Printing date 07/31/2016

Reviewed on 07/31/2016

1 Identification

- · Product name
- · Trade name: Gadolinium powder (99.9% REO)
- Item number: 93-6430
- · CAS Number:
- 7440-54-2
- *EC number:* 231-162-2
- Details of the supplier of the safety data sheet
 Manufacturer/Supplier: Strem Chemicals, Inc.
 7 Mulliken Way NEWBURYPORT, MA 01950 USA

info@strem.com

- · Information department: Technical Department
- Emergency telephone number: EMERGENCY: CHEMTREC: + 1 (800) 424-9300 During normal opening times: +1 (978) 499-1600

2 Hazard(s) identification

Classification of the substance or mixture

Flam. Sol. 1 H228 Flammable solid.

· Label elements

- · GHS label elements
- *The substance is classified and labeled according to the Globally Harmonized System (GHS). Hazard pictograms*



Signal word Danger
Hazard statements
H228 Flammable solid.
Precautionary statements
P231 Handle under inert gas.
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P280 Wear protective gloves / eye protection / face protection.

P240 Ground/bond container and receiving equipment.

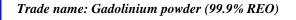
P403+P233 Store in a well-ventilated place. Keep container tightly closed.

P501 Dispose of contents/container in accordance with local/regional/national/international regulations. (Contd. on page 2)

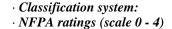
n page 2)

Printing date 07/31/2016

Reviewed on 07/31/2016



(Contd. of page 1)





Fire = 0*Reactivity* = 0

· HMIS-ratings (scale 0 - 4)

HEALTH • Health = 00 FIRE Fire = 0**REACTIVITY O** *Reactivity* = 0

- · Other hazards
- · Results of PBT and vPvB assessment
- · **PBT:** Not applicable.

· vPvB: Not applicable.

3 Composition/information on ingredients

- · Chemical characterization: Substances
- · CAS No. Description
- 7440-54-2 none
- Identification number(s)
- · EC number: 231-162-2

4 First-aid measures

- · Description of first aid measures
- After inhalation: Supply fresh air; consult doctor in case of complaints.
- After skin contact: Generally the product does not irritate the skin.
- After eye contact: Rinse opened eye for several minutes under running water.
- · After swallowing: If symptoms persist consult doctor.
- · Information for doctor:
- · Most important symptoms and effects, both acute and delayed No further relevant information available.
- · Indication of any immediate medical attention and special treatment needed
- No further relevant information available.

5 *Fire-fighting measures*

- · Extinguishing media
- · Suitable extinguishing agents:
- CO2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- · Special hazards arising from the substance or mixture No further relevant information available.
- · Advice for firefighters
- · Protective equipment: No special measures required.

6 Accidental release measures

· Personal precautions, protective equipment and emergency procedures Wear protective equipment. Keep unprotected persons away.

(Contd. on page 3)

US

Printing date 07/31/2016

Reviewed on 07/31/2016

Trade name: Gadolinium powder (99.9% REO)

(Contd. of page 2)

- Environmental precautions: No special measures required.
- *Methods and material for containment and cleaning up:* Dispose contaminated material as waste according to item 13. Ensure adequate ventilation.
- Reference to other sections
 See Section 7 for information on safe handling.
 See Section 8 for information on personal protection equipment.
 See Section 13 for disposal information.

7 Handling and storage

- · Handling: Handle under inert gas.
- · Precautions for safe handling No special precautions are necessary if used correctly.
- Information about protection against explosions and fires: Keep ignition sources away - Do not smoke.
- Protect against electrostatic charges.
- · Conditions for safe storage, including any incompatibilities
- Storage: Store contents under inert gas.
- Requirements to be met by storerooms and receptacles: No special requirements.
- Information about storage in one common storage facility: Not required.
- Further information about storage conditions: Keep receptacle tightly sealed.
- · Specific end use(s) No further relevant information available.

8 Exposure controls/personal protection

· Additional information about design of technical systems: No further data; see item 7.

