1. Product and Company Identification

Product Name: AeroVa™
Chemical Name: Trimethylated silica gel
Use of the Substance/Preparation: High performance insulation material, Biochemical carriers
Supplier: JIOS AEROGEL Corporation
531-14, Gajang-ro, Osan-si, Gyeonggi-do, Korea 447-210
Tel: +82 31 379 8700
Fax: +82 31 379 8788, 8799

2. Hazards Identification

Note to section 2: Hazard identification is based on literature review for synthetic amorphous silica (CAS No. 7631-86-9)

Hazard-Risk Classification
- Acute dermal toxicity: Category 5
- Acute Inhalation toxicity (Dusts and Mists): Category 4

Label elements including precautionary statements
Symbol:

Signal Word: Warning

Hazard-Risk Statement:
- H332: Harmful if inhaled.
- H313: May be harmful in contact with skin.

Precautionary Statement
*Prevention:
- P261: Avoid breathing dust.
- P271: Use only outdoors or in a well-ventilated area.

*Response:
- P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- P312: Call a poison center or doctor/physician if you feel unwell.

Other Hazard-Risk which is not included in the classification criteria

<table>
<thead>
<tr>
<th>NFPA HAZARD CLASSIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
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<table>
<thead>
<tr>
<th>HMIS HAZARD CLASSIFICATION</th>
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</thead>
<tbody>
<tr>
<td>Health</td>
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</table>
3. Composition/Information on Ingredients

<table>
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<tr>
<th>Chemical Name</th>
<th>Other Name</th>
<th>CAS Number</th>
<th>Content (%)</th>
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</thead>
<tbody>
<tr>
<td>trimethylated silica gel</td>
<td>Silica gel, trimethylsilated</td>
<td>7631-86-9</td>
<td>≥ 98</td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td>7732-18-5</td>
<td>&lt; 2</td>
</tr>
</tbody>
</table>

4. First Aid Measures

**Eye Contact:**
Flush eyes immediately with large amount of water for 15 minutes. If irritation occurs and persists, get medical treatment.

**Skin Contact:**
Remove contaminated clothing and shoes from skin and wash thoroughly with soap and water or waterless cleanser. Get medical attention if irritation or other ill effects develop or persist.

**Inhalation:**
If cough, shortness of breath or other breathing problems occur, move to fresh air. Seek medical attention if symptoms persist. If necessary, restore normal breathing through standard first aid measures.

**Ingestion:**
Do not induce vomiting. If conscious, give several glasses of water. Never give anything by mouth to an unconscious person. Material will pass through the body normally.

**Acute and Delayed Symptoms/Effects:**
Acute and Chronic high concentration of this material may cause irritation to eyes skin, Acute and Chronic high concentration of this material may cause irritation to eyes skin, respiratory tract and have an effect on Lung.  **Note:** See section 11 for toxicological information

**Indication of Immediate Medical Attention and Notes for Physician:**
Treat symptomatically.

5. Fire-Fighting Measures

**Suitable (and unsuitable) extinguishing media:**
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
On large fires, use dry chemical, foam or water spray. On small fires, use carbon dioxide (CO2), dry chemical or water spray. Water can be used to cool fire exposed containers.  **DO NOT USE** a solid water stream as it may scatter and spread fire.

**Specific hazards arising from the chemical**
**Specific Hazards:** Wear suitable protective equipment. In the event of fire, wear self-contained breathing apparatus.
**Hazardous Combustion Products:** Heating can release vapors which can be ignited.
Avoid temperatures above 250°C. The product is insoluble and floats on water. If possible, try to contain floating material.
Carbon monoxide, Carbon dioxide, Organic products of decomposition.
**Risk of Dust Explosion:** Dust may form explosive mixture in air. Take precautionary measures against static discharges.
Special protective equipment and precautions for fire-fighters
Self-contained breathing apparatus and protective clothing should be worn in fighting large fires involving chemicals. Use water spray to keep fire exposed containers cool. Determine the need to evacuate or isolate the area according to your local emergency plan.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures
Personal Precautions: Avoid dust formation. Ensure adequate ventilation. Remove all sources of ignition. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use personal protective equipment.

Protective equipment and emergency procedures
Eyes: Use full face respirator.
Skin: Wash at mealtime and end of shift. Wear protective clothing to minimize mechanical irritation.
Inhalation/Suitable Respirator: Respiratory protection recommended. Follow OSHA Respirator Regulations (29 CFR 1910.134) and use NIOSH/MHSA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection.
Note: These precautions are for room temperature handling. Use at elevated temperature or aerosol/spray applications may require added precautions.

