1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND THE COMPANY/UNDERTAKING

1.1 PRODUCT IDENTIFIER

- **Product Name**: CALCINED ALUMINA (GROUND AND UNGROUND)
- **Technical Name**: Aluminum Oxide, Alumina
- **Synonyms**: All AC*** Calcined Aluminas, AO-104
- **REACH Registration No.**: Registered – Registration number may be requested

1.2 RELEVANT IDENTIFIED USES OF THE SUBSTANCE OR MIXTURE AND USES ADVISED AGAINST

- **Recommended Uses**: Ceramics, Refractories, Polishing Agents, Fillers
- **Uses not recommended**: Avoid use with ethylene oxide or chlorine trifluoride

1.3 DETAILS OF THE SUPPLIER OF THE SAFETY DATA SHEET

- AluChem, Inc.
  - 1 Landy Lane, Reading, OH 45215, USA
  - +1 513 733 8519

- AluChem of Jackson, Inc.
  - 14782 Beaver Pike, Jackson, OH 45640, USA
  - +1 740 286 2455

- AluChem of Little Rock, LLC
  - 10500 Arch Street Pike, Little Rock, AR 72206, USA
  - +1 501 486 9106

1.4 EMERGENCY TELEPHONE NUMBER

- AluChem, Inc. +1 513 733 8519 (Monday – Friday; 8AM – 5PM EST)

2. HAZARDS IDENTIFICATION

2.1 CLASSIFICATION OF THE SUBSTANCE OR MIXTURE

These products are **not** classified as dangerous according to Regulation (EC) No. 1272/2008
These products are **not** classified according to EU Directives 67/548/EEC or 1999/45/EC
These products are **not** listed by NTP, IARC or regulated by OHSA as a carcinogen
These products are **not** classified as dangerous substances or mixtures according to the Globally Harmonized System (GHS)
2.2 LABEL ELEMENTS

Symbol(s)  None
Signal Word None
Hazard Statements  None
Precautionary Statements
P261 – Avoid breathing dust / fumes / gas / mist / vapors / spray
P280 - Wear eye protection / face protection
P285 - In case of inadequate ventilation wear respiratory protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, If present and easy to do. Continue rinsing.
P302 + P352 – IF ON SKIN – Wash with soap and water

2.3 OTHER INFORMATION

Prolonged or excessive contact may cause irritation of the respiratory tract.

3 COMPOSITION/INFORMATION ON INGREDIENTS

3.1 SUBSTANCES

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No</th>
<th>EINECS</th>
<th>Weight(%)</th>
<th>REACH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Oxide</td>
<td>1344-28-1</td>
<td>215-691-6</td>
<td>&gt;99</td>
<td>Registered</td>
</tr>
<tr>
<td>(Non-Fibrous)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4 FIRST AID MEASURES

4.1 DESCRIPTION OF FIRST AID MEASURES

EYE CONTACT  Intensive rinsing with water. Consult physician if necessary
SKIN CONTACT Wash skin with soap and water
INHALATION Move to fresh air. Consult a physician if necessary
INGESTION Rinse mouth with plenty of water. Seek medical advice.

4.2 MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED
No information is currently available

4.3 INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED
Treat symptomatically

5 FIRE-FIGHTING MEASURES

5.1 EXTINGUISHING MEDIA
Suitable Extinguishing Media  Product itself is non-combustible. Use extinguishing media appropriate to the source of the fire.
Unsafe Extinguishing Media  None

5.2 SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE
None
5.3 ADVICE FOR FIREFIGHTERS
Firefighters should use self-contained breathing apparatus (SCBA) and full protective gear.

6 ACCIDENTAL RELEASE MEASURES

6.1 PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES
Avoid dust formation. In case of exposure to high levels of airborne dust, wear a personal respirator in compliance with and approved by appropriate governmental regulations and authorities.

6.2 ENVIRONMENTAL PRECAUTIONS
No special environmental precautions are required.

6.3 METHODS AND MATERIALS FOR CONTAINMENT AND CLEANING UP
Recover product and place into appropriate containers for disposal or recycling.
Preferable method is by using a vacuum device, if available, otherwise by broom and shovel.

7 HANDLING AND STORAGE

7.1 PRECAUTIONS FOR SAFE HANDLING
Avoid dust formation. Use adequate ventilation when dust is present.

7.2 CONDITIONS FOR SAFE STORAGE, INCLUDING ANY COMPATABILITIES
Keep material dry and in closed containers when possible.
Material is incompatible with ethylene oxide and chlorine trifluoride.

