Safety Data Sheet for GetterMax® 133

1. IDENTIFICATION

PRODUCT: GetterMax® 133 Copper Zinc Oxide Catalyst for Gas and Liquid Purification as Oxygen Getter etc.

COMPANY: Research Catalysts, Inc.

16791 Carrol Lane
Willis, TX 77378 USA
Phone: 936-856-3600
Fax: 866-730-6925

24-hour Emergency Response Line: 281-935-8123

RECOMMENDED USE: Removal of O₂ from gases or liquids (following activation)

RESTRICTIONS ON USE: Do not use on process fluids containing greater than 1 mol% O₂, or a combination of 2 mol% or more of H₂ with an equal or higher concentration of olefins, dienes and/or acetylenes, as such conditions can lead to an unsafe rise in temperature.

2. HAZARDS IDENTIFICATION

CLASSIFICATION OF THE PRODUCT

Aquatic Acute 1 Hazardous to the aquatic environment – acute
Aquatic Chronic 1 Hazardous to the aquatic environment – chronic

LABEL ELEMENTS

Signal Word: Warning
Hazard Statement:
H410 Very toxic to aquatic life with long-lasting effects.

Precautionary Statements (Prevention):
P273 Avoid release to the environment.

Precautionary Statements (Response):
P391 Collect spillage.

Precautionary Statements (Disposal):
P501 Dispose of contents/container to hazardous or special waste collection point.

Hazards not otherwise classified

No specific dangers known, if regulations/guidelines for storage and handling are followed.

Emergency Overview

CAUTION:
- May be harmful if swallowed in large quantities.
- Contact with powders or dust may irritate the eyes, skin and respiratory tract.
- Prolonged or repeated exposure to dust may cause pulmonary problems.

3. COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS Number</th>
<th>Content (wt%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper Oxide</td>
<td>1317-38-0</td>
<td>Proprietary</td>
</tr>
<tr>
<td>Zinc Oxide</td>
<td>1314-13-2</td>
<td>Proprietary</td>
</tr>
<tr>
<td>Aluminum Oxide</td>
<td>1344-28-1</td>
<td>Proprietary</td>
</tr>
<tr>
<td>Graphite</td>
<td>7782-42-5</td>
<td>&lt; 5%</td>
</tr>
<tr>
<td>Moisture</td>
<td>7732-18-5</td>
<td>&lt; 5%</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

INHALATION:
Remove immediately from contaminated atmosphere into fresh air. If breathing is difficult, give artificial respiration or administer oxygen.

SKIN CONTACT:
Wash with soap and water immediately after exposure.

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EYE CONTACT:
Flush eyes thoroughly with water for at least 15 minutes. Get medical attention.

INGESTION:
Rinse mouth and then drink plenty of water. Induce vomiting unless victim is unconscious or having convulsions. Get medical attention.

MOST IMPORTANT SYMPTOMS AND EFFECTS:
Symptoms: skin eruptions, itching, hemolytic anemia

5. FIRE-FIGHTING MEASURES

FLAMMABILITY:
Does not ignite.

EXTINGUISHING MEDIA:
Use media suitable for surrounding environment (water; dry extinguishing media; foam; carbon dioxide).

HAZARDS DURING FIRE-FIGHTING: No particular hazards known.

NFPA Hazard Codes:
Health: 2 Fire: 0 Reactivity: 0 Special:

FURTHER INFORMATION:
Product itself is non-combustible. Dispose of fire debris and contaminated extinguishing water in accordance with applicable regulations.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES:
Avoid dust formation. Do not breathe dust avoid contact with skin, eyes and clothing. Use personal protective clothing. See Section 8 regarding personal protective measures.

ENVIRONMENTAL PRECAUTIONS:
Do not discharge into drains/surface waters/groundwater. Contain contaminated water/firefighting water.

CLEAN-UP OF SPILLS:
Spills should be swept up and placed in appropriate containers for disposal.

7. HANDLING AND STORAGE
HANDLING:
Use the recommended Personal Protective Equipment (dust mask, eye protection, etc.). Do not breathe dust. Avoid contact with eyes, skin and clothing. Ensure adequate ventilation.

