FACT SHEET

Tri- and Tetramethoxysilanes

This fact sheet provides a summary of the Development Support Document (DSD) created by the TCEQ for the development of Regulatory Guidelines (ESLs, AMCVs and ReVs) for ambient exposure to this chemical. For more detailed information, please see the DSD or contact the TD by phone (1-877-992-8370) or e-mail (tox@tceq.texas.gov).

What are tri- and tetramethoxysilanes?

Tri- and tetramethoxysilanes are members of methxoysilanes category. Like other methoxysilanes, they are clear, colorless liquids with fruity odors. They are structural analogs and are in the organic silane family. Methoxysilanes are commonly used for coatings, adhesion promoters, crosslinkers, and water scavengers. For example, trimethoxysilane is used as an intermediate in the production of organofunctional silanes and tetramethoxysilane is used in coating the screens of television picture tubes.

How are tri- and tetramethoxysilanes released into ambient air?

Tri- and tetramethoxysilanes can be released into the air from uses in coatings and in the production of organic silanes. Tri- and tetramethoxysilanes released to the environment undergo hydrolysis in the presence of water rapidly to produce methanol and silanols. Methanol can contribute to the formation of photochemical smog when it reacts with other volatile organic carbon substances in air. Depending on the pH and concentration of the substance, the silanols may condense to form oligomers and polymers.

How can tri- and tetramethoxysilanes affect my health?

Tri- and tetramethoxysilanes enter the body when breathed in with contaminated air. These methoxysilanes hydrolyze quickly to yield methanol and silanetriol. Permitted levels of tri- and tetramethoxysilanes should not cause adverse health and welfare effects. Laboratory studies show that exposure to relatively high concentration of tri- and tetramethoxysilanes in air cause effects including irritation (lesions) of eyes and respiratory tract and urinary bladder/kidney systemic effects after inhalation exposure in animals. Health effects observed (respiratory versus systemic effects) may be due to hydrolysis products and the parent compounds. Tri- and tetramethoxysilanes are not considered reproductive/developmental toxicants. There are no human or animal studies indicating tri- and tetramethoxysilanes methanol have a potential to be a human carcinogen. Tri- and tetramethoxysilanes are not currently listed by the International Agency for Research on Cancer (IARC) or other government agencies (e.g., USEPA, or National Toxicology program) as carcinogenic.

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Are tri- and tetramethoxysilanes odorous or harmful to plants?

Tri- and tetramethoxysilanes generally have sweet fruity odors that become less apparent as the molecular weight increases. Tri- and tetramethoxysilanes has not been shown to have an adverse effect on plants.

Why does the TCEQ set Regulatory Guidelines for tri- and tetramethoxysilanes?

The TCEQ has set various air quality guideline levels (ESLs, AMCVs and ReVs) to protect human health and welfare. Please see Definitions of ESLs, ReVs, and AMCVs located on the TCEQ DSD webpage for more information. The air quality guideline levels for methanol have been designed to protect the general public from short-term and long-term adverse health and welfare effects. The general public includes sensitive populations such as children, the elderly, pregnant women and people with preexisting health conditions. If you would like to know more about the specific ESLs, AMCVs and ReVs developed, what the values are and what they are used for, please see the DSD.