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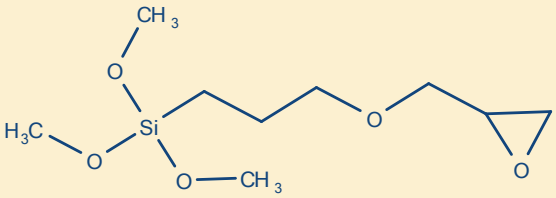
40th anniversary



AS-14542
CAS Number 2530-83-8

3-Glycidoxypropyltrimethoxysilane (GPTMS / KH-560)

The world's most commercially important epoxy silane coupling agent — over 40 years in use

Overview

GPTMS is a bifunctional organosilane carrying an epoxide (glycidoxy) group at one end and a trimethoxylsilyl group at the other. It is the benchmark epoxy coupling agent: the methoxy groups hydrolyse to silanols and bond covalently to glass, metal, ceramic, or mineral substrates, while the epoxide opens to react with amines, thiols, carboxylic acids, and hydroxyls in organic matrices. The resulting covalent bridge dramatically improves wet adhesion, corrosion resistance, and mechanical durability of composite systems.

Key applications

- Sol-gel hybrid coatings on steel, aluminium, and stainless steel — barrier against corrosion and chemicals
- Adhesion promoter in waterborne epoxy and acrylic coatings applied to glass and metal
- PCB conformal coating and encapsulant adhesion to glass-reinforced laminate substrates
- Hard optical coatings for ophthalmic lenses (CR-39, polycarbonate) — typically combined with TEOS and nanoparticles
- Construction sealants and tile adhesives — eliminates need for separate primer on glass or ceramic
- Filler surface treatment in mineral-filled epoxy, phenolic, and polyester resins

Selected literature

[1] Casagrande C. et al. (2020). Analysis of GPTMS Hydrolysis by Infrared Spectroscopy. Matéria (Rio de Janeiro) 25. https://doi.org/10.1590/s1517-707620200003.1111

[2] Chantarachindawong R. et al. (2016). Hard coatings for CR-39 based on Al_2O_3–ZrO_2/GPTMS/TEOS nanocomposites. J Sol-Gel Sci Technol 79, 190–200. https://doi.org/10.1007/s10971-016-4006-3

[3] Al-Saadi S. & Singh Raman R.K. (2022). Silane Coatings for Corrosion and Microbiologically Influenced Corrosion Resistance of Mild Steel. Materials 15, 7809. https://doi.org/10.3390/ma15217809

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