aspen aerogels

SAFETY DATA SHEET

Pyrogel ® XT

Revision Date: 05/22/09

1. IDENTIFICATION OF THE SUBSTANCE AND OF THE COMPANY

Product Name:	Pyrogel® XT
Synonyms:	Silica aerogel materials
Use of the Substance/Preparation:	High performance insulation material
Manufacturer: **Address:**	Aspen Aerogels, Inc. 30 Forbes Road Northborough, MA 01532
Telephone: **Email:**	**(508) 691-1111** **EHS@aerogel.com**
Emergency Telephone Number:	800-535-5053 US (INFOTRAC) 352-323-3500 International

2. HAZARDS IDENTIFICATION

Classification: Product is not classified as a dangerous material or preparation as defined in EC Directives 67/548/EEC or 1999/45/EC.

Emergency Overview: Inhalation of excessive amounts of dust from the product may cause mechanical irritation to the respiratory tract. Dermal contact may cause mechanical irritation.

POTENTIAL HEALTH EFFECTS

Inhalation: Inhalation of airborne dusts may cause mechanical irritation of the upper respiratory tract.

Eye Contact: Exposure to dust from this product can produce a drying sensation and mechanical irritation of the eyes.

Skin Contact: Skin contact with dust from this product can produce a drying sensation and mechanical irritation of the skin and mucous membranes.

Ingestion: This material is not intended to be ingested (eaten). If ingested in large quantity, the material may produce mechanical irritation and blockage

Acute Health Hazards: Dust from this product is a physical irritant, and may cause temporary irritation or scratchiness of the throat and / or itching and redness of the eyes and skin.

Chronic Health Hazards: In 2006, the International Agency for Research on Cancer (IARC) reclassified titanium dioxide as "possibly carcinogenic to humans" (Group 2B) based on animal experiments. In the draft Titanium Dioxide Monograph (Vol. 93), IARC concluded that the human carcinogenic studies "do not suggest an association between occupational exposure as it occurred in recent decades in western Europe and North America and risk of cancer." See Section 11 for a full discussion.

Medical Conditions Aggravated by Exposure: Excessive inhalation of dust may aggravate pre-existing chronic lung conditions including, but not limited to, bronchitis, emphysema, and asthma. Dermal contact may aggravate existing dermatitis.

CARCINOGENICITY

Component	ACGIH	NTP	IARC
Titanium Dioxide	A4	Not Listed	2B
Continuous Filament Glass Fibers	*A4*	*Not Listed*	*3*
Aluminum Trihydrate	Not Listed	Not Listed	None
Amorphous Silica	NA	Not Listed	None

SECTION 2 NOTES: This product is composed of synthetic amorphous silica dioxide. Amorphous silica should not to be confused with crystalline silica. Epidemiological studies indicate low potential for adverse health effects from exposure to synthetic amorphous silica.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS Number	Percent	EINECS Number	EU Classification
Methylsilylated Silica	68909-20-6	40-50	272-697-1	None
Fibrous glass (textile grade)	NA	40-50	Not Assigned	None
Titanium Dioxide	1317-80-2	1-5	236-675-5	None
Aluminum Trihydrate	21645-51-2	1-5	244-492-7	None

4. FIRST AID MEASURES

Eye Contact: Immediately wash with large amounts of water for at least 15 minutes, occasionally lifting lids. If irritation occurs and persists, get medical treatment.

Skin Contact: Wash skin thoroughly with soap and plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Obtain medical attention if symptoms occur.

Ingestion: Material will pass through the body normally.

Inhalation: Remove to fresh air. Drink water to clear throat and blow noise to remove dust. Obtain medical attention if ill effects persist.

5. FIRE-FIGHTING MEASURES

5.1 FLAMMABILITY PROPERTIES

Auto ignition Temperature	Not Applicable
Flash Point	Not Applicable
Flammability Limits: (Lower Explosive Limit)	Not Applicable
Flammability Limits: (Upper Explosive Limit)	Not Applicable

5.2 EXTINGUISHING MEDIA:

Use media suitable for surrounding fire and that are appropriate to the surrounding environment; normal fog nozzle water application and/or exclusion of air is typically suitable for extinguishing this product in blanket form.

5.3 PROTECTION FOR FIRE FIGHTERS

Special Fire Fighting Procedures: Normal fire fighting procedures should be followed to avoid inhalation of smoke and gases produced by a fire.

