Date of Issue:

24 June 2014

**SAFETY DATA SHEET**

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| **1. Substance and Source Identification** |

**Product Identifier**

**SRM Number:** 699

**SRM Name:** Alumina (Reduction Grade)

**Other Means of Identification:** Not applicable.

**Recommended Use of This Material and Restrictions of Use**

This Standard Reference Material (SRM) is intended for use in the evaluation of chemical methods of analysis and in calibration of instrumental analyses. Each unit of SRM 699 consists of 60 g alumina powder of which 95 %passes a 74 µm (No. 200) sieve.

Company Information

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| National Institute of Standards and Technology |  |
| Standard Reference Materials Program |  |
| 100 Bureau Drive, Stop 2300 |  |
| Gaithersburg, Maryland 20899-2300 |  |
|  |  |
| Telephone: 301-975-2200 | Emergency Telephone ChemTrec: |
| FAX: 301-948-3730 | 1-800-424-9300 (North America) |
| E-mail: [SRMMSDS@nist.gov](mailto:SRMMSDS@nist.gov) | +1-703-527-3887 (International) |
| Website: <http://www.nist.gov/srm> |  |

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| **2. HAZARDS IDENTIFICATION** |

**Classification**

**Physical Hazard:** Not classified.

**Health Hazard:** Not classified.

**Label Elements**

**Symbol**

No symbol

**Signal Word**

No signal word.

**Hazard Statement(s)**

Not applicable.

**Precautionary Statement(s)**

Not applicable.

**Hazards Not Otherwise Classified:** Not applicable.

**Ingredients(s) with Unknown Acute Toxicity:** Not applicable.

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| **3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS** |

**Substance:** Alumina

**Other Designations:**

Alumina (alundum, aluminum oxide, dialuminum trioxide; aluminum sesquioxide; alpha-alumina; Al2O3)

Components are listed in compliance with OSHA’s 29 CFR 1910.1200. The material contains trace amounts of other oxide components; for the actual values see the Certificate of Analysis.

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| **Hazardous Component(s)** | **CAS Number** | **EC Number**  **(EINECS)** | **Nominal Mass Concentration  (%)** |
| Aluminum oxide | 1344-28-1 | 215-691-6 | >99 |

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| **4. FIRST AID MEASURES** |

**Description of First Aid Measures:**

**Inhalation:** If adverse effects occur, remove to uncontaminated area. If not breathing, give artificial respiration or oxygen by qualified personnel. Seek immediate medical attention.

**Skin Contact:** Wash skin with soap and water.

**Eye Contact:** Flush eyes with water for at least 15 minutes. If necessary, seek medical attention.

**Ingestion:** If adverse effects occur after ingestion, seek medical treatment.

**Most Important Symptoms/Effects, Acute and Delayed:** May cause eye, skin and respiratory irritation.

**Indication of any immediate medical attention and special treatment needed, if necessary:** If any of the above symptoms are present, seek medical attention if needed.

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| **5. FIRE FIGHTING MEASURES** |

**Fire and Explosion Hazards:** Negligible fire hazard. Avoid generating dust. See Section 9, “Physical and Chemical Properties” for flammability properties.

**Extinguishing Media:**

Suitable: Regular dry chemical, carbon dioxide, water, regular foam.

Unsuitable: None listed.

**Specific Hazards Arising from the Chemical:** None listed.

**Special Protective Equipment and Precautions for Fire-Fighters:** Avoid inhalation of material or combustion byproducts. Wear full protective clothing and NIOSH approved self-contained breathing apparatus (SCBA).

**NFPA Ratings** (0 = Minimal; 1 = Slight; 2 = Moderate; 3 = Serious; 4 = Severe)

Health = 1 Fire = 0 Reactivity = 0

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| **6. ACCIDENTAL RELEASE MEASURES** |

**Personal Precautions, Protective Equipment and Emergency Procedures:** Any accumulated material on surfaces should be removed and properly disposed of. Use suitable protective equipment; see Section 8, “Exposure Controls and Personal Protection”.

**Methods and Materials for Containment and Clean up:** Collect spilled material in appropriate container for disposal. Keep out of water supplies and sewers. Keep unnecessary people away, isolate hazard area and deny entry.

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| **7. HANDLING AND STORAGE** |

**Safe Handling Precautions:** Minimize dust generation and accumulation on surfaces. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. See Section 8, “Exposure Controls and Personal Protection”. Avoid contact with incompatible materials (see Section 10 “Stability and Reactivity”).