STORAGE:
Suitable for storage in general chemical storage area. Containers should be kept tightly sealed, and stored in a cool, dry place.
Suitable material for containers: low density polyethylene (LDPE), stainless steel, glass, high density polyethylene (HDPE), carbon steel.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

COMPONENTS WITH WORKPLACE CONTROL PARAMETERS

<table>
<thead>
<tr>
<th>Component</th>
<th>OSHA</th>
<th>ACGIH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum oxide</td>
<td>PEL 5 mg/m3</td>
<td>TWA value 10 mg/m3</td>
</tr>
<tr>
<td></td>
<td>PEL 15 mg/m3</td>
<td>TWA 5 mg/m3 Respirable fraction</td>
</tr>
<tr>
<td>Copper oxide</td>
<td>PEL 1 mg/m3</td>
<td>TWA value 15 million particles/ft3</td>
</tr>
<tr>
<td>Graphite</td>
<td>PEL 5 mg/m3</td>
<td>TWA value 2 mg/m3 Respirable fraction</td>
</tr>
<tr>
<td></td>
<td>PEL 15 mg/m3</td>
<td>STEL value 10 mg/m3 fumes/smoke</td>
</tr>
<tr>
<td></td>
<td>TWA value 5 mg/m3 Respirable fraction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TWA 10 mg/m3</td>
<td>STEL value 10 mg/m3 Respirable fraction</td>
</tr>
<tr>
<td>Zinc oxide</td>
<td>PEL 5 mg/m3</td>
<td>TWA 2 mg/m3 Respirable fraction</td>
</tr>
<tr>
<td></td>
<td>PEL 15 mg/m3</td>
<td>STEL value 10 mg/m3 Respirable fraction</td>
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<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td>STEL value 10 mg/m3 fumes/smoke</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TWA value 10 mg/m3 Total dust</td>
<td></td>
</tr>
</tbody>
</table>

PERSONAL PROTECTIVE EQUIPMENT:
Respiratory – wear a NIOSH-certified (or equivalent) respirator.
Hand protection – chemical-resistant protective gloves.
Eye protection – safety goggles.
Body protection – suitable protective clothing to prevent skin contact.

GENERAL SAFETY & HYGIENE:
Eye wash fountains and safety showers must be easily accessible. Avoid inhalation of dust. Wear protective clothing to minimize skin contact. Employees should shower at the end of the shift. Soiled clothes should be washed after each use.

9. PHYSICAL AND CHEMICAL PROPERTIES

FORM: Solid; uniform cylindrical tablets; 3x3 mm.
ODOR: Odorless
COLOR: Dark grey/black
pH VALUE: Not applicable
BULK DENSITY: approx. 1300 kg/m3
SOLUBILITY IN WATER: Sparingly soluble

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID:
No conditions known that should be avoided.

SUBSTANCES TO AVOID:
No substances known that should be avoided.

HAZARDOUS REACTIONS:
The product is chemically stable.

DECOMPOSITION PRODUCTS:
No hazardous decomposition products known.

THERMAL DECOMPOSITION:
No decomposition if correctly stored and handled.

CORROSION TO METALS:
No corrosive effect on metal.

11. TOXICOLOGICAL INFORMATION

Primary Routes of Exposure
Routes of entry are ingestion, inhalation of dust, and eye or skin contact.

Acute Toxicity/Effects
ACUTE TOXICITY
Not expected to be acutely toxic. If swallowed in large quantities may cause pain, nausea, vomiting and diarrhea. The product has not been tested. The statement has been derived from the properties of the individual components.

**ORAL**
- Aluminum oxide / LD50 (rat): > 10,000 mg/kg, no mortality observed
- Copper oxide / LD50 (rat): > 2500 mg/kg, no mortality observed
- Graphite / LD50 (rat): > 2000 mg/kg
- Zinc oxide / LD50 (rat): > 5000 mg/kg

**INHALATION**
- Aluminum oxide / LC50 (rat): > 2.3 mg/l, no mortality observed (4 hr)
- Graphite / LC50 (rat): > 20 mg/l (aerosol), no mortality observed (6 hr)
- Zinc oxide / LC50 (rat): > 5.7 mg/l (4 hr)

**DERMAL**
- Copper oxide / LD50 (rat): > 2000 mg/kg

**SPECIFIC TARGET ORGAN TOXICITY**
- No specific target organ toxicity to be expected after a single exposure.

**IRRITATION / CORROSION**
- Contact with powder or dust may cause irritation to the skin or eyes.

**SENSITIZATION**
- The product has not been tested, but no sensitization is expected based on properties of the individual components.

**Chronic Toxicity/Effects**

**REPEATED DOSE TOXICITY**
- The product has not been tested, but based on properties of the individual components, repeated exposure may cause pulmonary problems.
  - Repeated exposure to Copper Oxide by ingestion of high doses may cause damage to the liver as shown in animal studies.
  - Repeated ingestion of Zinc Oxide may cause damage to the kidney.
  - Prolonged and repeated exposure to Zinc Oxide may lead to blood disorders.
  - Prolonged and repeated inhalation of dust may cause lung damage.