Unusual Fire and Explosion Hazards: Product is a super-insulation material. Rolls of material can retain heat within internal layers and re-ignite combustible materials if heat is not removed.

Hazardous Decomposition Products: Primary combustion products are carbon monoxide and carbon dioxide. Other undetermined products could be released in small quantities.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions: Minimize dust generation. Ensure adequate ventilation. Use personal protective equipment as necessary.

Environmental Precautions: Material is not soluble. Do not flush into surface water or sanitary sewer system.

Methods for Cleaning Up: Contain and collect released material for proper disposal. Dry vacuuming is the preferred method of cleaning up.

7. HANDLING AND STORAGE

Handling Aerogel blankets will generate dust when handled. Workplace exposure to all dusts should be controlled with standard industrial hygiene practices. Dry vacuuming is the preferred method for cleaning up dust. Because aerogel dust is hydrophobic, water is not effective as a dust control agent.

Storage Aerogel blankets should be kept in their packaging until they are ready to be used. Unpack the material in the work area. This will help to minimize the area where dust exposure may occur. Trimmed material and scrap should be promptly packed in disposal bags.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Exposure Limit Values

There are no exposure limits identified for the main product component, classified as synthetic amorphous silica.

CAS Number	Component Name	Exposure Limits	
7631-86-9	Silica, Amorphous	Germany TRGS 900	4 mg/m^3 (inhalable fraction)
		UK WEL	6 mg/m^3 (total inhalable fraction) 2.4 mg/m^3 (respirable fraction)
		US OSHA PEL (TWA)[a]:	15 mg/m^3 (total dust) 5 mg/m^3 (respirable fraction)
		US ACGIH[b]	10 mg/m^3 (inhalable) 3 mg/m^3 (respirable)
1317-80-2	Titanium Dioxide	Germany TRGS 900	1.5 mg/m^3 (respirable dust)
		UK WEL	10 mg/m^3 (total inhalable fraction) 4 mg/m^3 (respirable fraction)
		US OSHA PEL (TWA):	10 mg/m^3 (total dust) 5 mg/m^3 (respirable fraction)
		US ACGIH:	10 mg/m^3 (total dust)
21645-51-2	Aluminum Trihydrate	US OSHA PEL (TWA)[a]:	15 mg/m^3 (total dust) 5 mg/m^3 (respirable fraction)
		US ACGIH[b]	10 mg/m^3 (inhalable) 3 mg/m^3 (respirable)
NA	Continuous filament glass fibers	US ACGIH	1.0 fibers/cc[c] 5 mg/m^3 (inhalable)
		US OSHA	10 mg/m^3 (total dust) 5 mg/m^3 (respirable fraction)

[a] The US OSHA standard for amorphous silica is: (80 mg/m^3)/(%SiO2). The NIOSH Sampling Method 7501 for Amorphous Silica calculates the %SiO2 based on the percentage of crystalline silica in the sample. Because the percentage of crystalline silica in aerogel is 0%, the particulate limit applies.

[b] US ACGIH based on Particles Not Otherwise Specified (PNOS)

[c] Respirable fibers: length >5 µm; aspect ratio ≥3:1, as determined by the membrane filter method at 400–450X magnification (4-mm objective), using phase-contrast illumination. US NIOSLengthµm, width <3 µm diameter and length:width ratios ≥3.

8.2 Exposure Control

Ventilation: Local exhaust in accordance with general industrial hygiene practices is recommended to control dust.

Respiratory Protection: A properly fitted, NIOSH or CE approved respirator should be worn when ventilation is unavailable or inadequate to maintain airborne concentrations below applicable occupational exposure limits. A respiratory protection program that meets applicable local regulations should be implemented whenever workplace conditions warrant use of a respirator.

Hand Protection Silica aerogels are hydrophobic (repel water) and may cause drying and irritation of the skin, eyes, and mucous membranes. For this reason, nitrile, latex, or other impermeable gloves should be worn when handling aerogel blankets.