7.3 SPECIFIC END USE(S)
See section 1.2

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 CONTROL PARAMETERS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>OSHA PEL</th>
<th>ACGIH (TLV-TWA)</th>
<th>MEXICO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Oxide (non-fibrous) (1344-28-1)</td>
<td>= 15 mg/m³ TWA</td>
<td>= 1 mg/m³ respirable fraction as Aluminum</td>
<td>= 10 mg/m³ TWA LMPE-PPT</td>
</tr>
<tr>
<td></td>
<td>total dust</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>= 5 mg/m³ TWA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Respirable fraction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Derived No Effect Level (DNEL)*
3 mg/m³, respirable, 8 hour TWA

*Predicted No Effect Concentration (PNEC)*
No information available

8.2 EXPOSURE CONTROLS

*Engineering Controls:* Use adequate ventilation in confined spaces.

*Personal Protective Equipment*

*Eye Protection* Safety glasses with full side shields. When air turbulence may be present, safety goggles should be worn.
Skin Protection
Wear long sleeve shirts to avoid skin irritation or injury.

Hand Protection
Protective gloves are recommended.

Respiratory Protection
Avoid inhaling the dust. In case of concentrations above the exposure limits, suitable certified respirator must be worn.

Hygiene Measures
Do not eat, drink or smoke when handling

Environmental Exposure Controls
Avoid dust formation.

9 PHYSICAL AND CHEMICAL PROPERTIES

Physical State
Granular, powder
Color
White
Odor
None
pH (20°C)(10g/100ml)
8 – 10
Solubility in Water
0.00002 g/l at 20°C
Density
3.4 – 3.9 g/cm³
Bulk Density
600 – 1250 kg/m³
Vapor Pressure
Not applicable
Boiling Point
2980°C
Melting Point
2050°C
Flash Point
None
Flammability
Not flammable
Auto Ignition
Does not ignite
Explosive Properties
Non explosive
Thermal decomposition
Does not occur

10 STABILITY AND REACTIVITY

10.1 Reactivity
None under normal processing

10.2 Chemical Stability
Stable under normal conditions

10.3 Possibility of Hazardous Reactions
None under normal processing

10.4 Conditions to Avoid
None under normal processing

10.5 Incompatible Materials
Ethylene oxide and chlorine trifluoride

10.6 Hazardous Decomposition
None under normal processing

11 TOXICOLOGICAL DATA

11.1 INFORMATION ON TOXICOLOGICAL EFFECTS
Acute Toxicity
Oral
LD50 => 5000mg/kg bw (rat)

Dermal
Conclusive but not sufficient for classification

Inhalation
LC50 = 7.6mg/l (rat)
SAFETY DATA SHEET
Calcined Alumina

Date of Preparation: 1 JUN 2015
SDS No. 101
Review Date: 21 JUN 2018

Skin Corrosion  Not corrosive (rabbit)
Skin Irritation  Not irritating (rabbit)

Chronic Toxicity
Irritation  Conclusive but not sufficient for classification
Corrosivity  Conclusive but not sufficient for classification
Sensitization  Conclusive but not sufficient for classification
Mutagenic Effects  Conclusive but not sufficient for classification
Carcinogenic Effects  Not classified as a human carcinogen – ACGIH – A4
Reproduction Effects  Conclusive but not sufficient for classification
Developmental Effects  Conclusive but not sufficient for classification
Aspiration Hazards  Conclusive but not sufficient for classification

11.2 ADDITIONAL INFORMATION
RTECS NO. BD1200000

12 ECOLOGICAL INFORMATION

12.1 TOXICITY

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Species</th>
<th>Type</th>
<th>Test Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish Toxicity</td>
<td>LC50 &gt; 100 mg/l</td>
<td>Salmo trutta</td>
<td>acute</td>
<td>aluminum oxide</td>
</tr>
<tr>
<td>Invertebrate Toxicity</td>
<td>EC50 &gt; 100 mg/l</td>
<td>Daphnia Magna</td>
<td>acute</td>
<td>aluminum oxide</td>
</tr>
<tr>
<td>Algae Toxicity</td>
<td>EC50 &gt; 100 mg/l</td>
<td>Selenastrum Capricornutum</td>
<td>acute</td>
<td>aluminum oxide</td>
</tr>
</tbody>
</table>

12.2 PERSISTANCE AND DEGRADABILITY
Not applicable for inorganic substances.

12.3 BIOCUMULATIVE POTENTIAL
No relevant information available

12.4 MOBILITY IN SOIL
No relevant information available

12.5 RESULTS OF PBT AND vPvB ASSESSMENT
As a result of the PBT/vPvB assessment it was determined that this product does not meet the criteria for classification as PBT/vPvB

12.6 OTHER ADVERSE EFFECTS
None known.

13 DISPOSAL CONSIDERATIONS

13.1 WASTE TREATMENT METHODS
Collect in containers or covered dumpsters. If reuse or recycling is not possible material may be disposed of in an industrial landfill in accordance with local regulations and restrictions.