Environmental precautions and protective procedures
The product is insoluble and floats on water. If possible, try to contain floating material. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained.

The methods of purification and removal
Remove possible ignition sources. Clean up promptly by vacuum. Sweep, mop or wipe up and contain for salvage or disposal. Fine powders may require special vacuum filters; damp mopping or washing is preferred. Pick up and transfer to properly labeled containers. Avoid dust formation.

7. Handling and Storage

Precautions for safe handling:
Dust may be harmful if inhaled. Avoid dust formation. Do not breathe dust. Provide appropriate exhaust ventilation at machinery and at places where dust can be generated. Avoid contact with skin and eyes. Keep away from heat and sources of ignition. Take precautionary measures against static discharge. All metal parts of the mixing and processing equipment must be earthed/grounded. Ensure all equipment is electrically earthed/grounded before beginning transfer operations.

Conditions for safe storage:
Keep containers tightly closed in a dry, cool and well-ventilated place. Keep in properly labeled containers. Do not store together with oxidizing materials and volatile chemicals as they may be adsorbed onto product.
8. Exposure Controls and Personal Protection

Control parameters (e.g. occupational exposure limit values, biological limit values):

**EXPOSURE LIMITS**
There are no exposure limits identified for this specific product. Exposure limits for silica are stated below. **Silica 7631-86-9**

- **Austria** MAK: 4 mg/m³ (TWA, Inhalable fraction)
- **Belgium** OEL: 10 mg/m³ (TWA, Inhalable fraction), 3 mg/m³ (TWA, Respirable fraction)
- **Germany** TRGS 900: 4 mg/m³ (TWA, Inhalable fraction), 10 mg/m³ (TWA, Inhalable fraction), 3 mg/m³ (TWA, Respirable fraction)
- **Italy**: OEL: 4 mg/m³ (TWA, Inhalable fraction), 10 mg/m³ (TWA, Inhalable fraction), 3 mg/m³ (TWA, Respirable fraction)
- **Netherlands** MAC: 10 mg/m³ (TWA, Inhalable fraction), 5 mg/m³ (TWA, Respirable fraction)
- **Norway**: 1.5 mg/m³ (TWA, Respirable fraction)
- **Spain**: 10 mg/m³ (TWA, Inhalable fraction), 3 mg/m³ (TWA, Respirable fraction)
- **Sweden**: 10 mg/m³ (TWA, Inhalable fraction), 5 mg/m³ (TWA, Respirable fraction)
- **UK**: WEL: 6 mg/m³ (TWA, Inhalable fraction), 2.4 mg/m³ (TWA, Respirable fraction)
- **US OSHA a PEL**: 15 mg/m³ (TWA, total dust), 5 mg/m³ (TWA, Respirable fraction)
- **ACGIH**: 10 mg/m³ (TWA, Inhalable fraction), 3 mg/m³ (TWA, Respirable fraction)

**Appropriate engineering controls:**
Provide appropriate exhaust ventilation at machinery and at places where dust can be generated. Ensure adequate ventilation to maintain exposures below occupational limits.

**Personal protective equipment:**

- **Respiratory protection**
  Use respiratory protection unless adequate local exhaust ventilation is provided or exposure assessment demonstrates that exposures are within recommended exposure guidelines. Suitable Respirator: Follow OSHA respirator regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators.

- **Eye/Face protection**
  Use proper eye/face protection - safety glasses with side-shields as a minimum.

- **Skin protection**
  Repeated exposure may cause skin dryness or cracking. Use protective skin cream before handling the product. Wear suitable gloves for hands and protective clothing for body. Remove and wash contaminated clothing before re-use. No special protective equipment required.

9. Physical and Chemical Properties

- **Appearance:** White Particles
- **Odour:** Odorless
- **Odour threshold:** Not determined.
- **pH:** Not applicable
- **Melting point/Freezing point:** 1700 °C after partial decomposition
- **Initial boiling point and boiling range:** 2230 °C after partial decomposition
- **Flash point:** > 482 °F / > 250 °C (Closed Cup)
- **Evaporation rate:** Not determined.
- **Flammability (solid, gas):** Not determined.
- **Upper/lower flammability or explosive limits:** Not determined.
- **Vapor pressure:** Not determined.
- **Solubility:** Insoluble
- **Vapor density:** Not determined.
- **Relative density:** Not determined.
- **Partition coefficient(n-octanol/water):** Not determined.(Floats on water; disperses in oil)
Auto-ignition temperature: 400°C
Decomposition temperature: Not determined.
Viscosity: Not determined.
Formula mass: Not determined.

