

## SAFETY DATA SHEET

### SECTION 1 – IDENTIFICATION

Product Identifier	Faraday Rotator GMF
Product Name	Substituted Rare-earth Iron Garnet single crystals (RIG)
Manufacturer/Supplier	GRANOPT CO.,LTD
Address	4-4, Ougibuchi, Aza, Ougida, Noshiro-shi, Akita, 016-0122, Japan
Division	Quality Assurance Sect.
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Created Date	Jul. 2, 2013
Revised Date	Oct. 1, 2021

### SECTION 2 – HAZARDS IDENTIFICATION

#### GHS Classification

Health hazards	Specific target organ toxicity (single exposure) / Category 1 (Respiratory system, Nervous system, Kidneys, Osteoarticular) Specific target organ toxicity (repeated exposure) / Category 1 (Respiratory system, Nervous system, Kidneys, Osteoarticular) Hazards not stated here are “Not applicable” or “Classification not possible”.
Environmental hazards	Classification not possible

#### GHS label

##### Symbols



Signal words	Danger
Hazard statements	Causes damage to organs (Respiratory system, Nervous system, Kidneys, Osteoarticular) (Inhalation) Causes damage to organs (Respiratory system, Nervous system, Kidneys, Osteoarticular) through prolonged or repeated exposure (Inhalation)

Precautionary statements

[Prevention]	Do not breathe dust/fume/gas/mist/vapors/spray. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product.
[Response]	IF exposed or concerned: Get emergency medical help immediately. Get medical help if you feel unwell. Specific treatment (see reference to supplemental first aid instruction on this document).
[Storage]	Store Locked up. Store at room temperatures and room humidity.
[Disposal]	Dispose of contents and container in accordance with all local, regional, national and international regulations.

SECTION 3 – COMPOSITION/INFORMATION OF INGREDIENTS

Classification of the substance or mixture      Mixture

Composition table

Chemical name or generic name	Concentration	Chemical property	Reference number in gazetted list in Japan		CAS No.
			METI No. (ENCS No.)	ISHL No.	
Diiron trioxide	33%	Fe <sub>2</sub> O <sub>3</sub>	(1)-357, (5)-5188	192	1309-37-1
Bismuth oxide	60.6%	Bi <sub>2</sub> O <sub>3</sub>	(1)-98	None	1304-76-3
Rare earth oxide		RE <sub>2</sub> O <sub>3</sub>	Proprietary		
Gallium oxide	6.3%	Ga <sub>2</sub> O <sub>3</sub>	(1)-695	None	12024-21-4
Lead monoxide	< 0.1%	PbO	(1)-527	411	1317-36-8

Impurity and stabilization additive of contributing

No information available.

Information as the mixture

This product is classified as a mixture, but it is equivalent to a single compound which consists of compounds listed in the components table. The product does not demonstrate properties which are inherent to each component on its own, or each components does not elute (from the product).

#### SECTION 4 – FIRST-AID MEASURES

Inhalation	Remove to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician.
Skin contact	Wash with soap and water. Remove/Take off immediately all contaminated clothing. Wash contaminated clothing before reuse. Call a POISON CENTER or doctor/physician if you feel unwell.
Eyes contact	Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a POISON CENTER or doctor/physician.
Ingestion	Rinse mouth. Call a POISON CENTER or doctor/physician if you feel unwell.

#### SECTION 5 – FIRE-FIGHTING MEASURES

Suitable extinguishing media	No information available.
Special protective equipment and precautions for fire-fighters	Wear proper protection. Use Self-Contained Breathing Apparatus (SCBA), chemical protective clothing.

#### SECTION 6 – ACCIDENTAL RELEASE MEASURES

Personal precautions (protective equipment and emergency measures)	Handling person should wear suitable protective equipment as indicated in SECTION 8 (EXPOSURE CONTROL/PERSONAL PROTECTION). Avoid contact with eye or skin. Avoid breathing gas.
Collection and neutralization	Vacuum up or sweep up spillage and collect in suitable container for disposal. Absorb the leakage with inert material (e.g. dry sand, soil, etc.,) and collect in a container for disposal of chemical product. Scoop up or use appropriate absorber to remove from the water surface. Do not use dispersant.
Methods and materials for containment and cleaning up	Substance is to solidify and gather up. After eliminating, clean completely contaminated area with water

SECTION 7 – HANDLING AND STORAGE

Handling

Technical measures                      Take equipment measures and wear suitable protective equipment as indicated in SECTION 8 (EXPOSURE CONTROL/PERSONAL PROTECTION).

Total or local exhaust ventilation

Use total or local exhaust ventilation as indicated in SECTION 8 (EXPOSURE CONTROL/PERSONAL PROTECTION).

