SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier
Product form : Substance (UVCB)
Substance name : Gadolinium Doped Ceria
CAS No : 66402-68-4
Other means of identification : Ceramic Materials and Wares
GDC
GCO
Gadolinium doped cerium oxide
Cerium(IV) oxide – gadolinium doped

1.2. Relevant identified uses of the substance or mixture and uses advised against
Use of the substance/mixture : Laboratory chemicals; Manufacture of substances

1.3. Details of the supplier of the safety data sheet
Fuel Cell Store
1902 Pinon Drive, Unit B
College Station, TX, USA 77845
Tel: 979 703-1925
www.fuelcellstore.com

1.4. Emergency telephone number

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture
Classification (GHS-US)
Eye Irrit. 2A  H319

2.2. Label elements
GHS-US labeling

Hazard pictograms (GHS-US) :

Signal word (GHS-US) : Warning
Hazard statements (GHS-US) : H319 - Causes serious eye irritation
Precautionary statements (GHS-US) : P264 - Wash hands thoroughly after handling
P280 - Wear eye 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.
P337+P313 - If eye irritation persists: Get medical advice/attention

2.3. Other hazards
No additional information available

SECTION 3: Composition/information on ingredients

3.1. Substances
Substance type : UVCB

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gadolinium Doped Ceria</td>
<td>(CAS No) 66402-68-4</td>
<td>100</td>
</tr>
</tbody>
</table>

Full text of H-phrases: see section 16
3.2. Mixtures
Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures
First-aid measures general: Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).
First-aid measures after inhalation: If inhaled and if breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
First-aid measures after skin contact: Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse.
First-aid measures after eye contact: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
First-aid measures after ingestion: Rinse mouth. Do NOT induce vomiting unless directed to do so by medical personnel.

4.2. Most important symptoms and effects, both acute and delayed
Symptoms/injuries after eye contact: Causes serious eye irritation.

4.3. Indication of any immediate medical attention and special treatment needed
All treatments should be based on observed signs and symptoms of distress in the patient.

SECTION 5: Firefighting measures

5.1. Extinguishing media
Suitable extinguishing media: Use extinguishing media appropriate for surrounding fire.
Unsuitable extinguishing media: None known.

5.2. Special hazards arising from the substance or mixture
Reactivity: No dangerous reactions known.

5.3. Advice for firefighters
Firefighting instructions: Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire.
Protection during firefighting: Do not enter fire area without proper protective equipment, including respiratory protection. Wear fire/ flame resistant/retardant clothing. Wear a self contained breathing apparatus.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel
Emergency procedures: Evacuate unnecessary personnel.

6.1.2. For emergency responders
Protective equipment: Equip cleanup crew with proper protection. Chemical goggles or safety glasses.
Emergency procedures: Ventilate area.

6.2. Environmental precautions
Prevent entry to sewers and public waters.

6.3. Methods and material for containment and cleaning up
Methods for cleaning up: On land, sweep or shovel into suitable containers. Minimize generation of dust.

6.4. Reference to other sections
See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Precautions for safe handling: Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Provide good ventilation in process area to prevent formation of vapor.
Hygiene measures: Wash hands thoroughly after handling.
7.2. Conditions for safe storage, including any incompatibilities
Storage conditions: Keep only in the original container in a cool well ventilated place.

7.3. Specific end use(s)
Laboratory chemicals, Manufacture of substances

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

<table>
<thead>
<tr>
<th>Gadolinium Doped Ceria</th>
<th>ACGIH TWA (mg/m³)</th>
<th>10 mg/m³ 8 hour TWA as Total dust</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA ACGIH</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8.2. Exposure controls
Appropriate engineering controls: Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). Either local exhaust or general room ventilation is usually required.
Personal protective equipment: Avoid all unnecessary exposure.
Hand protection: Dust impervious gloves.
Eye protection: Chemical goggles or safety glasses. In case of dust production: protective goggles.
Respiratory protection: Where excessive dust may result, use approved respiratory protection equipment. Use air-purifying respirator equipped with particulate filtering cartridges.
Other information: When using, do not eat, drink or smoke.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties
Physical state: Solid
Color: White/yellow
Odor: Odorless.
Odor threshold: No data available
pH: Not applicable
Relative evaporation rate (butyl acetate=1): Not applicable
Melting point: No data available
Freezing point: No data available
Boiling point: Not applicable
Flash point: Not applicable
Self ignition temperature: Not applicable
Decomposition temperature: No data available
Flammability (solid, gas): No data available
Vapor pressure: Not applicable
Relative vapor density at 20 °C: No data available
Relative density: No data available
Solubility: Insoluble in water.
Log Pow: No data available
Log Kow: No data available
Viscosity, kinematic: No data available
Viscosity, dynamic: No data available
Explosive properties: Product is not explosive.
Oxidizing properties: No oxidizing properties.
Explosive limits: No data available

9.2. Other information
VOC content: 0 %

SECTION 10: Stability and reactivity

10.1. Reactivity
No dangerous reactions known.
10.2. Chemical stability
The product is stable at normal handling- and storage conditions.