**Storage:** Store and handling in accordance with all current regulations and standards.

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| **8. EXPOSURE CONTROLS AND PERSONAL PROTECTION** |

| **Exposure Limits** | | | |
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| **Components** | **OSHA (PEL)** | **ACGIH (TLV)** | **NIOSH (REL)** |
| Aluminum oxide | TWA: 15 mg/m3 (total dust)  TWA: 5 mg/m3 (respirable fraction) | TWA: 1 mg/m3  (respirable fraction, related to Aluminum insoluble compounds) | No occupational exposure limits established. |

**Engineering Controls:** Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

**Personal Protection:** In accordance with OSHA 29 CFR 1910.132, subpart I, wear appropriate Personal Protective Equipment (PPE) to minimize exposure to this material.

**Respiratory Protection:** If workplace conditions warrant a respirator, a respiratory protection program that meets OSHA 29CFR 1910.134 must be followed. Refer to NIOSH 42 CFR 84 for applicable certified respirators.

**Eye/Face Protection:** Wear splash resistant safety goggles with a face shield. An eye wash station should be readily available near areas of use.

**Skin and Body Protection:** Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Chemical‑resistant gloves should be worn at all times when handling chemicals.

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| **9**. **Physical and Chemical Properties** |

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| **Descriptive Properties:** | **Alumina** |
| **Appearance (physical state, color, etc.)** | White to grey crystalline powder |
| **Molecular Formula** | Al2O3 |
| **Molar Mass (g/mol)** | 101.96 |
| **Odor** | odorless |
| **Odor threshold** | not available |
| **pH** | not available |
| **Evaporation rate** | not available |
| **Melting point/freezing point** | 2053 °C to 2072 °C (3727 °F to 3762 °F) |
| **Density:** | 3.965 g/cc |
| **Vapor Pressure** | 1 mmHg at 2158 °C |
| **Vapor Density (air = 1)** | not available |
| **Viscosity (cP)** | not available |
| **Solubility(ies)** | water: insoluble  slightly soluble: mineral acids, strong alkali practically insoluble: nonpolar organic solvents |
| **Partition coefficient (n-octanol/water)** | not available |
| **Particle Size** | 95 % <74 µm |
| **Thermal Stability Properties** |  |
| **Autoignition Temperature** | not available |
| **Thermal Decomposition** | not available |
| **Initial boiling point and boiling range** | 2980 °C (5396 °F) |
| **Explosive Limits, LEL (Volume %)** | not available |
| **Explosive Limits, UEL (Volume %)** | not available |
| **Flash Point** | not available |
| **Flammability (solid, gas)** | not available |

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| **10. Stability and Reactivity** |

**Reactivity:** Stable at normal temperatures and pressure.

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| **Stability:** | X | Stable |  | Unstable |

**Possible Hazardous Reactions:** None listed.

**Conditions to Avoid:** Avoid generating dust.

**Incompatible Materials:** Halo carbons, halogens, combustible materials, and oxidizing materials.

**Fire/Explosion Information:** See Section 5, “Fire Fighting Measures”.

**Hazardous Decomposition:** Thermal decomposition will produce miscellaneous compounds.

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| **Hazardous Polymerization:** |  | Will Occur | X | Will Not Occur |

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| **11. TOXICOLOGICAL INFORMATION** |

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| **Route of Exposure:** | X | Inhalation | X | Skin |  | Ingestion |

**Symptoms Related to the Physical, Chemical and Toxicological Characteristics:** This material may aggravate respiratory disorders.

**Potential Health Effects (Acute, Chronic, and Delayed)**

**Inhalation:** Inhalation of high concentrations may cause coughing, shortness of breath, respiratory tract irritation due to mechanical action, unpleasant deposits in the nasal passages, and exacerbation of symptoms in persons with impaired pulmonary function.

**Skin Contact:** Contact may cause an irritant dermatitis accompanied by pruritis.

**Eye Contact:** Dust may cause mechanical irritation with redness and possibly swelling of the conjunctiva.

**Ingestion:** Chronic ingestion of aluminum compounds cause constipation.

**Numerical Measures of Toxicity**

**Acute toxicity:** Not classified.

Rat, Oral LD50: >5 000 mg/kg

**Skin corrosion/irritation:** No data available.

**Serious eye damage/eye irritation:** No data available.

**Respiratory sensitization:** No data available.

**Skin sensitization:** No data available.

**Germ Cell Mutagenicity:** No data available.

**Carcinogenicity:** Not classified

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| **Listed as a Carcinogen/Potential Carcinogen** |  | **Yes** | X | **No** |

Alumina is not listed by OSHA, IARC or NTP as carcinogens/potential carcinogens.

