

Product Name: CESIUM DOPED IRON OXIDE  
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## SAFETY DATA SHEET

### SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

#### PRODUCT

**Product Name:** CESIUM DOPED IRON OXIDE

**Product Description:** Research Sample

**Intended Use:** Research & Development

#### COMPANY IDENTIFICATION

**Supplier:** EXXON MOBIL CORPORATION  
22777 Springwoods Village Parkway  
Spring, TX 77389 USA

**24 Hour Health Emergency  
Transportation Emergency Phone  
Product Technical Information  
MSDS Internet Address**

609-737-4411  
800-424-9300 or 703-527-3887 CHEMTREC  
800-662-4525  
www.exxon.com, www.mobil.com

### SECTION 2 HAZARDS IDENTIFICATION

This material is hazardous according to regulatory guidelines (see (M)SDS Section 15).

#### CLASSIFICATION:

Combustible Dust

#### LABEL:

**Pictogram:** No Pictogram

**Signal Word:** Warning

#### Hazard Statements:

May form combustible dust concentrations in air.

#### Supplemental Statements:

If small particles are formed during further processing, handling, or by other means, may form combustible dust concentrations in air.

#### Other hazard information:

**HAZARD NOT OTHERWISE CLASSIFIED (HNOC):** None as defined under 29 CFR 1910.1200.

#### PHYSICAL / CHEMICAL HAZARDS

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**WARNING:** May form combustible dust concentrations in air (during processing/handling).

#### HEALTH HAZARDS

Repeated exposure may cause skin dryness or cracking. Dust may be irritating to eyes and respiratory tract.

#### ENVIRONMENTAL HAZARDS

No significant hazards.

<b>NFPA Hazard ID:</b>	Health: 1	Flammability: 1	Reactivity: 0
<b>HMIS Hazard ID:</b>	Health: 1	Flammability: 1	Reactivity: 0

**NOTE:** This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

Toxicological, ecotoxicological, physical, and chemical properties may not have been fully investigated. Hazard data above is estimated based on best available information. This data sheet is for the unused catalyst. Appropriate precautions for the used material should be followed.

### SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

This material is defined as a mixture.

#### Hazardous Substance(s) or Complex Substance(s) required for disclosure

Name	CAS#	Concentration*	GHS Hazard Codes
IRON OXIDE (FE2O3)	1309-37-1	90 - < 100%	None

\* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

**NOTE:** This material is supplied for limited use only for purposes of experimental research and development. The material or one of its components has not yet been listed on relevant inventories of chemical substances. It should not be used for commercial purposes or be made available except in small quantities. The material must be used by or under the supervision of a technically qualified person. All persons who may be exposed to this material must be supplied with a copy of this document. This material is supplied for limited use only for purposes of experimental research and development. It should not be used for commercial purposes or be made available except in small quantities. The material must be used by or under the supervision of a technically qualified person. The toxicological properties of this product may not have been fully investigated.

As per paragraph (i) of 29 CFR 1910.1200, formulation is considered a trade secret and specific chemical identity and exact percentage (concentration) of composition may have been withheld. Specific chemical identity and exact percentage composition will be provided to health professionals, employees, or designated representatives in accordance with applicable provisions of paragraph (i).

### SECTION 4 FIRST AID MEASURES

#### INHALATION

Immediately remove from further exposure. Get immediate medical assistance. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. Give supplemental oxygen, if available. If breathing has stopped, assist ventilation with a mechanical device.

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### SKIN CONTACT

Wash contact areas with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse.

### EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

### INGESTION

Seek immediate medical attention.

<b>SECTION 5</b>	<b>FIRE FIGHTING MEASURES</b>
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### EXTINGUISHING MEDIA

**Appropriate Extinguishing Media:** Use water fog, foam, dry chemical or carbon dioxide (CO<sub>2</sub>) to extinguish flames.

**Inappropriate Extinguishing Media:** Straight Streams of Water

### FIRE FIGHTING

**Fire Fighting Instructions:** Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

**Unusual Fire Hazards:** Explosion: Avoid generating dust; fine dust dispersed in air in sufficient concentration and in the presence of an ignition source is a potential dust explosion hazard. Adsorption of water will generate heat and possibly steam; closed containers may get very hot and build up pressure.

**Hazardous Combustion Products:** None.

### FLAMMABILITY PROPERTIES

**Flash Point [Method]:** N/A

**Flammable Limits (Approximate volume % in air):** LEL: N/A UEL: N/A

**Autoignition Temperature:** N/A

<b>SECTION 6</b>	<b>ACCIDENTAL RELEASE MEASURES</b>
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### NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

### PROTECTIVE MEASURES

Avoid contact with spilled material. Dust Deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Avoid dispersal of dust in the air (for example, clearing dust surfaces with compressed air). Prevent dust exposure to ignition sources. For example, use non-sparking tools and prohibit smoking, flares, sparks or flames in immediate area. See Section 5 for fire fighting information. See the Hazard Identification Section for

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Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

## SPILL MANAGEMENT

**Land Spill:** Stop leak if you can do it without risk. Ventilate the area. Prevent dust cloud. Vacuum material into a recovery container.

