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Product Information

2-MERCAPTOETHANOL

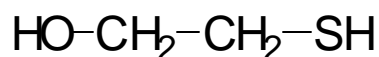
Sigma Prod. Nos. M3148, M6250, M7154, and M7522

CAS NUMBER: 60-24-2

SYNONYMS: beta-mercaptoethanol; 2-ME; β -ME; 2-thioethanol;
2-hydroxyethylmercaptan; 1-ethane-2-thiol; thioglycol

PHYSICAL DESCRIPTION:

Appearance: clear colorless to very faint yellow liquid
Molecular formula: C_2H_6OS
Molecular weight: 78.13
Boiling point: 157-158°C with decomposition at 742 torr¹
Density: 1.114 g/mL at 20°C¹, 1.1196 g/mL at 25°C²



The liquid has a concentration of 14.3 M (moles/L).

STORAGE / STABILITY AS SUPPLIED:

The bulk product decomposes slowly in air. If kept sealed at room temperature, 2-mercaptoethanol will remain >99% (by GC) for up to three years. Bottles opened frequently may decline at 2% per year.³

SOLUBILITY / STABILITY OF SOLUTIONS:

2-Mercaptoethanol (2-ME) is miscible in water in all proportions, and miscible in alcohol, ether and benzene.^{1,2} The product typically gives clear solutions when diluted 1:1 in water or diluted 2:1 in 1 M Tris buffer.

Solutions of 2-ME containing even trace levels (nanomolar) of some metal salts, especially copper(II) or cobalt(II), are unstable at pH > 5 and progressively less stable at higher pH values. Most buffers (especially phosphate) contain enough metal salts to lead to substantial loss of -SH within 1-2 days. EDTA helps to stabilize solutions.

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SOLUBILITY / STABILITY OF SOLUTIONS: (continued)

Experimental data are reported for several buffers and pH values at room temperature.³

Buffer, 25 mM	pH	0.05 mM EDTA	Loss/day (by DTNB)	
phosphate	6	no	22%	<p>Note that stability in Tris has been reported by Koundal et al.⁴</p> <p>Refrigerated samples lost -SH at approximately 25% of those at room temperature. Frozen samples were only slightly more protected than refrigerated ones; repeated freeze-thaw cycles led to faster breakdown.</p> <p>Optimal: Stored at pH 6-7 with EDTA, stored at 2-8°C. Adding neat 2-ME as needed is recommended over preparing/diluting stock solution.</p>
phosphate	6	yes	0.47%	
phosphate	7	no	69%	
phosphate	8	no	~100%	
HEPES	7	no	11%	
Tris-Cl	7	no	13%	
Tris-Cl	7	yes	0.04%	
Tris-Cl	8	no	18%	
Borate	8	no	15%	
Borate	8	yes	0.89%	
Borate	9	no	38%	
Borate	9	yes	0.96%	

GENERAL REMARKS:

In solution, 2-mercaptoethanol (2-ME) is readily oxidized in air to a disulfide, especially at alkaline pH. Because of this property, 2-ME is widely used to protect proteins, enzymes in particular, from becoming inactive. An excess of 2-ME (generally used at 0.01 M) will maintain the protein thiol groups in their reduced state.

Researchers have seen artifactual bands in SDS-PAGE systems, appearing in the range of 54 to 68 kDa, particularly in 2-dimensional electrophoresis systems when sensitive staining techniques are used to detect proteins, such as gold or silver staining.⁵⁻⁸ Although these have appeared when 2-ME is used, they have been attributed to the action of 2-ME on some component in the system. These bands may be eliminated by removing the 2-ME from the protein sample during equilibration and replacing it by iodoacetamide, which reportedly improves recovery and detection of proteins.^{7,8}

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