Empty containers should be emptied entirely and taken for recycling, recovery or waste disposal in accordance with local regulations and restrictions.
13.2 RCRA STATUS

If discarded in its purchased form, this product would not be a hazardous waste either by listing or characteristic nor is it federally (USA) regulated. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal whether a material containing the product or derived from the product should be classified as a hazardous waste (40 CFR 261.20-24 or state equivalent in the USA).

14 TRANSPORT INFORMATION

14.1 UN NUMBER Not Regulated
14.2 UN PROPER SHIPPING NAME Not Regulated
14.3 TRANSPORT REGULATIONS
   DOT (US) Not regulated
   IMDG/IMO Not regulated
   RID Not regulated
   ADR Not regulated
   ICAO Not Regulated
   IATA Not Regulated
14.4 HTSUS CODE 2818.20.0000 (US)

15 REGULATORY INFORMATION

15.1 SAFETY, HEALTH AND ENVIRONMENTAL REGULATIONS/LEGISLATION SPECIFIC FOR THE SUBSTANCE

International Inventories

<table>
<thead>
<tr>
<th>Inventory</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSCA</td>
<td>Listed</td>
</tr>
<tr>
<td>DSL</td>
<td>Listed</td>
</tr>
<tr>
<td>NDSL</td>
<td>Not Listed</td>
</tr>
<tr>
<td>EINECS</td>
<td>Listed</td>
</tr>
<tr>
<td>ELINCS</td>
<td>Not Listed</td>
</tr>
<tr>
<td>IECSC</td>
<td>Listed</td>
</tr>
<tr>
<td>KECL</td>
<td>KE-01012</td>
</tr>
<tr>
<td>PICCS</td>
<td>Listed</td>
</tr>
<tr>
<td>AICS</td>
<td>Listed</td>
</tr>
<tr>
<td>MITI</td>
<td>Listed</td>
</tr>
<tr>
<td>ENCS</td>
<td>1-23</td>
</tr>
<tr>
<td>IECSC</td>
<td>Listed</td>
</tr>
</tbody>
</table>

Legend

TSCA – United States Toxic Substances Control Act Section 8(b) Inventory
DSL – Canadian Domestic Substances List
NDSL – Canadian Non-Domestic Substances List
EINECS – European Inventory of Existing Commercial Chemical Substances
ELINCS – European List of Notified Commercial Chemical Substances
IECSC – China Inventory of Existing Chemical Substances
KECL – Korean Existing and Evaluated Chemical Substances
PICCS – Philippines Inventory of Chemicals and Chemical Substances
AICS – Australian Inventory of Chemical Substances
15.2 COUNTRY/LOCAL SPECIFIC REGULATIONS

US Federal Regulations:
- OSHA Classification – Nonhazardous
- TSCA Chemical Inventory Status: All components of this product are listed.
- CERCLA Reportable Quantity: None.
- SARA Title III:
  - Section 302 Extremely Hazardous Substances: None.
  - Section 304 Emergency Release Reporting: None.
  - Section 311/312 Hazardous Categories: Immediate (acute).
  - Section 313 Toxic Categories: None.
- Clean Air Act of 1990 – Title VI: This material does not contain nor was it manufactured using ozone depleting chemicals.

US State and Regional Regulations:
- California Proposition 65: Not listed.
- Cal-OSHA Workplace Airborne Contaminant: Listed.
- Coalition of Northeast Governors (CONEG) – Toxics in Packaging Clearinghouse (TPCH): Compliant
- Idaho Air Contaminant: Listed.
- Illinois Toxic Substances Disclosure to Employees List: Listed.
- Massachusetts Right to Know List: Listed.
- Massachusetts Hazardous Substance Code: F9
- Minnesota Hazardous Substance List: Listed. Code: A Carcinogen: No
- New Jersey Right to Know List: Listed – Substance No. 2891
- Pennsylvania Right to Know List: Listed.
- Pennsylvania Hazardous Substance List (Chapter 323 Appendix A): Listed Code: E
- Rhode Island Hazardous Substance List: Listed.
- Texas Air Contaminant with Health Effects Screening Level: Listed (as a synonym)
- Washington Air Contaminant: Listed – limit TWA 10 mg/m³

Canadian Regulations:
- WHMIS Classification: Not a controlled product.
- DSL (Domestic Substance List): All components of this product are listed on the DSL.
- NPRI (National Pollutant Release Inventory): Not subject to mandatory reporting requirements.
- IDL (Ingredient Disclosure List): All components of this product are listed on the IDL.
- Canadian Hazard Symbol: Not applicable.
- Note: This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (Canada) and this SDS contains all the information required by the Controlled Products Regulations (Canada).