Precautions for safe handling

Avoid contact with eyes and skin.  
 Do not eat, drink or smoke when using this product.  
 Wash hands thoroughly after handling.  
 Avoid ingestion.  
 Avoid contact with skin.  
 Use outdoors or in a well-ventilated place.  
 Avoid breathing dust/fume.  
 Use exhaust ventilation to keep the atmospheric concentration below the occupational exposure limits.

Prevention of Contact

Refer to SECTION 10 (STABILITY AND REACTIVITY).

Storage

Incompatible materials

Refer to SECTION 10 (STABILITY AND REACTIVITY).

Storage conditions

Store at normal temperatures and normal humidity.

Safe packaging materials

No information available.

SECTION 8 – EXPOSURECONTROLS/PERSONAL PROTECTION

Administrative level, Occupational exposure limits

	Administrative level	Japan Society for Occupational Health	ACGIH
As products	No information available	No information available	No information available
Diiron trioxide	Not established	[Dust occupational exposure limits] (Class 2 dust) Respirable dust 1 mg/m <sup>3</sup> Total dust 4 mg/m <sup>3</sup>	TWA 5 mg/m <sup>3</sup>
Bismuth oxide	Not established.	Not established.	Not established.
Gallium oxide	Not established.	Not established.	Not established.

Equipment measures

If dust or fume is produced in thermal process, install ventilating

equipment to keep the atmospheric concentration of the air contaminant below the administrative level or allowable exposure limit.

Personal protection equipment

Respiratory protection	Wear a suitable dust mask.
Hand protection	Wear suitable protective gloves.
Eye protection	Wear suitable eye protection.
Specific Hygiene Measures	Wash hands thoroughly after handling.

SECTION 9 – PHYSICAL AND CHIMICAL PROPERTIES

As products

Physical state/Physical Form	Solid (in room temperatures)
Melting point/Freezing point	approx. 1200 °C
Relative weight (density)	6.6 (room temperatures)
Solubility	Soluble in strong acid or in strong alkaline.
Decomposition temperature	No data available.
Boiling, Initial boiling point and boiling range	No data available
Flash point	Not flash
Auto-ignition temperature	No data available
pH	No data available

SECTION 10 – STABILITY AND REACTIVITY

Stability	Considered Stable under handling and storage at according to Laws and regulations.
Possibility of hazardous reaction	No data available.
Condition to avoid	No data available.
Hazardous decomposition products	No data available.

SECTION 11 – TOXICOLOGICAL INFORMATION

As product

Acute toxicity (oral)	Not classified.
Acute toxicity (dermal)	Not classified.
Acute toxicity (inhalation gas)	Not classified. (Classified as “solid” according to GHS definition.)

Acute toxicity (inhalation vapor)	Not classified.
Acute toxicity (inhalation dust/mist)	Not classified.
Skin corrosion/irritation	Not classified.
Serious eye damage/eye irritation	Not classified.
Respiratory or skin sensitization	Not classified.
Germ cell mutagenicity	Not classified.
Carcinogenicity	Not classified.
Reproductive toxicity	Not classified.
Specific target organ toxicity (single exposure)	Category 1 (Respiratory organs, Nervous system, Kidneys, Osteoarticular)
Specific target organ toxicity (repeated exposure)	Category 1 (Respiratory organs, Nervous system, Kidneys, Osteoarticular)
Aspiration hazard	Classification not possible.
As Diiron trioxide	
Acute toxicity (oral)	Classification not possible.
Acute toxicity (dermal)	Classification not possible.
Acute toxicity (inhalation gas)	Not classified. (Classified as "solid" according to GHS definition.)
Acute toxicity (inhalation vapor)	Classification not possible.
Acute toxicity (inhalation dust/mist)	Not classified.
Skin corrosion/irritation	Not classified.
Serious eye damage/eye irritation	Not classified.
Respiratory or skin sensitization	Classification not possible.
Germ cell mutagenicity	Not classified.
Carcinogenicity	Classification not possible.
Reproductive toxicity	Classification not possible.
Specific target organ toxicity (single exposure)	