10. Stability and Reactivity

Chemical stability: This product is stable.
Possibility of hazardous reactions: Hazardous polymerization does not occur.
Conditions to avoid (e.g. static discharge, shock or vibration, etc.):
Do not expose to temperature above 250°C. Avoid conditions where oxygen may condense in or around this product, as this will increase the flammability.
Incompatibility with various substances: Not available
Hazardous decomposition products:
Thermal breakdown of this product during fire or very high heat conditions may evolve the following decomposition products: Carbon oxides and traces of incompletely burned carbon compounds.

11. Toxicological Information

Note to section 11: Toxicological information is based on literature review for synthetic amorphous silica (CAS No. 7631-86-9)

Information on the likely routes of exposure
Inhalation:
Inhalation of airborne dusts may cause mechanical irritation of the upper respiratory tract.
Skin Contact:
Skin contact with dust from this product can produce a drying sensation and mechanical irritation of the skin and mucous membranes.
Eye Contact:
Exposure to dust from this product can produce a drying sensation and mechanical irritation of the eyes.

Delayed, acute and chronic toxic effect for short and long term exposure

<table>
<thead>
<tr>
<th>Effect</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute toxicity (Oral)</td>
<td>Not Classified</td>
</tr>
<tr>
<td></td>
<td>Rat LD50 &gt;5110 mg/kg, OECD TG 401 GLP</td>
</tr>
<tr>
<td>Acute toxicity (Dermal)</td>
<td>Category 5</td>
</tr>
<tr>
<td></td>
<td>Rabbit LD50 &gt; 2000 mg/kg</td>
</tr>
<tr>
<td>Acute toxicity (Inhalation-dust)</td>
<td>Category 4</td>
</tr>
<tr>
<td></td>
<td>Rat LC50 &gt;2.2mg/L</td>
</tr>
<tr>
<td>Skin Corrosion/ Irritation</td>
<td>Not classified</td>
</tr>
<tr>
<td></td>
<td>Not irritating (OECD Test Guidelines 404, GLP). Slightly hazardous in case of skin contact on human are not irritating to skin and eyes under experimental conditions.</td>
</tr>
<tr>
<td>Serious Eye Damage/ Irritation</td>
<td>Not classified</td>
</tr>
<tr>
<td></td>
<td>Not irritating (OECD Test Guidelines 405, GLP). Draize score 0.7/110, 24 hr. Non-irritating. Synthetic amorphous silica is not irritating to skin and eyes on human under experimental conditions.</td>
</tr>
</tbody>
</table>
Material Safety Data Sheet
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Respiratory sensitizer
Skin Sensitization
Not available
Not classified
A delayed contact hypersensitivity study
(Directive 84/449/EEC, B. 6) in guinea pigs utilizing the
Buehler technique was performed. Not-sensitizing

Carcinogenicity
Not classified
Negative findings in a rat carcinogenicity (up to 5 % in
the diet given to rats and mice)
Not listed by NTP, OSHA, ACGIH or EU.IARC: Group 3

Mutagenicity
Not classified
In vitro - Not mutagenic in Ames Test, chromosomal
aberration in Chinese hamster ovary (CHO) cells.
In vivo – Not mutagenic in cytogenetic assay.

Reproductive toxicity
Not classified
NOAEL>497 mg /kg bw/d
No evidence of adverse effects on reproduction
performance

Specific target organ toxicity
(single exposure)
Silica gel administered intratracheally resulted in no
fibrosis. The tissue reaction (peritoneal) to 11 types of
amorphous silica was examined and 3 types failed to
produce peritoneal fibrosis; 2 of these were dried
precipitated silica and 1 was dried silica gel.

Specific target organ toxicity
(repeated exposure)
Inhalation
Human effects: The potential clinical toxicology of
exposure to precipitated amorphous silica in 165
workers who had been exposed for an average of 8.6
years was studied. Serial pulmonary function values and
chest radiographs were not adversely affected by
long-term exposure to this dust.

Animal effects: NOAEL: 0.035 mg/L
(subchronic,13 weeks).
Mild reversible pro-inflammatory cell proliferation,
stimulation of collagen production, increase in lung
weight, incipient interstitial fibrosis, slight focal
atrophy in the olfactory epithelium.

Oral
Animal effects: NOAEL> 8%
(sub-chronic, 13 weeks)
No clinical signs and other findings.

Aspiration Hazard
Not available

12. Ecological Information

Note to section 12: Ecological information is based on literature review for synthetic amorphous
silica (CAS No. 7631-86-9).