European Union
- Regulation (EC) No 2037/2000 (Ozone Depleting Substances) Not listed
- Regulation (EC) No 850/2004 (PERSISTANT ORGANIC POLLUTANTS) Not listed
- Regulation (EC) No 689/2008 (Export and Import of Dangerous Substances) Not listed
- Directive 2002/95/EC (RoHS) Compliant
- Restrictions according to Title VIII of the Regulation (EC) No 1907/2008 (REACH) None
15.3 CHEMICAL SAFETY ASSESSMENT
A chemical safety assessment has been carried out

16 OTHER INFORMATION

16.1 HAZARD RATINGS

<table>
<thead>
<tr>
<th>NFPA® Ratings:</th>
<th>Health:</th>
<th>Flammability:</th>
<th>Reactivity:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HMIS® III Codes:</th>
<th>Health:</th>
<th>Flammability:</th>
<th>Physical Hazard:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

This safety data sheet complies with the requirements of the United Nations’ (UN) Globally Harmonized System of Classification and Labeling of Chemicals (GHS) as defined in Annex 4 and the United States Occupational Health and Safety Administration (OSHA) Hazard Communication Standard (HCS)

Prepared By: Technical Services Department
AluChem, Inc.
1 Landy Lane
Reading, OH 45215
USA
+1-513-354-3667

Preparation Date: 1-Jun-2015
Revision/Review Date: 21-Jun-2018
Revision Summary: Revision 6, Jul 2013
All Sections revised and re-written to conform to GHS and HCS guidelines

Disclaimer:

Information presented herein has been compiled from sources considered to be dependable and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. It is the user’s responsibility to determine for themselves the suitability of any material for a specific purpose whether alone or in combination with any other products, and to adopt such safety precautions as may be necessary. This shall in no way establish a legally valid contractual relationship.
SAFETY DATA SHEET
Calcined Alumina

Date of Preparation: 1 JUN 2015
SDS No. 101
Review Date: 21 JUN 2018

LEGEND:

ACGIH  American Conference of Governmental Industrial Hygienists
ADR    European Agreement Concerning the International Carriage of Dangerous Goods by Road
CAS    Chemical Abstract Service
CEPA   Canadian Environmental Protection Act
CERCLA Comprehensive Environmental Response, Compensation and Liability Act
CFR    United States Code of Federal Regulations
CPR    Cardio-pulmonary Resuscitation
DOT    United States Department of Transportation
DSL    Canadian Domestic Substances List
EINECS European Inventory of Existing Commercial Chemical Substances
EPA    United States Environmental Protection Agency
GHS    United Nations’ Globally Harmonized System of Classification and Labeling of Chemicals
HCS    United States Occupational Safety and Health Administration’s (OSHA) Hazard Communication Standard
IDL    Canadian Ingredient Disclosure List
IARC   International Agency for Research on Cancer
IATA   International Air Transport Association
IATA-DRG International Air Transport Association – Dangerous Goods Regulations
ICAO   International Civil Aviation Organization
ICAO-TI International Civil Aviation Organization – Technical Instructions on the Safe Transport of Dangerous Goods by Air
IMDG   International Maritime Dangerous Goods Code
IMO    International Maritime Organization
LMPE-PPT Limite Maximo Permissible de Exposicion Promedio Ponderado en Tiempo
NDSL   Canadian Non-domestic Substances List
NIOSH  National Institute for Occupational Safety and Health (USA)
NTP    National Toxicology Program (USA)
OEL    Occupational Exposure Limit
OSHA   United States Occupational Health and Safety Administration
PBT/vPvB Persistant, Bioaccumulative and Toxic / Very Persistant and Very Bioaccumulative
PEL    Permissive Exposure Limits
PIN    Product Identification Number
PPE    Personal Protective Equipment
RCRA   Resource Conservation and Recovery Act (USA)
REACH  Registration, Evaluation, Authorization and Restriction of Chemicals (EU)
RID    European Agreement Concerning the International Carriage of Dangerous Goods by Rail
RTECS  The Registry of Toxic Effects of Chemical Substances
SARA   Superfund Amendments and Reauthorization Act (USA)
TDGR   Transportation of Dangerous Goods Regulations
TLV    Threshold Limit Values
TSCA   Toxic Substances Control Act (USA)
TWA    Time Weighted Average

cm = centimeter, m = meter, g = gram, kg = kilogram, ml = milliliter, l = liter, > = greater than,
< = less than, bw = body weight

END OF SDS SHEET