W. R. Grace & Co.-Conn.
Aluminum Phosphate Product Stewardship Summary

I. Overview

W. R. Grace & Co.-Conn produces aluminum phosphate, a key ingredient that improves the performance of a wide range of alumina based refinery catalysts. The aluminum phosphate manufactured by Grace is formed when phosphoric acid reacts with alumina present in the catalyst. Grace does not commercially supply aluminum phosphate.

II. Chemical Identity – Physical and Chemical Properties

Chemical Identity:

CAS# (EC inventory):	7784-30-7
CAS Name:	aluminum phosphate
EC Number:	232-056-9
EC Name:	aluminium orthophosphate
RTECS Number:	TB6450000
Molecular Formula:	Al.H3O4P
Molecular Weight:	124.98

Synonyms: Phosphoric acid, aluminum salt (1:1); monoaluminum phosphate; aluminium orthophosphate; aluminum monophosphate; aluminum phosphoric acid

Physical and Chemical Properties:

- Solid, white crystalline powder
- Density: 2.566 g/cm³ at 20°C
- Melting Point: > 1500 ° C
- Boiling Point: N/A
- Solubility: ≤6.92 x 10-3 g/l at 20.0 ± 0.5ºC

Aluminum phosphate is a largely insoluble odorless white powder that is stable under normal temperatures and pressures. Aluminum phosphate reacts violently with strong acids and strong bases; therefore care should be taken to avoid storage of products containing this substance near strong acids or bases.

III. Applications

Aluminum is one of the most common metals found in nature and is present in air, food, and water. Aluminum phosphate occurs in nature as the minerals angelite; coeruleolactite; evansite; lucinite; metavariscite; sterretite; variscite; vashegyite; wavellite; zepharovicht. It is used as cement in admixture with calcium sulfate and sodium silicate, as a flux for ceramics, in dental cements, waterproofing concrete, as a flame retardant, as a catalyst in organic synthesis, and for special glasses. Aluminum phosphate is also used in cosmetics as an emollient, in pharmaceuticals, dyes, and for special glasses. It is also used in pharmaceutical applications as the gel or dried gel for relief stomach ailments such as heartburn or peptic ulcer pain, and in the control of excessive sweating. Grace uses of aluminum phosphate are largely limited to its catalyst businesses. Grace does not manufacture pure aluminum phosphate and does not isolate or store aluminum phosphate.

IV. Manufacturing Process

In a refinery, hydroprocessing or hydrotreating catalysts are used to remove contaminants such as sulfur from gasoline and diesel fuels. Hydroprocessing catalysts are solid alumina-based products that contain active metals, which are responsible for removal of the contaminants from fuels in the presence of hydrogen. The metals are incorporated into the alumina catalysts by creating liquid solutions of the active metals and soaking the solid catalysts in the solutions. In order for the catalysts to work efficiently, the metals must be very well distributed throughout the catalyst. The addition of phosphoric acid to the metals solutions improves the distribution of metals on the alumina catalyst. Aluminum phosphate is formed when the phosphoric acid reacts with alumina present in the catalyst.

In another refinery process step, the Fluid Catalytic Cracking (FCC) unit uses alumina-based catalysts and additives to produce transportation fuels such as gasoline and diesel as well as chemicals for plastics production. The amount of fuel or chemicals produced by the FCC unit is adjusted by the use of catalysts and additives. The addition of phosphoric acid to either alumina-based catalysts or additives stabilizes the active ingredients so they can better withstand the operating temperatures of the FCC process. Aluminum phosphate is formed when the phosphoric acid reacts with alumina present in the products.

V. Health Effects

Aluminum phosphate has no irritating effect on the eye, and is generally not irritating to the skin, although may cause mechanical irritation with dryness and abrasion. It is not a sensitizer to the skin or respiratory system, and based on reviewed data aluminum phosphate is not classified as an acute or chronic toxin however, a particulate filter respirator adapted to the airborne concentration of the substance should also be used to avoid inhalation of aluminum phosphate if present in solid form. Metal oxide smoke may be released if aluminum phosphate is heated above the decomposition temperature. These fumes could include phosphorus oxides therefore; care should be taken to avoid

exposing products containing aluminum phosphate to extreme heat. Aluminum phosphate is not listed as carcinogenic nor is it classified as a reproductive or mutagenic substance.

VI. Environmental Effects

Aluminum phosphate is not classified as an acute or chronic toxin to aquatic life or the environment. As an inorganic substance aluminum phosphate will not be biodegraded. Neither bioaccumulation nor biomagnification are considered to be environmental issues.

VII. Conclusions

Aluminum phosphate is not stored or used as an isolated material by Grace. It is present only in finished products that are manufactured under controlled industrial conditions. Because aluminum phosphate is manufactured in-situ and the products in which it is contained are handled and stored in closed systems potential exposure to the environment is expected to be very low. Furthermore, because Grace refinery customers are located in regulated industrial settings who also employ closed systems the risk of exposure to the general public is considered negligible.

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

ATSDR: Agency for Toxic Substances and Disease Registry, U.S. Dept. of Health and Human services, Public Health Service (2008), Toxicological Profile for Aluminum. http://www.atsdr.cdc.gov/hazdat.html.

European Chemicals Agency registered substances webpage: http://echa.europa.eu/web/guest/information-on-chemicals/registered-substances

National Center for Biotechnology Information, U.S. National Library of Medicine. Compound Summary for: Aluminum phosphate http://chem.sis.nlm.nih.gov/chemidplus/rn/7784-30-7

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