Eye Protection:	Safety glasses, or chemical goggles as needed to provide greater protection from dust.
Skin Protection:	Long-sleeved, long-legged work clothes are also advised. Disposable coveralls should be considered to minimize skin exposure and track out of aerogel dusts into adjacent areas.
Work Hygienic Practices	Keep materials packaged until just prior to use. Die cut in preference to rotary or other cutting methods. Dry vacuum with proper filtration preferred to sweeping. Wash thoroughly after using the product. Wash clothing if dust conditions present. Wash hands before eating or drinking.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Opaque yellow fabric blanket; material is hydrophobic (repels water)
Odor:	No characteristic odor. Under certain conditions, product may have faint ammonia-like odor.
pH:	Not applicable.
Boling Point/Range:	Not applicable.
Flash Point:	Not applicable.
Flammability (solid, gas):	Not applicable.
Explosive Properties:	Not applicable.
Oxidizing Properties:	Not applicable.
Vapor Pressure:	Not applicable.
Solubility:	Insoluble.
Viscosity:	Not applicable.
Evaporation Rate:	Not applicable

10. STABILITY AND REACTIVITY

Chemical Stability:	Stable
Conditions to Avoid:	Prolonged exposure to temperatures above the recommended use temperature. Avoid conditions that produce large quantities of dust dispersed in air.
Materials to Avoid:	Avoid strong acids and bases.
Hazardous Decomposition Products	Under recommended usage conditions, hazardous decomposition products are not expected. Hazardous decomposition products may occur as a result of oxidation, heating or reaction with another material.

11. TOXICOLOGICAL INFORMATION

ACUTE TOXICITY
Dust may cause mechanical irritation and dryness to eyes and skin.

Synthetic Amorphous Silica

Oral LD50:	>5,000 mg/kg
Inhalation LC50:	>2,000 mg/m^3
Dermal LD50:	>3,000 mg/kg
Eye Irritation:	Synthetic amorphous silica and silicates are not irritating to skin and eyes under experimental conditions, but may produce dryness following prolonged and repeated exposure.
Skin Irritation:	Synthetic amorphous silica and silicates are not irritating to skin and eyes under experimental conditions, but may produce dryness following prolonged and repeated exposure.

Titanium Dioxide

Oral LD50:	>5,000 mg/kg
Inhalation LC50:	>6,820 mg/m^3 (ALC/4 hour rat)
Dermal LD50:	>10,000 mg/kg (rabbit)
Eye Irritation:	Slight irritation
Skin Irritation:	Slight irritation

Aluminum Trihydrate

Oral LD50:	>5,000 mg/kg (rat)
Eye Irritation:	Slightly irritating
Skin Irritation:	Non-irritating

CHRONIC TOXICITY

Some studies of long term amorphous silica dust exposures indicate a potential for decreased lung function. In surveyed studies, this effect is characterized as compounded by smoking. Additionally, surveyed studies characterize the decreased lung function effect as reversible on discontinuation of exposure.

CARCINOGENICITY

In February 2006, the International Agency for Research on Cancer (IARC) reclassified titanium dioxide (TiO_2) to "possibly carcinogenic to humans" (Group 2B). This classification was based on *inadequate evidence* in humans and *sufficient evidence* in experimental animals. In the draft Titanium Dioxide Monograph (Vol. 93), IARC concluded that the human carcinogenic studies "do not suggest an association between occupational exposure as it occurred in recent decades in western Europe and North America and risk of cancer." The Group 2B for TiO_2 classification was based on three animal studies and four human studies.

US OSHA currently does not regulate titanium dioxide as a carcinogen (ref: OSHA Letter of Interpretation to North American Refractories Co, 11/19/97). The US National Institute for Occupational Safety & Health (NIOSH) currently recommends that titanium dioxide be considered a potential occupational carcinogen. NIOSH based this recommendation on a chronic inhalation study of rats exposed to 250 mg/m^3 of fine titanium dioxide. NIOSH presently is reviewing the available toxicity data on titanium dioxide, as well as other relevant health data associated with particle surface area, with the intent of developing new workplace recommendations for titanium dioxide, including recommended exposure limits (RELs). NIOSH has indicated that the tumorigenic effects of titanium dioxide do not appear to be chemical-specific or a direct action of the chemical substance itself. Rather, these effects appear to be a function of particle size and surface area acting through a secondary genotoxic mechanism associated with persistent inflammation. Titanium dioxide is **NOT** included in California's List of Chemicals Known to the State to Cause Cancer or Reproductive Toxicity dated December 19, 2008. The American Conference of Governmental Industrial Hygienists (ACGIH) considers titanium dioxide to be not classifiable as a human carcinogen (A4).

According to the manufacturer, the fiberglass in this product is considered textile grade fibrous glass and it is not classified as a carcinogen by ACGIH, IARC, NTP or OSHA.

