

GHS Classification

ID618

2-Butanone

CAS 78-93-3

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	-	-	-	There are no chemical groups associated with explosive properties present in the molecules.
2 Flammable gases	Not applicable	-	-	-	Liquid (GHS definition)
3 Flammable aerosols	Not applicable	-	-	-	Not aerosol products
4 Oxidizing gases	Not applicable	-	-	-	Liquid (GHS definition)
5 Gases under pressure	Not applicable	-	-	-	Liquid (GHS definition)
6 Flammable liquids	Category 2	Flame	Danger	Highly flammable liquid and vapour	Flash point: <23degC, Boiling point: >35degC, UNRTDG Class: 3, PG II
7 Flammable solids	Not applicable	-	-	-	Liquid (GHS definition)
8 Self-reactive substances and mixtures	Not applicable	-	-	-	There are no chemical groups associated with explosive or self-reactive properties present in the molecule.
9 Pyrophoric liquids	Not classified	-	-	-	Flash point: 505degC (ICSC (J), 1998)
10 Pyrophoric solids	Not applicable	-	-	-	Liquid (GHS definition)
11 Self-heating substances and mixtures	Not classified	-	-	-	UNRTDG Class: 3
12 Substances and mixtures, which in contact with water, emit flammable gases	Not applicable	-	-	-	The chemical structure of the substance does not contain metals or metalloids(B, Si, P, Ge, As, Se, Sn, Sb, Te, Bi, Po, At).
13 Oxidizing liquids	Not applicable	-	-	-	Organic compounds containing oxygen (but not chlorine and fluorine) chemically bonded only to carbon (but not to other elements).
14 Oxidizing solids	Not applicable	-	-	-	Liquid (GHS definition)
15 Organic peroxides	Not applicable	-	-	-	Containing no -O-O- structure
16 Corrosive to metals	Not classified	-	-	-	UNRTDG Class: 3

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	Calculated based on rat oral LD50 value = 5520mg/kg (EHC 143 (1992), ACGIH (7th, 2001), PATTY (4th, 1994), IRIS (2003), ATSDR (1992)), 2737mg/kg (PATTY (4th, 1994), IRIS (2003), ATSDR (1992)), 2483mg/kg (PATTY (4th, 1994)), and 2884mg/kg (PATTY (4th, 1994)). But the calculation value was lower than lowest value of these data, lowest value was adopted, and it was set as Category 5.
1 Acute toxicity (dermal)	Not classified	-	-	-	Based on rabbit dermal LD50 5000mg/kg (PATTY (4th, 1994)), >8000mg/kg (EHC 143 (1992), DFGOTvol.12 (1999), PATTY (4th, 1994), ATSDR (1992)), and 13000mg/kg (PATTY (4th, 1994)), it was set as the outside of Category.
1 Acute toxicity (inhalation: gas)	Not applicable	-	-	-	Liquid (GHS definition)
1 Acute toxicity (inhalation: vapour)	Category 5	-	Warning	May be harmful if inhaled	It was classified as Category 5 based on rat inhalation LC50 (4 hours) value = 11700ppm (EHC 143 (1992), PATTY (4th, 1994), IRIS (2003), ATSDR (1992)).
1 Acute toxicity (inhalation: dust, mist)	Classification not possible	-	-	-	No data available
2 Skin corrosion / irritation	Category 2	Exclamation mark	Warning	Causes skin irritation	There is description that when exposed to human skin, irritation was not observed (EHC 143 (1992), DFGOTvol.12 (1999), PATTY (4th, 1994), and ATSDR (1992)). But based on the description that mild to moderate irritation was observed in the skin application examination on rabbits (EHC 143 (1992), DFGOTvol.12 (1999), PATTY (4th, 1994), and ATSDR (1992)), it was classified as Category 2.
3 Serious eye damage / eye irritation	Category 2B	-	Warning	Causes eye irritation	There is description that irritation was seen in the eye in humans evidence of exposure to vapor (ACGIH and (7th, 2001), DFGOTvol.12 (1999), PATTY (4th, 1994), and IRIS (2003)). And the average value of the mark in 24 hours was corneal cloudings 2.5 and the conjunctival redness 2 in the eye irritation examination using a rabbit, but it had recovered mostly within seven days (ECETOC TR48 (1992)). So it was set as Category 2B.
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)-	Respirator: No data Skin: Although there are descriptions of one case in which the contact dermatitis was seen, based on the same former literature(EHC 143 (1992)), DFGOTvol.12 (1999), PATTY (4th, 1994), and ATSDR (1992), there are no other case reports, and since there is a negative statement by Mouse Ear Swelling Test (DFGOTvol.12 (1999) and PATTY (4th, 1994)), it was decided that it could not be classified due to lack of sufficient data.
5 Germ cell mutagenicity	Not classified	-	-	-	Since there were the negative results by the micronucleus tests which used mammalian erythrocytes (EHC 143 (1992), DFGOTvol.12 (1999), PATTY (4th, 1994), IRIS (2003), ATSDR (1992)), we classified it as Out Of Category.
6 Carcinogenicity	Not classified	-	-	-	Since it was classified into 1 (inadequate) according to EPA, it carried out the outside of Category.