	Category 1 (Respiratory organs)
Specific target organ toxicity (repeated exposure)	
	Category 1 (Respiratory organs)
Aspiration hazard	Classification not possible.
As Bismuth oxide	
Acute toxicity (oral)	Classification not possible. "See other hazard data of bismuth compound as well."
Acute toxicity (dermal)	Classification not possible.
Acute toxicity (inhalation gas)	Not Classified. (Classified as "solid" according to GHS definition.)
Acute toxicity (inhalation vapor)	Classification not possible.
Acute toxicity (inhalation dust/mist)	Classification not possible.
Skin corrosion/irritation	Classification not possible.
Serious eye damage/eye irritation	Classification not possible.
Respiratory or skin sensitization	Classification not possible.
Germ cell mutagenicity	Classification not possible.
Carcinogenicity	Classification not possible.
Reproductive toxicity	Classification not possible.
Specific target organ toxicity (single exposure)	Category 1 (Nervous system, Kidneys, Osteoarticular): It was reported that common toxic effects that were attributed to bismuth and bismuth compounds in humans are encephalopathy, nephropathy, osteoarthropathy, gingivitis, stomatitis and colitis, and inorganic bismuth compounds cause neurotoxicity (PATTY (5th, 2001)). Additionally, there is a report that clinical manifestations of acute bismuth intoxication are similar to those caused by mercury and lead: neurological abnormalities which include encephalopathy, and renal dysfunction with nephrotic syndrome (PATTY (5th, 2001)).
Specific target organ toxicity (repeated exposure)	Category 1 (Nervous system, Kidneys, Osteoarticular): Since it was reported that common toxic effects that were attributed to bismuth and bismuth compounds in humans are encephalopathy,

nephropathy, osteoarthropathy, gingivitis, stomatitis and colitis, and inorganic bismuth compounds cause neurotoxicity (PATTY (5th, 2001)). In addition, there is a report that the symptoms of chronic toxicity in humans consist of decreased appetite, rheumatic pain, diarrhea, fever, foul breath, gingivitis and dermatitis (HSDB (2002)).

Aspiration hazard Classification not possible.

As Gallium oxide

Acute toxicity (oral) Not classified.

Acute toxicity (dermal) Not classified.

Acute toxicity (inhalation gas) Not classified.

Acute toxicity (inhalation vapor) Not classified.

Acute toxicity (inhalation dust/mist)  
Not classified.

Skin corrosion/irritation Not classified.

Serious eye damage/eye irritation  
Not classified.

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.

SECTION 12 – ECOLOGICAL INFORMATION

As product

Hazardous to the aquatic environment: Short term (Acute)  
No information available.

Hazardous to the aquatic environment: Long term (Chronic)  
No information available.

Hazardous to the ozone layer No information available.



As Diiron trioxide

Environmental hazards

Hazardous to the aquatic environment: Short term (Acute)

Classification not possible.

Hazardous to the aquatic environment: Long term (Chronic)

Classification not possible.

Hazardous to the ozone layer Classification not possible.

As Bismuth oxide

Environmental hazards

Hazardous to the aquatic environment: Short term (Acute)

Classification not possible.

Hazardous to the aquatic environment: Long term (Chronic)

Classification not possible.

Hazardous to the ozone layer Classification not possible: This substance is not listed in Annexes to the Montreal Protocol.

## SECTION 13 – DISPOSAL CONSIDERATIONS

Residual waste

Lower hazard level as much as possible before disposal by detoxification, stabilization or neutralization processing.

Waste disposal should be in accordance with existing federal, state and local environmental control laws.

Entrust disposal to officially recognized expert traders or disposal dealers with the permission of the prefectural governor, or entrust to local public entities if they are dealing disposal.

Entrust disposal by notifying dangerous and hazardous information thoroughly to a waste disposal dealer.

Waste material categorized as “Special designated hazardous industrial waste” of “Special Control Industrial Waste” should be disposed in accordance with applicable and related regulation.

Avoid direct release to the rivers, etc. landfill or disposal of the effluent and washing water containing this product.

Including contaminated containers and packaging

Recycle used containers by cleaning or dispose appropriately in accordance with official regulation.

Dispose of empty container after elimination contents completely.

## SECTION 14 – TRANSPORT INFORMATION

### International regulations

Marine regulation	Not applicable.
UN Number	Not applicable.
Marine Pollutant	Not applicable.
Aviation regulation information	Not applicable.
UN Number	Not applicable.

## SECTION 15 – REGULATORY INFORMATION

### International regulation

Directive Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

Compliant.

Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)

Not applicable.

The Toxic Substances Control Act (TSCA), PBT substances

Not applicable.

Regulatory information with regard to this product in your country or region should be examined by your own responsibility.

## SECTION 16 – OTHER INFORMATION

### Hazardous Materials Identification System (HMIS)

Health	2
Fire	0
Reactivity	0
Personal Protection	-

Reference	GHS Classification Results by the Japanese Government (FY2019) GHS Classification Guidance for the Japanese Government revised edition (Ver.1.1) (GHS 4th edition, JIS Z 7252:2014)
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The information in this SDS was obtained from current and reputable sources, data and information. However, composition content, physical and chemical property, danger and hazard information data are it may be updated based on the new scientific finding and test data etc.. As cautions described are for normal usage, and it is assumed any chemical product has unknown hazard, extreme caution is required

for handling. It is the user's responsibility to determine safe conditions for use of this product. For special handling, please use it in the light of suitable safety measures for application and usage.

End of Document.

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