Tumorigenic: Implant, Rat TDLo: 200 mg/kg

**Reproductive Toxicity:** No data available.

**Specific Target Organ Toxicity, Single Exposure:** No data available.

**Specific Target Organ Toxicity, Repeated Exposure:** No data available.

**Aspiration hazard:** Not applicable.

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| **12. ECOLOGICAL INFORMATION** |

**Ecotoxicity Data:** No data available.

**Persistence and Degradability:** No data available.

**Bioaccumulative Potential:** No data available.

**Mobility in Soil:** No data available.

**Other Adverse effects:** No data available.

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| **13. DISPOSAL CONSIDERATIONS** |

**Waste Disposal:** Dispose of waste in accordance with all applicable federal, state, and local regulations.

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| **14. TRANSPORTATION INFORMATION** |

**U.S. DOT and IATA:** Not regulated by DOT or IATA.

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| **15. REGULATORY INFORMATION** |

**U.S. Regulations:**

CERCLA Sections 102a/103 (40 CFR 302.4): Not regulated.

SARA Title III Section 302 (40 CFR 355.30): Not regulated.

SARA Title III Section 304 (40 CFR 355.40): Not regulated.

SARA Title III Section 313 (40 CFR 372.65): Not regulated.

OSHA Process Safety (29 CFR 1910.119): Not regulated.

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

ACUTE HEALTH: No

CHRONIC HEALTH: Yes

FIRE: No

REACTIVE: No

PRESSURE: No

**State Regulations:**

California Proposition 65: Not listed.

**U.S. TSCA Inventory:** Alumina is listed.

**TSCA 12(b), Export Notification:** Not listed.

**Canadian Regulations:** WHMIS Information is not provided for this material.

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| **16. OTHER INFORMATION** |

**Issue Date:** 24 June 2014

**Sources:** ChemADVISOR, Inc., MSDS, *Aluminum Oxide,* 21 March 2014.

**Key of Acronyms:**

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| ACGIH | American Conference of Governmental Industrial Hygienists | NRC | Nuclear Regulatory Commission |
| ALI | Annual Limit on Intake | NTP | National Toxicology Program |
| CAS | Chemical Abstracts Service | OSHA | Occupational Safety and Health Administration |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act | PEL | Permissible Exposure Limit |
| CFR | Code of Federal Regulations | RCRA | Resource Conservation and Recovery Act |
| DOT | Department of Transportation | REL | Recommended Exposure Limit |
| EC50 | Effective Concentration, 50 % | RM | Reference Material |
| EINECS | European Inventory of Existing Commercial Chemical Substances | RQ | Reportable Quantity |
| EPCRA | Emergency Planning and Community Right-to-Know Act | RTECS | Registry of Toxic Effects of Chemical Substances |
| IARC | International Agency for Research on Cancer | SARA | Superfund Amendments and Reauthorization Act |
| IATA | International Air Transportation Agency | SCBA | Self‑Contained Breathing Apparatus |
| IDLH | Immediately Dangerous to Life and Health | SRM | Standard Reference Material |
| LC50 | Lethal Concentration, 50 % | STEL | Short Term Exposure Limit |
| LD50 | Lethal Dose, 50 % | TLV | Threshold Limit Value |
| LEL | Lower Explosive Limit | TPQ | Threshold Planning Quantity |
| MSDS | Material Safety Data Sheet | TSCA | Toxic Substances Control Act |
| NFPA | National Fire Protection Association | TWA | Time Weighted Average |
| NIOSH | National Institute for Occupational Safety and Health | UEL | Upper Explosive Limit |
| NIST | National Institute of Standards and Technology | WHMIS | Workplace Hazardous Materials Information System |

**Disclaimer:** Physical and chemical data contained in this SDS are provided only for use in assessing the hazardous nature of the material. The SDS was prepared carefully, using current references; however, NIST does not certify the data in the SDS. The certified values for this material are given in the NIST Certificate of Analysis.

Users of this SRM should ensure that the SDS in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail srmmsds@nist.gov; or via the Internet at http://www.nist.gov/srm.