The International Agency for Research on Cancer (IARC) considers synthetic amorphous silica to be not classifiable as to its carcinogenicity to humans (Group 3).

NOTE TO SECTION 11: Toxicological information is based on literature review for synthetic amorphous silica. Health information on Aluminum Trihydrate is based on manufacturer's safety data sheet.

12. ECOLOGICAL INFORMATION

Aquatic Toxicity

Synthetic Amorphous Silica	Fish: LC50 > 10,000 mg/L (Brachydanio rerio: 96 hour), Method OECD 203 Daphnia magna: EC50 > 10,000 mg/l (24 hours), Method OECD 202
Titanium Dioxide	Fish: LC50 > 1,000 mg/L (fathead minnow 96 hour)
Aluminum Trihydrate	Fish: LC50 > 10,000 mg/L

Mobility	None expected due to insoluble nature of product.
Persistence and Biodegradability	Not applicable for inorganic material.
Bioaccumulative Potential	None expected due to insoluble nature of product.
Other Adverse Effects	None expected.

NOTE TO SECTION 12: Ecological information is based on literature review for synthetic amorphous silica. Information on aluminum trihydrate based on manufacturer's information.

13. DISPOSAL CONSIDERATIONS

Dispose in an approved landfill in accordance with federal, state / provincial, and local regulation. Cover promptly to avoid blowing of dust. This product is not regulated as a hazardous waste under US RCRA regulations.

14. TRANSPORT INFORMATION

Shipping Name:	Not regulated for transport
Hazard Class	None
UN Number	None
Packing Group	None
Required Label(s)	None
Marine Pollutant	No
Additional Information	None

15. REGULATORY INFORMATION

EU REGULATORY INFORMATION
Product is not classified as a dangerous material or preparation as defined in EC Directives 67/548/EEC or 1999/45/EC. Aerogel insulation blankets are considered an article, not a substance or preparation, under the REACH directive.

U.S. FEDERAL REGULATIONS
CERCLA (Comprehensive Response Compensation and Liability Act): Product is not classified as hazardous or reportable under this requirement.

SARA TITLE III (Superfund Amendments and Reauthorization Act): Product is not classified as hazardous or reportable under this requirement.

311/312 HAZARD CATEGORIES: Materials in this product are classified as hazardous or reportable under this requirement.

313 REPORTABLE INGREDIENTS: Materials in this product are not classified as hazardous or reportable under this requirement.

TSCA: All chemical substances in this material are included on or exempted from listing on the TSCA Inventory of Chemical Substances.

STATE REGULATIONS: Materials in this product appear on the following state hazardous substance lists: CA, IN, KY, MA, MN, NC, NJ, OR, PA. Check individual state requirements.

CANADIAN REGULATIONS: All chemical substances in this product are included on or exempted from the Canadian Domestic Substance List (DSL). Amorphous silica (CAS No. 7631-86-9) is listed on the WHMIS Ingredient Disclosure List at a concentration threshold of 1 %. Titanium dioxide (CAS No. 1344-28-1) is listed at a concentration threshold of 0.1%.

16. OTHER INFORMATION

NFPA HAZARD CLASSIFICATION		HMIS HAZARD CLASSIFICATION	
Health	**1**	**Health**	**1**
Flammability	**0**	**Flammability**	**0**
Reactivity	**0**	**Reactivity**	**0**
Other	**N/A**	**Protection**	**Please refer to Section 8.**

Section 11 Titanium Dioxide Epidemiological References: 1) Fryzek JP, et. al. [2003]. A cohort study among titanium dioxide manufacturing workers in the United States. J Occup Environ Med 45:400-409. 2) Boffeta et. al. [2004]. Mortality among workers in the titanium dioxide production industry in Europe. Cancer Causes Control 15:697-706.

Synthetic Amorphous Silica Toxicity Information Reference: United Nations Environmental Programme (UNEP), Organization for Economic Cooperation & Development (OECD) Screening Information Data Set (SIDS) Initial Assessment Report, Synthetic Amorphous Silica, July 23, 2004.

Revision Summary: Revisions to Sections 2, 3, 5, 6, 7, 11, and 15.

DISCLAIMER: The information herein is presented in good faith and believed to be accurate as the effective data given. However, no warranty, expressed or implied, is given. It is the user's responsibility to ensure that its activities comply with Federal, State or Provincial, and local laws.