**GENETIC TOXICITY**
The product has not been tested for mutagenicity, but based on properties of the individual components, no genotoxic potential is expected.

CARCINOGENICITY

The whole of the information available provides no indication of a carcinogenic effect.

REPRODUCTIVE TOXICITY

The product has not been tested, but animal studies with the individual components gave no indication of a fertility-impairing effect.

ADDITIONAL INFORMATION

Although data gaps exist to some extent for the individual components, dangers which are not covered by the current labeling are not to be expected based on present knowledge and experience.

SYMPTOMS OF EXPOSURE

Skin eruptions, itching, hemolytic anemia

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE

Individuals with pre-existing diseases of the skin, respiratory disorders or impaired function of the liver or kidneys may have increased susceptibility to excessive exposures; individuals with pre-existing blood disorders may be severely affected.

12. ECOLOGICAL INFORMATION

AQUATIC TOXICITY

The product has not been tested, but based on the properties of copper oxide and zinc oxide, is expected to be highly toxic to aquatic organisms (acute effect) and may cause adverse long-term effects in the aquatic environment.

TOXICITY TO FISH

<table>
<thead>
<tr>
<th>Component</th>
<th>LC50 (96 hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum oxide</td>
<td>218.64 mg/l</td>
</tr>
<tr>
<td>Copper oxide</td>
<td>0.0366 mg/l</td>
</tr>
<tr>
<td>Graphite</td>
<td>&gt; 100 mg/l</td>
</tr>
<tr>
<td>Zinc oxide</td>
<td>0.169 mg/l</td>
</tr>
</tbody>
</table>

AQUATIC INVERTEBRATES

<table>
<thead>
<tr>
<th>Component</th>
<th>EC50 (48 hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum oxide, no observed effect at 100 mg/l for 48 hours (Daphnia magna)</td>
<td>0.0313 mg/l (Ceriodaphnia dubia)</td>
</tr>
<tr>
<td>Copper oxide</td>
<td>0.416 mg/l (Ceriodaphnia dubia)</td>
</tr>
<tr>
<td>Graphite</td>
<td>&gt; 100 mg/l (Daphnia magna)</td>
</tr>
<tr>
<td>Zinc oxide</td>
<td>0.416 mg/l (Ceriodaphnia dubia)</td>
</tr>
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</table>
ADDITIONAL INFORMATION

Although data gaps exist to some extent for the individual components, dangers which are not covered by the current labeling are not to be expected based on present knowledge and experience.

13. DISPOSAL CONSIDERATIONS

DISPOSAL OF THE SUBSTANCE ITSELF
In its original condition (before use) this material has no hazardous characteristics, however, after use, its characteristics may have changed due to contamination from operation in chemical processes. Disposal must take into consideration possible contamination from how it was used, and dispose accordingly in compliance with all applicable federal, state and local regulations.

DISPOSAL OF EMPTY CONTAINERS
Uncleaned empty containers should be disposed of in the same manner as the material substance itself.

14. TRANSPORT INFORMATION

Land transport
USDOT
Not classified as dangerous good under transport regulations.

Sea transport
IMDG
Hazard class: 9
Packing Group: III
ID Number UN 3077
Hazard label: 9, EHSM
Marine Pollutant: Yes
Shipping Description: Environmentally Hazardous Substance, Solid, N.O.S. (contains ZINC OXIDE)

Air transport
IATA/CAO
Hazard class: 9
Packing Group: III
15. REGULATORY INFORMATION

Federal Regulations

OSHA:
Chronic target organ effects reported. OSHA PEL and ACGIH TLV established.

TSCA:
This material or all of its components are listed on the Inventory of Existing Chemical Substances under the Toxic Substances Control Act (TSCA).

EPCRA 311/312 (Hazard categories): None

EPCRA 313:

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<td>Copper oxide</td>
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<td>1314-13-2</td>
<td>Zinc oxide</td>
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</tbody>
</table>

State Regulations

State RTK

<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Chemical Name</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1344-28-1</td>
<td>Aluminum oxide</td>
<td>MA, NJ, PA</td>
</tr>
<tr>
<td>1317-38-0</td>
<td>Copper oxide</td>
<td>NJ</td>
</tr>
<tr>
<td>7782-42-5</td>
<td>Graphite</td>
<td>MA, PA</td>
</tr>
<tr>
<td>1314-12-2</td>
<td>Zinc oxide</td>
<td>MA, NJ, PA</td>
</tr>
</tbody>
</table>

16. OTHER INFORMATION

Recommended for industrial, laboratory or research use only.

DATE CREATED/UPDATED: November 1, 2016
DISCLAIMER:
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