

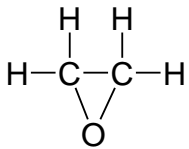
CHAPTER 4. CHEMICAL AND PHYSICAL INFORMATION

4.1 CHEMICAL IDENTITY

Ethylene oxide is both a manmade substance and a natural substance produced in the body via oxidation of absorbed or endogenously produced ethylene during normal oxidation processes.

Table 4-1 lists common synonyms, trade names, and other pertinent identification information for ethylene oxide.

Table 4-1. Chemical Identity of Ethylene Oxide

Characteristic	Information	Reference
Chemical name	Ethylene oxide	NLM 2021
Synonym(s) and registered trade name(s)	Oxirane; dihydro-oxirane; dimethylene oxide; epoxyethane; ETO; Anprolene; Oxyfume; T-Gas; 1,2-epoxyethane; ethene oxide; diethylene oxide; E.O.; oxane; oxidoethane	NLM 2021; Parod 2014; WHO 2003
Chemical formula	C ₂ H ₄ O	EPA 2017b
Chemical structure	 <pre> H H H - C - C - H \ / O </pre>	
CAS Registry Number	75-21-8	WHO 2003

CAS = Chemical Abstracts Service

4.2 PHYSICAL AND CHEMICAL PROPERTIES

Ethylene oxide is a colorless, flammable gas. It is highly soluble in water (1×10^6 mg/L at 20°C) and possesses a high vapor pressure (1.095×10^3 mm Hg at 20°C).

Table 4-2 lists important physical and chemical properties of ethylene oxide.

4. CHEMICAL AND PHYSICAL INFORMATION

Table 4-2. Physical and Chemical Properties of Ethylene Oxide

Property	Information	Reference
Molecular weight	44.05 g/mol	WHO 2003
Color	Colorless	WHO 2003
Physical state	Gas	NIOSH 2007
Melting point	-111.7°C	NLM 2021
Boiling point	51°F (10.6°C)	NIOSH 2016
Density at 10°C	0.8824	NLM 2021; Weast 1985
Odor	Sweet, olefinic; ether-like	NIOSH 2007; Verschueren 1983
Odor threshold:		
Water	140 mg/L	Amoore and Hautala 1983
Air	787 mg/m ³ (432.85 ppm)	Amoore and Hautala 1983
Solubility:		
Water at 20°C	1x10 ⁶ mg/L	EPA 2017b
Organic solvents	Soluble in alcohol, ether, acetone, benzene	EPA 2017b
Partition coefficients:		
Log K _{ow}	-0.22	EPA 2017b
Log K _{oc}	1.204	WHO 2003
Vapor pressure at 20°C	1.095x10 ³ mm Hg	EPA 2017b
Henry's law constant at 25°C	1.48x10 ⁻⁴ atm-m ³ /mol	NLM 2021
Autoignition temperature	429°C	NLM 2021
Flashpoint	<-18°C (open cup)	NLM 2021
Flammability limits	Lower: 3.0% Upper: 100%	NLM 2021
Conversion factors at 20°C and 101.3 kPa	1 ppm=1.83 mg/m ³ 1 mg/m ³ =0.55 ppm	WHO 2003
Explosive limits	Lower: 3.0% Upper: 100%	NLM 2021