Page : 6/9
Aquatic and terrestrial ecotoxicity: Not classified

Fish: 96hr LC50 > 10,000 mg/l (*Brachydano rerio*, OECD TG 203)
Water flea: 24hr EC50 > 10,000 mg/l (*Daphnia magna*, OECD TG 201)

Degradability
- Stability: Stable
- Degradability: The methods for determining biodegradability are not applicable to inorganic substances.

Bioaccumulative potential
- Biodegradable: Not applicable for inorganic material.
- Enrichment: Not applicable for inorganic material.

Mobility in soil: Insoluble. Not expected to migrate.

Other adverse effects: None expected.

13. Disposal Considerations

Disposition method
Can be burned in suitable incineration plants or disposed of in a suitable landfill in accordance with the regulations issued by the appropriate federal, provincial, state and local authorities.

Dispensation precaution

14. Transport Information

Not classified as dangerous in the meaning of transport regulations.

Shipping Name: Not regulated for transport
Hazard Class / UN Number / Packing Group / Required Label(s) / Marine Pollutant / Additional Information / DOT Road Shipment Information (49 CFR 172.101) / Ocean Shipment (IMDG) / Air Shipment (IATA): None

15. Regulatory Information

Hazard Classification
- Mexico - NOM-018-STPS-2000: Refer to HMIS Rating in Section 16.
- Canada - WHMIS Classification (CPR, SOR/88-66): Not controlled.

International Inventories:
This material is listed on or exempt from the following inventories:
- Australian Inventory of Chemical Substances (AICS) / Canadian Domestic Substances List (DSL) / European Inventory of Existing Commercial Chemical Substances (EINECS) / New Zealand Hazardous Substances and New Organisms Act (HSNO) / United States Toxic Substances Control Act (TSCA) Inventory: YES
- Chinese Inventory / Japanese Inventory of Existing and New Chemical Substances (ENCS) / Korean Existing Chemicals List (KECL) / Philippines Inventory of Chemicals and Chemical Substances

9/10 page
(PICCS): No

NOTE: The chemicals in this product may not be subject to notification in the following countries under an "article" exemption: Canada, Japan, Korea, New Zealand and Switzerland.
Material Safety Data Sheet  
(Trimethylated silica gel)

U.S. Federal Regulations
TSCA 12(b) Export Notification: This product does not contain any components that are subject to TSCA 12(b) Export Notification.

Clean Air Act Amendments of 1990 (CAA, Section 112, 40 CFR 82): This product does not contain any components listed as a Hazardous Air Pollutant, Flammable Substance, Toxic Substance, or Class 1 or 2 Ozone Depletory.

Clean Water Act (CWA, 40 CFR 116) Priority Pollutants: This product does not contain any listed Priority Pollutants.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, 40 CFR 302): This product does not contain any listed Hazardous Substances.

Superfund Amendments and Reauthorization Act, Title III (SARA): SARA Section 302 (40 CFR 355) Extremely Hazardous Substances: No components are listed as extremely hazardous chemicals under SARA Section 302. SARA Sections 311/312 (40 CFR 370) Hazard Category: This product does not meet any of the MSDS Requirement definitions for a hazardous material under SARA Sections 311/312. SARA Section 313 (40 CFR 372) Toxics Release Inventory: Does not contain any of the substances identified under Section 313 as toxic chemicals in excess of the minimum concentrations necessary to be subject to this rule.

Pharmaceutical Information: Not permitted U.S. State Regulations

California Proposition 65: This product does not contain any components listed on California Proposition 65.

US Coalition of North Eastern Governors (CONEG) Metals List: This product meets the CONEG Source Reduction Council limits for the sum of the levels of lead, cadmium, mercury and hexavalent chromium of less than 100 parts per million by weight.

EC Regulatory Information
Product is not a classified as a dangerous material or preparation as defined in EC Directives 67/548/EEC or 1999/45/EC and EU CLP.

16. Other Information

Information source and references
ECOTOX Database, EPA (http://cfpub.epa.gov/ecotox)
ECB-ESIS (European chemical Substances Information System) (http://ecb.jrc.it/esis)
International Uniform Chemical Information Database (IUCLID) (http://ecb.jrc.it/esis)
International Program on Chemical Safety (IPCS INCHEM) (http://www.inchem.org)
American Conference of Governmental Industrial Hygienists TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH, 2008, p. 35
United Nations Environmental Programme (UNEP)
Organization for Economic Co-operation and Development (OECD) Screening Information Data Set (SIDS) Initial Assessment Report, Synthetic Amorphous Silica, July 23, 2004

Prepared by: Corporation - Safety, Health and Environmental Affairs
Issuing date: 02/05/2011
Revision number and date: 2, 27/05/2013
Reason for revision: -
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