10.3. Possibility of hazardous reactions
Hazardous polymerization will not occur.

10.4. Conditions to avoid
No additional information available

10.5. Incompatible materials
No additional information available

10.6. Hazardous decomposition products
Oxides.

SECTION 11: Toxicological information

11.1. Information on toxicological effects
Acute toxicity : Not classified

<table>
<thead>
<tr>
<th>Gadolinium Doped Ceria (Based on Cerium dioxide (1306-38-3))</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD50 oral rat</td>
</tr>
<tr>
<td>LD50 dermal rat</td>
</tr>
<tr>
<td>LC50 inhalation rat (mg/l)</td>
</tr>
</tbody>
</table>

Skin corrosion/irritation : Not classified
Serious eye damage/irritation : Causes serious eye irritation
Respiratory or skin sensitization : Not classified
Germ cell mutagenicity : Not classified
Carcinogenicity : Not classified
Reproductive toxicity : Not classified
Specific target organ toxicity (single exposure) : Not classified
Specific target organ toxicity (repeated exposure) : Not classified
Aspiration hazard : Not classified

Potential Adverse human health effects and symptoms :
Symptoms/injuries after eye contact : Causes serious eye irritation.
Likely routes of exposure : Inhalation; Skin and eyes contact.

SECTION 12: Ecological information

12.1. Toxicity

<table>
<thead>
<tr>
<th>Gadolinium Doped Ceria (Based on Cerium dioxide (1306-38-3))</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50 fish 1</td>
</tr>
<tr>
<td>EC50 Daphnia 1</td>
</tr>
</tbody>
</table>

12.2. Persistence and degradability

<table>
<thead>
<tr>
<th>Gadolinium Doped Ceria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persistence and degradability</td>
</tr>
</tbody>
</table>

12.3. Bioaccumulative potential

<table>
<thead>
<tr>
<th>Gadolinium Doped Ceria</th>
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</thead>
<tbody>
<tr>
<td>Bioaccumulative potential</td>
</tr>
</tbody>
</table>

12.4. Mobility in soil
No additional information available

12.5. Other adverse effects
Other information : Avoid release to the environment.
SECTION 13: Disposal considerations

13.1. Waste treatment methods
- Waste disposal recommendations: Dispose in a safe manner in accordance with local/national regulations.
- Ecology - waste materials: Avoid release to the environment.

SECTION 14: Transport information

- In accordance with DOT
- Not considered a dangerous good for transport regulations

ADR
- No additional information available

Transport by sea
- No additional information available

Air transport
- No additional information available

SECTION 15: Regulatory information

15.1. US Federal regulations
- Gadolinium Doped Ceria (66402-68-4)
  - Listed on the United States TSCA (Toxic Substances Control Act) inventory

15.2. International regulations

CANADA
- Gadolinium Doped Ceria (66402-68-4)
  - WHMIS Classification
    - Class D Division 2 Subdivision B - Toxic material causing other toxic effects
    - This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR

EU-Regulations
- Gadolinium Doped Ceria
  - Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances) substances

Classification according to Regulation (EC) No. 1272/2008 [CLP]
- Eye Irrit. 2  H319
- Full text of H-phrases: see section 16

Classification according to Directive 67/548/EEC or 1999/45/EC
- Xi; R36

15.3. US State regulations
- No additional information available

SECTION 16: Other information
- Indication of changes: Original Document.
Gadolinium Doped Ceria
Safety Data Sheet
according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Data sources: Chemical Inspection & Regulation Service; accessed at: http://www.cirs-reach.com/inventory/Global_Chemical_Inventories.html
European Chemicals Agency (ECHA) Registered Substances list.
TSCA Chemical Substance Inventory. Accessed at http://www.epa.gov/oppt/existingchemicals/pubs/tscainventory/howto.html

Abbreviations and acronyms: CAS (Chemical Abstracts Service) number.
GHS: Globally Harmonized System (of Classification and Labeling) of Chemicals
OSHA: Occupational Safety & Health Administration.
TSCA: Toxic Substances Control Act.

Other information: None.

Full text of H-phrases:

| Eye Irrit. 2A | Serious eye damage/eye irritation Category 2A |
| H319 | Causes serious eye irritation |

NFPA health hazard: 1 - Exposure could cause irritation but only minor residual injury even if no treatment is given.
NFPA fire hazard: 0 - Materials that will not burn.
NFPA reactivity: 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.

SDS US (GHS HazCom 2012)

SDS Prepared by: The Redstone Group, LLC
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Dublin, OH 43016
T 614-923-7472
www.redstonegrp.com

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.