**Water Spill:** Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Skim from surface.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

## ENVIRONMENTAL PRECAUTIONS

Prevent entry into waterways, sewers, basements or confined areas.

## SECTION 7

### HANDLING AND STORAGE

## HANDLING

Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Dust from material can accumulate electrostatic charges due to friction from transfer and mixing operations and cause an electrical spark (ignition source). Provide adequate precautions to ignition sources, such as electrical grounding and bonding, inert atmosphere or non-sparking tools. However, bonding and grounds may not eliminate the hazard for static accumulation. Consult local applicable standards for guidance. Refer to NFPA 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids and EN 61241, Electrical Apparatus for Use in the Presence of Combustible Dust for safe handling. Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Avoid all personal contact. Avoid contact with eyes. Product may generate heat if it comes in contact with water or water vapor. Prevent small spills and leakage to avoid slip hazard.

**Static Accumulator:** This material is a static accumulator.

## STORAGE

The type of container used to store the material may affect static accumulation and dissipation. Do not store in open or unlabelled containers. Keep container tightly closed and dry.

## SECTION 8

### EXPOSURE CONTROLS / PERSONAL PROTECTION

## EXPOSURE LIMIT VALUES

Exposure limits/standards (Note: Exposure limits are not additive)

Substance Name	Form	Limit / Standard			NOTE	Source
IRON OXIDE (FE <sub>2</sub> O <sub>3</sub> )	Fume.	TWA	10 mg/m <sup>3</sup>		N/A	OSHA Z1

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IRON OXIDE (FE <sub>2</sub> O <sub>3</sub> )	Respirable fraction.	TWA	5 mg/m <sup>3</sup>		N/A	ACGIH
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**Exposure limits/standards for materials that can be formed when handling this product:** For dusty conditions, OSHA recommends for particulates not otherwise regulated an 8-hour TWA of 15 mg/m<sup>3</sup> (total dust), 5 mg/m<sup>3</sup> (respirable fraction); ACGIH recommends for insoluble and poorly soluble particles not otherwise specified an 8-hour TWA of 10 mg/m<sup>3</sup> (inhalable particles), 3 mg/m<sup>3</sup> (respirable particles).

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

No biological limits allocated.

## ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

Adequate ventilation should be provided so that exposure limits are not exceeded. Adequate ventilation should be provided whenever the material is heated or mists are generated. It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product are designed and maintained to minimize dust generation and accumulation. Ensure that dust-handling systems (such as exhaust ducts, dusts collectors, vessels, and processing equipment) are designed to minimize the potential for dust ignition and prevent explosion propagation. For example, use explosion relief vents, an explosion suppression system or inert equipment internals. Additional examples of proper equipment include using only appropriately classified electrical equipment and powered industrial trucks.

## PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

**Respiratory Protection:** If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

Particulate air-purifying respirator approved for dust / oil mist is recommended.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

**Hand Protection:** Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

Chemical resistant gloves are recommended. If contact with forearms is likely wear gauntlet style gloves.

**Eye Protection:** Chemical goggles are recommended.

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**Skin and Body Protection:** Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

Chemical/oil resistant clothing is recommended.

**Specific Hygiene Measures:** Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

## ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

## SECTION 9

## PHYSICAL AND CHEMICAL PROPERTIES

**Note:** Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

### GENERAL INFORMATION

**Physical State:** Solid

**Color:** Dark Red

**Odor:** Odorless

**Odor Threshold:** N/D

### IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

**Relative Density (at 15 °C):** 1

**Flammability (Solid, Gas):** N/A

**Flash Point [Method]:** N/A

**Flammable Limits (Approximate volume % in air):** LEL: N/A UEL: N/A

**Autoignition Temperature:** N/A

**Boiling Point / Range:** N/A

**Decomposition Temperature:** N/D

**Vapor Density (Air = 1):** N/A

**Vapor Pressure:** N/A

**Evaporation Rate (n-butyl acetate = 1):** N/A

**pH:** N/A

**Log Pow (n-Octanol/Water Partition Coefficient):** N/A

**Solubility in Water:** Negligible

**Viscosity:** N/A

**Oxidizing Properties:** See Hazards Identification Section.

### OTHER INFORMATION

**Freezing Point:** N/A

**Melting Point:** >1200°C (2192°F)

## SECTION 10

## STABILITY AND REACTIVITY

**REACTIVITY:** See sub-sections below.

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**STABILITY:** Material is stable under normal conditions.