7	Toxic to reproduction	Not classified	-	-	-	There are descriptions that fetal malformations were observed in teratogenicity studies of inhalation exposures in rats (EHC 143 (1992), DFGOTvol.12 (1999), PATTY (4th, 1994), IRIS (2003), and ATSDR (1992)). In a retest, however, malformations are not observed, although delayed ossification and mutations were observed (EHC 143 (1992), ACGIH (7th, 2001), DFGOTvol.12 (1999), PATTY (4th, 1994), IRIS (2003) and ATSDR (1992)). Furthermore, malformation is not observed, although lower weight levels of offsprings and mutations were also observed in teratogenicity studies of inhalation exposure to mice (EHC 143 (1992), ACGIH (7th, 2001), DFGOTvol.12 (1999), PATTY (4th, 1994), IRIS (2003) and ATSDR (1992)). Therefore, all were judged to be minimum influence and were placed out of classification.
8	Specific target organs/systemic toxicity following single exposure	Category 1 (central nervous system); Category 2 (kidneys); Category 3 (respiratory tract irritation)	Health hazard	Danger	Causes damage to organs (central nervous system); May cause damage to organs (kidneys); May cause respiratory irritation or may cause drowsiness and dizziness (respiratory tract irritation)	There are descriptions that effects on the central nerve system were not observed in the inhalation exposure test by humans (EHC 143 (1992), DFGOTvol.12 (1999), IRIS (2003), and ATSDR (1992)), and that there was no statistically significant difference against contrast groups in the result of the time estimation test (EHC 143 (1992) and PATTY (4th, 1994)). On the other hand, since effects on the central nerve systems in the inhalation exposure test of the rat or the mouse were identified in comparatively low concentrations (EHC 143 (1992), PATTY (4th, 1994) and IRIS (2003)), the target organ was judged to be the central nerve system and it was set as Category 1. Moreover, based on the description that effects were observed in kidney by a moderate dosage of the oral administration to rats (DFGOTvol.12 (1999), IRIS (2003), and ATSDR (1992)), kidney was also judged to be the target organ and was set as Category 2. Furthermore, it was set as Category 3 based on the description that respiratory irritation was observed by the human evidence of inhalation exposure (ACGIH (7th, 2001), DFGOTvol.12 (1999), PATTY (4th, 1994), IRIS (2003), and ATSDR (1992)).
9	Specific target organs/systemic toxicity following repeated exposure	Category 1 (central nervous system, peripheral nervous system)	Health hazard	Danger	Causes damage to organs (central nervous system, peripheral nervous system) through prolonged or repeated exposure	It was classified all to Category 1 considering target organ a central nervous systems and the peripheral nervous system, according to the description that the sensory paralysis of hand and arm was seen in the case of human occupation exposure (EHC 143 (1992), DFGOTvol.12 (1999) and IRIS (2003)), the description suggesting the central nervous systems disorders in the case of occupation exposure (DFGOTvol.12 (1999) and IRIS (2003)), and the description about three cases in which the effects on the central nervous systems were seen (IRIS (2003)).
10	Aspiration hazard	Category 2	Health hazard	Warning	May be harmful if swallowed and enters airways	Category 2 because of being a primary normal alcohol composed of carbon atoms (3<n=13) and containing an isobutyl alcohol and ketone composed of carbon atoms (n>=13).

Environmental Hazards

Hazard class	Classification	symbol	signal word	hazard statement	Rational for the classification
11 Hazardous to the aquatic environment (acute)	Not classified	-	-	-	It carried out the outside of Category from 96-hour LC50>100mg/L of fishes (<i>Oryzias latipes</i>) (MOE eco-toxicity tests of chemicals, 1996).
11 Hazardous to the aquatic environment (chronic)	Not classified	-	-	-	Since not water-insoluble (aqueous solubility =2.23*105mg/L(PHYSROP Database, 2005)) and acute toxicity is low.