

4. CHEMICAL AND PHYSICAL INFORMATION

4.1 CHEMICAL IDENTITY

Information regarding the chemical identity of hydrogen sulfide is located in Table 4-1. This information includes synonyms, chemical formula and structure, and identification numbers.

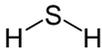
4.2 PHYSICAL AND CHEMICAL PROPERTIES

Information regarding the physical and chemical properties of hydrogen sulfide is located in Table 4-2.

Hydrogen sulfide (H_2S) is a poisonous, colorless gas with a characteristic odor of rotten eggs. The odor threshold for hydrogen sulfide is variable and various ranges have been reported. Ruth (1986) reviewed odor thresholds of several hundred chemicals, including hydrogen sulfide, from the industrial hygiene literature and other compilations of odor threshold data; an odor threshold range of 0.0005–0.010 ppm was reported. Guidotti (1994) reported an odor threshold range of 0.01–0.3 ppm.

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Table 4-1. Chemical Identity of Hydrogen Sulfide^a

Characteristic	Information
Chemical name	Hydrogen sulfide
Synonyms/trade names	Hydrosulfuric acid; hydrogen sulphide, sewer gas, stink damp; sulfur hydride; sulfurated hydrogen; dihydrogen monosulfide; dihydrogen sulfide
Chemical formula	H ₂ S
Chemical structure	
Identification numbers:	
CAS registry	7783-06-4
NIOSH/RTECS	MX1225000b
EPA hazardous waste	U135
DOT/UN/NA/IMCO shipping	UN1053; IMO 2.1
HSDB	576
EINECS	231-977-3
NCI	No data

^aAll information obtained from HSDB 2004 and ChemID 2004, except where noted.

^bNIOSH 2004

CAS = Chemical Abstract Services; DOT/UN/NA/IMCO = Department of Transportation/United Nations/North America/International Maritime Dangerous Goods Code; EINECS = European Inventory of Existing Commercial Substances; EPA = Environmental Protection Agency; HSDB = Hazardous Substance Data Bank; NCI = National Cancer Institute; NIOSH = National Institute for Occupational Safety and Health; RTECS = Registry of Toxic Effects of Chemical Substances

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Table 4-2. Physical and Chemical Identity of Hydrogen Sulfide^a

Property	Information
Molecular weight	34.08
Color	Colorless
Taste	Sweetish taste
Physical state	Gas
Melting point	-85.49 °C
Boiling point	-60.33 °C
Density in Air	1.19 (air=1.00) ^b
Density at 0 °C, 760 mmHg	1.5392 g/L
Odor	Rotten eggs
Odor threshold:	
Water	0.000029 ppm ^c
Air	0.0005–0.3 ppm ^{d,e}
Solubility:	
Water	5.3 g/L at 10 °C; 4.1 g/L at 20 °C; 3.2 g/L at 30 °C ^b
Organic solvent(s)	Soluble in glycerol, gasoline, kerosene, carbon disulfide, crude oil
Partition coefficients:	
Log K _{ow}	Not applicable
Log K _{oc}	Not applicable
Vapor pressure at 25 °C	15,600 mm Hg ^f
Acid dissociation:	H ₂ S(aq) ⇌ H ⁺ (aq) + HS ⁻ (aq) (1); HS ⁻ (aq) ⇌ H ⁺ (aq) + S ²⁻ (aq) (2)
pK _a (1)	7.04 ^b
	$Ka_1 = \frac{[HS^-(aq)][H^+(aq)]}{[H_2S(aq)]}$
pK _a (2)	11.96 ^b
	$Ka_2 = \frac{[S^{2-}(aq)][H^+(aq)]}{[HS^-(aq)]}$
Henry's law constant:	
at 20 °C	468 atm/mole fraction ^g
at 30 °C	600 atm/mole fraction ^g
at 40 °C	729 atm/mole fraction ^g
Autoignition temperature	500 °F (260 °C)
Flammability limits	Upper, 44%; lower, 4.0% (by volume at room temperature)

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Table 4-2. Physical and Chemical Identity of Hydrogen Sulfide^a

Property	Information
Conversion factors	1 ppm = 1.40 mg/m ^{3h}
Explosive limits	Upper, 45.5%; lower, 4.3% (by volume in air)

^aAll information obtained from HSDB 2004, except where noted.

^bO'Neil et al. 2001

^cAmoore and Hautala 1983

^dRuth 1986

^eGuidotti 1994

^fNIOSH 2004

^gDaubert and Danner 1989

^hAl-Haddad et al. 1989