(13) Thiodiglycol, $C_4H_{10}O_2S$
CAS No. 111-48-8
HS No. 29.30.90.00
NIOSH/RTECS No. KM 2975000
Merck 9259

Synonyms: Bis (2-hydroxyethyl) sulphide; 2,2'-dithiobisethanol; thiodiethylene glycol

Physical Characteristics: MW: 122.19, mp: -16°, n_D^{20} 1.5215, d1.221, miscible with water and alcohol.

Synthesis: Ethylene can be oxidized either by air or oxygen over a silver catalyst to produce ethylene oxide, a chemical that is produced worldwide in large tonnages. This is a very reactive substance and on reaction with hydrogen sulphide, gives thiodiglycol in essentially quantitative yield. The process can be modified to form 2-mercaptoethanol which also can be converted to thiodiglycol. An alternative, but commercially obsolete process, involves the reaction of 2-chloroethanol (ethylene chlorohydrin) with sodium sulphide to give thiodiglycol in about 86% yield (Collected Organic Synthesis, Vol. 2 P. 576, John Wiley and Sons, New York, 1943).

Reactivity: Chlorination of thiodiglycol leads to mustard gas, chlorinating agents used are phosphorous trichloride, thionyl chloride or concentrated hydrochloric acid. Oxidation leads to the corresponding sulphone.

Toxicology: This has not been thoroughly investigated but it is not acutely harmful. The reported LD_{50}s are in the range of 3000-6000 mg/kg. Its vapour is irritating to the eyes, mucuous membranes and upper respiratory tract. It is harmful by inhalation, ingestion or skin absorption. Exposure leads to headaches, nausea and vomiting.

Uses: Thiodiglycol has industrial uses in elastomers, lubricants, stabilizers, antioxidants, inks, dyer, photographic and copying processes, antistatic agents, epoxides, coatings, metal plating and textiles. The textile industry would appear to be the major user.

Suppliers: There are seven listed suppliers currently: USA (1), Japan (3), France (1), Germany (1) and the Netherlands (1).

Literature Survey: A detailed literature survey was presented to the Conference on Disarmament in 1990 as CD/CW/WP.279. this was based on Chemical Abstracts from 1975 to 1988. It produced 346 references from 26 countries. An unusual feature was the fact that 56% of the references came from industry and 52% resulted from the patent literature. The USA, Japan, Germany, Russia and the UK accounted for 75% of the published work.