, starts to decompose at 250degC -- a process that continues at 280degC (Bretherick (J), 5th, 1998). The decomposition energy stands at about 85% of that of TNT (2,4,6-trinitrotoluene) (5.1kJ/g) (Bretherick (J), 5th, 1998), according to some reports (NFPA, 13th, 2002).
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	—	—	—	Classified as flammable according to ICSC (2004). Classified into Division 6.1 (UN#3454 (solid) and UN#1600 (molten)) (UN Recommendations on the Transport of Dangerous Goods).
8 Self-reactive substances and mixtures	Not classified	—	—	—	Containing nitro groups with explosive properties. 2,6-DNT, 3,4-DNT and 2,4-DNT may explode if heated according to ICSC (2004). Classified into Division 6.1 (UN#3454 (solid) and 1600 (molten)) (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 6.1 (UN#3454 (solid) and 1600 (molten)) (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 (the melting points of isomers range from 52.5degC to 93degC, and the test temperature is 140degC. The melting points are 66degC (2,6-DNT), 58degC (3,4-DNT), 59-61degC (2,3-DNT), 71degC (2,4-DNT) (ICSC (2004)), 93degC (3,5-DNT) and 52.5degC (2,5-DNT)) (HSDB, 2006).
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	—	—	—	No data available, though being organic compounds containing oxygen bound to elements other than carbon and hydrogen. Classified into Division 6.1 (UN#3454 (solid) and 1600 (molten)) (UN Recommendations on the Transport of Dangerous Goods).
15 Organic peroxides	Not applicable	—	—	—	Organic compounds containing no "-O-O-" structure
16 Corrosive to metals	Not classified (2,5-DNT), Classification not possible (2,6-DNT, 3,4-DNT, 2,3-DNT, 3,5-DNT)	—	—	—	As for 2,5-DNT, classified into Division 6.1 (UN#3454 (solid) and 1600 (molten)) (UN Recommendations on the Transport of Dangerous Goods). As for 2,6-DNT, 3,4-DNT, 2,3-DNT, 3,5-DNT and 2,4-DNT, test methods applicable to solid substances are not available. The melting points of isomers are 66degC (2,6-DNT), 58degC (3,4-DNT), 59-61degC (2,3-DNT), 71degC (2,4-DNT) (ICSC (2004)), 93degC (3,5-DNT), 52.5degC (2,5-DNT) (HSDB, 2006) (the test temperature: 55degC).

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 rat LD50 (oral route) value of 1,000mg/kg (CERI Hazard Data 98-15(3) (1998)).
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 "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	Not classified	—	—	—	Based on the description in the report on rabbit skin irritation tests (SIDS (2005)): "non-irritating to the skin; mild erythema."
3 Serious eye damage / eye irritation	Not classified	—	—	—	SIDS (2005) reports that in a rabbit eye irritation test "one animal exhibited mild erythema which persisted for 24 hours." However, the study concludes that the substance is "non-irritating."
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	Not classified	—	—	—	Based on negative data on multi-generation mutagenicity tests (dominant lethal tests) and somatic cell mutagenicity tests in vivo (micronucleus tests and mouse spot tests), and the absence of data on germ cell mutagenicity tests in vivo, described in SIDS (2005) and DFGOT vol.6 (1994).
6 Carcinogenicity	Category 2	Health hazard	Warning	Suspected of causing cancer	Due to the fact that the substance is classified as Category A3 by ACGIH (2001).

7	Toxic to reproduction	Category 2	Health hazard	Warning	Suspected of damaging fertility or the unborn child	Based on the evidence of increased incidence of resorptions and fetal loss at doses causing parental toxicity in teratogenicity studies in rats, described in MOE Risk Assessment vol. 2 (2003). As for the health hazards, refer to "ID33, 2,4-Dinitrotoluene, CAS: 121-14-2," "ID414, 2,6-Dinitrotoluene, CAS: 606-20-2" and "ID416, 3,5-Dinitrotoluene, CAS: 618-85-9."
8	Specific target organs/systemic toxicity following single exposure	Category 1 (central nervous system, blood system)	Health hazard	Danger	Causes damage to organs (central nervous system, blood system)	Based on the human evidence: "acute effects include methemoglobinemia which leads to cyanosis, headache, hypersensitivity, dizziness, debility, nausea, vomiting, dyspnea and loss of consciousness" (CERI Hazard Data 98-15 (1999)). Also based on the evidence from animal studies: "toxic symptoms include clonic convulsion, dyspnea," "central nerves system damage, dyspnea, and cyanosis" (SIDS 2004). The effects on experimental animals were observed at dosing levels within the guidance value ranges for Category 2
9	Specific target organs/systemic toxicity following repeated exposure	Category 1 (cardiovascular system, blood system, nervous system, liver, kidneys) Category 2 (testes, adrenal)	Health hazard	Danger	Causes damage to organs through prolonged or repeated exposure (cardiovascular system, blood system, nervous system, liver, kidneys) May cause damage to organs through prolonged or repeated exposure (testes).	Based on the human evidence: "electrocardiographic abnormalities and tachycardia were detected only in those workers who might have been exposed," "154 male workers suffered vomiting and nausea; exhibited hematological abnormalities including anemia, cyanosis and increased WBC, and muscular weakness. Of 154 workers, two developed jaundice and hepatitis; 36 complained of anemia at clinical examination performed immediately after exposure" (CERI-NITE Hazard Assessment No.51 (2004)), "excess deaths due to ischemic heart disease were observed," "major findings included paleness, cyanosis, anemia and leukocytosis," "nephrotoxicity manifested as renal tubular degeneration was detected in a dose dependent manner," "loss of appetite, taste disorder, nausea, dizziness and hypersensitivity" (SIDS (2004)). Also based on the evidence from animal studies including "decreased hemoglobin/RBC, idiopathic cardiomyopathy, testicular degeneration, adrenal degeneration, hepatocellular vacuolar degeneration/punctate necrosis, and exacerbation of chronic interstitial nephritis," "marked increases in reticulocytes and Heinz bodies observed in all treated groups" (SIDS (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)	Classification not possible	-	-	-	Classification not possible due to lack of data
11 Hazardous to the aquatic environment (chronic)	Classification not possible	-	-	-	Classification not possible due to lack of data