- · Control parameters
- Components with limit values that require monitoring at the workplace: Not required.
- · Additional information: The lists that were valid during the creation were used as basis.
- · Exposure controls
- · Personal protective equipment:
- General protective and hygienic measures: Wash hands before breaks and at the end of work.
- · Breathing equipment: Not required.
- · Protection of hands:



Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation. Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.

Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation • Material of gloves

The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.

· Penetration time of glove material

The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

(Contd. on page 4)

(Contd. of page 3)

Safety Data Sheet according to OSHA HCS

Printing date 07/31/2016

CHEMICALS, INC.

Reviewed on 07/31/2016

Trade name: Gadolinium powder (99.9% REO)

• Eye protection: Safety glasses

Information on basic physical and o	chemical properties	
General Information	nemeu properties	
Appearance:		
Form:	Powder	
Color:	Grey	
Odor:	Odorless	
Odor threshold:	Not determined.	
pH-value:	Not applicable.	
Change in condition		
Melting point/Melting range:	1311 °C (2392 °F)	
Boiling point/Boiling range:	3233 °C (5851 °F)	
Flash point:	Not applicable.	
Flammability (solid, gaseous):	Flammable.	
Ignition temperature:		
Decomposition temperature:	Not determined.	
Auto igniting:	Not determined.	
Danger of explosion:	Not determined.	
Explosion limits:		
Lower:	Not determined.	
Upper:	Not determined.	
Vapor pressure at 20 $^{\circ}C$ (68 $^{\circ}F$):	no data hPa	
<i>Density at 20 °C (68 °F):</i>	7.898 g/cm ³ (65.909 lbs/gal)	
Relative density	Not determined.	
Vapor density	Not applicable.	
Evaporation rate	Not applicable.	
Solubility in / Miscibility with		
Water:	Insoluble.	
Partition coefficient (n-octanol/wate	er): Not determined.	
Viscosity:		
Dynamic:	Not applicable.	
Kinematic:	Not applicable.	
Solvent content:		
Organic solvents:	0.0 %	
VOC content:	0.0 g/l / 0.00 lb/gl	
Solids content:	100.0 %	
Other information	No further relevant information available.	

(Contd. on page 5)

Printing date 07/31/2016

Reviewed on 07/31/2016

Trade name: Gadolinium powder (99.9% REO)

(Contd. of page 4)

10 Stability and reactivity

- · Reactivity No further relevant information available.
- · Chemical stability
- Thermal decomposition / conditions to be avoided: No decomposition if used according to specifications.
- · Possibility of hazardous reactions No dangerous reactions known.
- · Conditions to avoid No further relevant information available.
- · Incompatible materials: No further relevant information available.
- · Hazardous decomposition products: No dangerous decomposition products known.

11 Toxicological information

- · Information on toxicological effects
- · Acute toxicity:
- · Primary irritant effect:
- on the skin: No irritant effect.
- on the eye: No irritating effect.
- Sensitization: No sensitizing effects known.
- · Additional toxicological information:

· Carcinogenic categories

· IARC (International Agency for Research on Cancer)

Substance is not listed.

· NTP (National Toxicology Program)

Substance is not listed.

· OSHA-Ca (Occupational Safety & Health Administration)

Substance is not listed.

12 Ecological information

- · Aquatic toxicity: No further relevant information available.
- · Persistence and degradability No further relevant information available.
- · Behavior in environmental systems:
- · Bioaccumulative potential No further relevant information available.
- · Mobility in soil No further relevant information available.
- · Additional ecological information:
- · General notes: Not known to be hazardous to water.
- · Results of PBT and vPvB assessment
- **PBT:** Not applicable.
- **vPvB:** Not applicable.
- · Other adverse effects No further relevant information available.

13 Disposal considerations

• Waste treatment methods

· Recommendation:

Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

(Contd. on page 6)

US



[·] Toxicity

(Contd. of page 5)

Safety Data Sheet according to OSHA HCS

Reviewed on 07/31/2016

Trade name: Gadolinium powder (99.9% REO)

· Uncleaned packagings:

• Recommendation: Disposal must be made according to official regulations.

