W. R. Grace & Co.-Conn.
Silicic Acid, Titanium Salt Product Stewardship Summary

I. Overview

W.R. Grace & Co.-Conn. is a global manufacturer of silicic acid, titanium salt. This substance is considered for US TSCA purposes to be a mixture ("statutory mixture"). Grace manufactures titanium oxide CAS# 13463-67-7 and silicic acid CAS# 7699-41-4 as the components of silicic acid, titanium salt. Substance control regulations in some other countries consider silicic acid, titanium salt (titanium silicate) to be a discrete substance identified by the CAS# 42613-21-8.

Silicic acid, titanium salt is not distributed as a discrete chemical compound. The substance is included as a component in certain catalyst products formulated by Grace Davison. These catalysts are added to processes to polymerize ethylene for the manufacture of polyethylene resins. These resins are used in products such as plastic lumber, plastic pipe and household containers.

II. Chemical Identity - Physical and Chemical Properties

Chemical Identity:

TSCA:	Statutory Mixture
CAS Number:	42613-21-8
IUPAC Name:	Titanium(2+) oxosilanediolate
Molecular Formula:	$Ti_{(0.038\text{-}0.045)}Si_{(0.962\text{-}0.955)}O_4$
Primary Synonym:	titanium silicate

Purity/Impurities/Additives:

Silicic acid, titanium salt has a purity of > 96.6%. Trace impurities may consist of different residues from raw materials, such as aluminium oxide (< 0.25%) and sodium oxide (<0.09%).

Physio-chemical Properties:

Parameter	Silicic acid, titanium salt
Physical state at 20 °C and 101.3 kPa	solid; white powder, odorless
Melting point	> 350 °C
Boiling point	data waiving
Relative Density	1.8854 ± 0.0977 at 24 °C
Vapor pressure	data waiving
Partition Coefficient (log Kow)	data waiving
Water solubility	not soluble
Flammability	not highly flammable
Particle size distribution	The size distribution of particles does not show single peaks but a continuous distribution between 25 and 80 µm, with less than 20 % > 80 µm and less than 10 % < 25 µm. No particles < 10 µm were detected.

III. Applications

The silicic acid, titanium salt is manufactured by Grace Davison to produce catalyst products. The Silicic acid, titanium salt has physical and chemical properties that make it a valuable material in the global supply chain. Physical properties such as pore volume, surface area and strength coupled with its unique surface attributes make it a valuable substance that is used globally as a critical part of catalyst systems to make many grades of polyethylene. The unique properties of the silicic acid, titanium salt typically allow use of approximately a pound of catalyst to produce many thousands of pounds of product.

Exposure to silicic acid, titanium salt during production and packaging is controlled through process design, engineering control measures, hygiene practices and personal protection equipment. If local exposures warrant, workers are protected with respirators, protective clothes, protective gloves and safety glasses.

Catalyst containing silicic acid, titanium salt is transferred to the customer, added to a closed system and employed in the polymerization process. Under controlled reaction conditions the active metals used in conjunction with the silicic acid, titanium salt facilitate the generation of active sites which polymerize ethylene.

IV. Manufacturing Processes

Silicic acid, titanium salt is manufactured using a wet process that involves an alkaline silicate solution (or water glass) and an acidic metal solution, typically including sulfuric acid. The process steps may include gelation, agitation, ageing, washing, multi-step drying, and granulation, followed by packing and shipping of the product. The size of the primary particles and the amount of aggregation and agglomeration are determined by the manufacturing process reaction conditions, e.g. pH, temperature, and concentration. Silicic acid titanium salt is generally manufactured under acidic and temperature controlled conditions with primary particles in the range of 20 -200 um. The final product is a free flowing, granular form of silicic acid with a high degree of purity containing trace amounts of other metal oxides, organics, sulfates and/or chlorides. In-process reclaim and reuse of the material helps minimize waste generation.

V. Health Effects

Due to the similarity in chemical structure, composition, production and processing as well as the similarities in physical and chemical properties, all available toxicologic and health data suggest that the toxicology of silicic acid, titanium salt would not be much different than the toxicology of synthetic amorphous silica.

Silicic acid, titanium salt forms part of the active catalyst that is consumed during the polymerization process. Catalyst particles are shattered during reaction and remain inside the polymer at ppm levels.

Silicic acid, titanium salt is sold, distributed and used solely within industry. It is handled and transferred in closed processes. This substance, as distributed, would not be anticipated to come in direct contact with consumers or the public at large. If it were released to the environment, it is anticipated that this substance would combine indistinguishably with soils or sediment. This in part explains why silicic acid, titanium salt has been the focus of so little toxicology research interest.

In contrast an extensive body of literature shows that synthetic amorphous silicas have a long history of safe use in commercial and consumer products. Consumers are likely to be exposed to synthetic amorphous silicas through application to the skin and even through ingestion as it is used in a number of food products. The long history of manufacturing and use of synthetic amorphous silica indicates that there is very little potential for any adverse health effects. By extension silicic acid, titanium salt even if it were to find its way into the general environment, would be expected to have a similar low potential for adverse health effects.

VI. Environmental Effects

The release of silicic acid, titanium salt from manufacturing and use is minimal. Waste material from plant production is disposed at chemical landfills, incinerated or recycled.

Silicic acid, titanium salt would be expected to have no adverse effects on eco systems, micro organisms, aquatic or terrestrial organisms. Because of its chemical similarity to minerals in soil, it is anticipated that if this product were released to the environment it would combine harmlessly with normal soils and sediments.

VII. Conclusion

Much like synthetic amorphous silicas, silicic acid, titanium salt is a safe product with a very low potential for toxic effects on humans, animals or the greater environment. Furthermore the manner in which silicic acid, titanium salt is distributed and used throughout its life cycle makes exposures to this product highly improbable.

VIII. W. R. Grace Contacts

Please feel free to contact one of the following Grace representatives should you desire additional information or have questions.

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IX. References, Literature and Other Sources of Information

European Centre for Ecotoxicology and Toxicology of Chemicals (ECETOC). 2006. "Synthetic Amorphous Silica (CAS No. 7631-86-9)." ECETOC JACC Report No. 51. Brussels, Belgium.

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