

Propylene Glycol Environmental Data

To clarify the environmental behavior and disposal options for Noburst –100 heat transfer fluid, the following are pertinent available data for its components.

Propylene Glycol, CAS-57-55-6

Volatility is low, and solubility is high, therefore, appreciable movement from water to air is not expected in the environment.

Biodegradation under aerobic static laboratory conditions is high (BOD₂₀/ThOD>40%), and biodegradation is expected under both aerobic and anaerobic conditions (in either the presence or absence of oxygen). The BOD data below indicates that propylene glycol should be treatable in typical biological wastewater treatment plants, if high influent concentrations are monitored and managed to avoid excess oxygen demands.

Syracuse Research Corporation judges this material to be biodegradable “at fast rate” based on consistent results in 3 or more aerobic screening tests and based on results in at least 2 anaerobic tests in water. Screening tests measured the following BOD results in parts per part and % of theoretical oxygen demand: 1.16 and 69% in 5 days, 1.18 and 70% in 10 days, 1.45 and 86% in 20 days. Verschueren cites a 10 day BOD of 56.7% of ThOD and 20 day BOD of 77.8%. In an evaluation of the OECD “activated sludge respiration inhibition test,” the 3-hr inhibitory concentration was reported to be >1000mg/L. In a Dow study of the effects of salt concentration on anaerobic degradation of propylene glycol, propylene glycol was rapidly degraded by microorganisms present in municipal anaerobic digester sludge. The mechanism was shown to be analogous to the metabolism of ethylene glycol under anaerobic conditions. In an anaerobic toxicity assay, propylene glycol was nontoxic and readily biodegradable. Dow reported results of a study of anaerobic treatment of a process waste stream containing propylene glycol; treatment efficiencies of propylene glycol were in the range of 50% at organic loadings between 0.4-0.65 g/L/day.

Laboratory results suggest a very low toxicity to terrestrial species, aquatic vertebrates and invertebrates, bacteria and algae. Dow reports 96-hr LC 50's in fathead minnow of approximately 55,000 mg/L for USP grade and 4460 mg/L for industrial grade material, and 48-hr LC50 in daphnia magna of 4850-34,000 mg/L. Verschueren cites additional acute fish toxicity as follows: 24-hr NOEL of 50,000 mg/L in fingerling and trout, 48-hour LC50 of >10,000 mg/L in guppy. Tests with bacteria and algae reported no significant toxic effect in the growth of pseudomonas putida at 10-20,000 mg/L (Dow) and toxicity in chlorella pyrenoidosa at 92,00 mg/L (Verschueren).