

TRIETHYLENE GLYCOL DIACRYLATE

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I. IDENTIFICATION

Chemical Name: 2 propenoic acid, 2-ethanediylbis (oxy-2, 1-ethanediyl) ester.
CAS 1680-21-3.

Synonyms: Triethylene Glycol Diacrylate;
TREGDA: acrylate ester; MFA (multi-functional acrylate); MFM (Multi Functional Monomer).

Formula: $C_{12}H_{18}O_6$

Molecular Weight: Mixture; Formula Weight = 258

II. CHEMICAL AND PHYSICAL PROPERTIES

A. Chemical Properties

Mainly a mixture of mono- and di-acrylate esters of triethylene glycol with some dimers and trimers, inhibited with 100 ppm (± 25 ppm) of free radical polymerization inhibitor MEHQ (monomethyl ester of hydroquinone). Rapid and violent polymerization possible at temperatures above 32 °C (89.6 °F). Exposure to light, free radical initiators, and oxidizing agents such as peroxides, iron, rust, and strong bases may initiate polymerization. May also react after more than twelve months of storage.⁽¹⁾

Cross linking occurs only after exposures to ultra-violet light at 300-400 nm.⁽²⁾

B. Physical Properties⁽¹⁾

Amber liquid with low volatility and odor.
Flash Point: > 37.7 °C (100 °F). Note reaction in II.A.
Boiling Point: estimate 265.5 °C (510 °F) at 760 mm Hg.
Melting Range: 0 - 10 °C (32 - 50 °F).
Vapor Pressure: estimate 0.5 mm Hg at 100 °C (212 °F).
Solubility in Water: 0.4%
Specific Gravity: 1.11 at 25 °C (77 °F).

III. USES AND CONSUMPTION

Major use in ultra-violet cured inks, coatings, and adhesives. Some MFAs are also used in dental seal-

ants.⁽²⁾ Production of all types of MFAs may be several million pounds per year depending on demand.

IV. SUMMARY OF TOXICOLOGIC AND USE EXPERIENCE

A. Toxicology Data

1. Animal Data⁽⁴⁾

a. Acute Toxicity

Rat Oral LD50: 996 mg/kg (SD \pm 101.1 mg/kg)

Rabbit Skin LD50: 24 hours, 1900 mg/kg

“Lab Animals” Inhalation: 6-hour exposure to air saturated by sparging through TREGDA at 60 °C (140 °F) caused no deaths.

Rabbit extremely irritating.

Primary skin irritation:

Rabbit Eye irritation: extremely irritating.

b. Sub-chronic Toxicity

Guinea Pig Undiluted TREGDA did Sensitization: not cause sensitization (10 animals).

Rabbit Two week 300 mg/kg undiluted dermal toxicity: TREGDA/day \times 5 day/week \times 2 week resulted in skin corrosion but no organ effects were noted.

2. Miscellaneous

In vitro Mutagenicity Assays⁽⁴⁾

Bacteria: Ames Test - negative (both activated and non-activated).

Mouse: Lymphoma Forward Mutation Assay - positive (both activated and non-activated)