**CONDITIONS TO AVOID:** Excessive heat. Moisture. High dust concentrations. High energy sources of ignition.

**MATERIALS TO AVOID:** Strong Acids, Strong Bases, Strong oxidizers, Water

**HAZARDOUS DECOMPOSITION PRODUCTS:** Material does not decompose at ambient temperatures.

**POSSIBILITY OF HAZARDOUS REACTIONS:** Hazardous polymerization will not occur.

SECTION 11	TOXICOLOGICAL INFORMATION
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**INFORMATION ON TOXICOLOGICAL EFFECTS**

<b>Hazard Class</b>	<b>Conclusion / Remarks</b>
<b>Inhalation</b>	
Acute Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data for material.	Negligible hazard at ambient/normal handling temperatures.
<b>Ingestion</b>	
Acute Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
<b>Skin</b>	
Acute Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Skin Corrosion/Irritation: No end point data for material.	Negligible irritation to skin at ambient temperatures. Based on assessment of the components.
<b>Eye</b>	
Serious Eye Damage/Irritation: No end point data for material.	May cause mild, short-lasting discomfort to eyes. Based on assessment of the components.
<b>Sensitization</b>	
Respiratory Sensitization: No end point data for material.	Not expected to be a respiratory sensitizer.
Skin Sensitization: No end point data for material.	Not expected to be a skin sensitizer. Based on assessment of the components.
<b>Aspiration:</b> No end point data for material.	Not expected to be an aspiration hazard. Based on physico-chemical properties of the material.
<b>Germ Cell Mutagenicity:</b> No end point data for material.	Not expected to be a germ cell mutagen. Based on assessment of the components.
<b>Carcinogenicity:</b> No end point data for material.	Not expected to cause cancer. Based on assessment of the components.
<b>Reproductive Toxicity:</b> No end point data for material.	Not expected to be a reproductive toxicant. Based on assessment of the components.
<b>Lactation:</b> No end point data for material.	Not expected to cause harm to breast-fed children.
<b>Specific Target Organ Toxicity (STOT)</b>	
Single Exposure: No end point data for material.	Not expected to cause organ damage from a single exposure.
Repeated Exposure: No end point data for material.	Not expected to cause organ damage from prolonged or repeated exposure. Based on assessment of the components.

**OTHER INFORMATION**

For the product itself:

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The toxicological properties of this material have not been fully assessed. This material must be used by or under the supervision of a technically qualified person.

Dust may be irritating to eyes and respiratory tract.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC

3 = IARC 1

5 = IARC 2B

2 = NTP SUS

4 = IARC 2A

6 = OSHA CARC

Experimental research and development material. Health hazard data above is estimated based on best available information.

<b>SECTION 12</b>	<b>ECOLOGICAL INFORMATION</b>
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The information given is based on data for the material, components of the material, or for similar materials, through the application of bridging principals.

**ECOTOXICITY**

Material -- Not expected to be harmful to aquatic organisms.

**MOBILITY**

Material -- Can float on water, but will sink when saturated.

**PERSISTENCE AND DEGRADABILITY**

**Biodegradation:**

Material -- Expected to be persistent.

**BIOACCUMULATION POTENTIAL**

Material -- Potential to bioaccumulate is low.

<b>SECTION 13</b>	<b>DISPOSAL CONSIDERATIONS</b>
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Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

**DISPOSAL RECOMMENDATIONS**

Recycle empty drums at an appropriate facility in accordance with current applicable laws and regulations, and product characteristics at time of disposal. Ensure drums are tightly sealed. Unused material should be returned for material reclaiming.

**REGULATORY DISPOSAL INFORMATION**

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrosivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used



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product may be regulated.

**Empty Container Warning** Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14	TRANSPORT INFORMATION
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**LAND (DOT):** Not Regulated for Land Transport

Footnote: May qualify for Small Quantity Exception under 49CFR 173.4.

**LAND (TDG):** Not Regulated for Land Transport

**SEA (IMDG):** Not Regulated for Sea Transport according to IMDG-Code

**Marine Pollutant:** No

**AIR (IATA):** Not Regulated for Air Transport

[Footnote: This material may meet the Limited Quantity Exemption Criteria in Section 2.8 of the IATA Dangerous Goods Regulation.]

SECTION 15	REGULATORY INFORMATION
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**OSHA HAZARD COMMUNICATION STANDARD:** This material is considered hazardous in accordance with OSHA HazCom 2012, 29 CFR 1910.1200.

**Listed or exempt from listing/notification on the following chemical inventories:**  
**Special Cases:**

Inventory	Status
TSCA	Experimental

**SARA 302:** No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302

**SARA (311/312) REPORTABLE GHS HAZARD CLASSES:** Combustible Dust

**SARA (313) TOXIC RELEASE INVENTORY:** This material contains no chemicals subject to the supplier notification requirements of the SARA 313 Toxic Release Program.

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The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
IRON OXIDE (FE2O3)	1309-37-1	1, 4, 13, 16, 17, 18

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

**SECTION 16**

**OTHER INFORMATION**

N/D = Not determined, N/A = Not applicable

**THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:**

No revision information

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