UN-Number DOT, IMDG, IATA	UN3089
UN proper shipping name DOT, IATA IMDG	Metal powders, flammable, n.o.s. METAL POWDER, FLAMMABLE, N.O.S.
Transport hazard class(es)	· · ·
DOT	
Class Label	4.1 Flammable solids, self-reactive substances and sol desensitised explosives
IMDG, IATA	4.1
Class	4.1 Flammable solids, self-reactive substances and sol
Label	desensitised explosives 4.1
	7.1
Packing group DOT, IMDG, IATA	II
Environmental hazards: Marine pollutant:	No
Special precautions for user	Warning: Flammable solids, self-reactive substances and sol desensitised explosives
Segregation groups	Heavy metals and their salts (including their organometall compounds), powdered metals
Stowage Category	B
Handling Code	H1 Keep as dry as reasonably practicable
Segregation Code	SG17 Stow "separated from" class 5.1 SG25 Stow "separated from" goods of classes 2.1 and 3. SG26 In addition: from goods of classes 2.1 and 3 when stowed of deck of a containership a minimum distance of two container spac athwartship shall be maintained, when stowed on ro-ro ships distance of 6 m athwartship shall be maintained.
Transport in bulk according to Annex I	
MARPOL73/78 and the IBC Code	Not applicable.





Printing date 07/31/2016

Printing date 07/31/2016

CHEMICALS.

Reviewed on 07/31/2016

Trade name: Gadolinium powder (99.9% REO)

	(Contd. of page 6)
· Transport/Additional information:	
· IMDG · Limited quantities (LQ) · Excepted quantities (EQ)	1 kg Code: E2 Maximum net quantity per inner packaging: 30 g Maximum net quantity per outer packaging: 500 g
· UN "Model Regulation":	UN 3089 METAL POWDERS, FLAMMABLE, N.O.S., 4.1, II

15 Regulatory information

· Safety, health and environmental regulations/legislation specific for the substance or mixture

• Sara

· Section 355 (extremely hazardous substances):

Substance is not listed.

· Section 313 (Specific toxic chemical listings):

Substance is not listed.

• TSCA (Toxic Substances Control Act): Substance is listed.

· Proposition 65

· Chemicals known to cause cancer:

Substance is not listed.

· Chemicals known to cause reproductive toxicity for females:

Substance is not listed.

· Chemicals known to cause reproductive toxicity for males:

Substance is not listed.

· Chemicals known to cause developmental toxicity:

Substance is not listed.

· Carcinogenic categories

· EPA (Environmental Protection Agency)

Substance is not listed.

· TLV (Threshold Limit Value established by ACGIH)

Substance is not listed.

· NIOSH-Ca (National Institute for Occupational Safety and Health)

Substance is not listed.

· GHS label elements

The substance is classified and labeled according to the Globally Harmonized System (GHS). • *Hazard pictograms*



· Signal word Danger

(Contd. on page 8)

US

Printing date 07/31/2016

Reviewed on 07/31/2016

Trade name: Gadolinium powder (99.9% REO)

(Contd. of page 7)

· Hazard statements

H228 Flammable solid.

• Precautionary statements

P231 Handle under inert gas.

P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.

P280 Wear protective gloves / eye protection / face protection.

P240 Ground/bond container and receiving equipment.

P403+P233 Store in a well-ventilated place. Keep container tightly closed.

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

· Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· Department issuing SDS: Technical Department.

· Date of preparation / last revision 07/31/2016 / -

· Abbreviations and acronyms: ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road) IMDG: International Maritime Code for Dangerous Goods DOT: US Department of Transportation IATA: International Air Transport Association ACGIH: American Conference of Governmental Industrial Hygienists EINECS: European Inventory of Existing Commercial Chemical Substances CAS: Chemical Abstracts Service (division of the American Chemical Society) NFPA: National Fire Protection Association (USA) HMIS: Hazardous Materials Identification System (USA) VOC: Volatile Organic Compounds (USA, EU) PBT: Persistent, Bioaccumulative and Toxic vPvB: very Persistent and very Bioaccumulative NIOSH: National Institute for Occupational Safety OSHA: Occupational Safety & Health TLV: Threshold Limit Value PEL: Permissible Exposure Limit REL: Recommended Exposure Limit Flam. Sol. 1: Flammable solids, Hazard Category 1

[·] Contact: Technical Director