GOLeafe

MATERIALS SAFETY DATA SHEET (MSDS)

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

1.1 Product Identifier

Product Name:	Reduced graphene oxide
Trade Names:	GOLeafe – Reduced Graphene Oxide, rGO
CAS #	7782-4-5 (graphite)

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses:
Industrial and research use

1.3 Details of the supplier of the safety data sheet

GOLeafe Inc.
321 Olive Branch Rd.
Durham, NC 27703
USA
Email: aallam@goleafe.com
Phone: +1-919-696-6780

1.4 Emergency telephone number

+1-919-696-6780

SECTION 2: Hazards Identification

2.1 Classification of the substance or mixture

Not classified as a hazardous substance according to Regulation (EC) No. 1272/2008. This substance is not classified as dangerous according to Directive 67/548/EEC.

2.2 Label elements

This substance is not classified as dangerous according to Directive 67/548/EEC.

2.3 Other hazards

Physical Hazards: This substance/mixtures no components considered to be either persistent, bioacummulative and toxic at levels 0.1% or higher

Electrically conductive. - Care should be taken, therefore, to avoid accumulations of rGO dusts or powders in places where these accumulations could cause shorting of electrical switches, circuits or components.

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	rGO, Reduced graphene oxide, Graphene
Description	Reduced graphene oxide is a thin layer of partially oxidized carbon; it is a single, tightly packed layer of carbon atoms that are bonded together in a hexagonal honeycomb lattice.
Formula	CxHyOz
Molecular weight	N/A

SECTION 4: First aid measures

4.1 Description of first aid measures

Inhalation	In case of discomfort provide fresh air, warmth and rest, preferably in a comfortable upright sitting position. Rinse nose and mouth with water. Get medical attention if any discomfort continues. If breathing stops, provide artificial respiration.
Ingestion	NEVER MAKE AN UNCONSCIOUS PERSON VOMIT OR DRINK FLUIDS! Rinse nose, mouth and throat with water, and then drink plenty of water. Get medical attention.
Skin contact	Wash skin with soap and water. Continue to rinse for at least 15 minutes. Get medical attention if irritation appears after washing.
Eye contact	Do not rub eye. Immediately flush with plenty of water for up to 15-20 minutes. Remove any contact lenses after 5 minutes, maintain open eyes wide apart. Get medical attention promptly if symptoms occur after washing.

4.2 Most important symptoms and effects both acute and delayed

Inhalation	It may cause irritation to respiratory tract/inhalation
Ingestion	No effects recorded
Skin contact	It may cause skin irritation.
Eye contact	It may cause eye irritation.
Delayed effects	No delayed effects known.

4.3 Indication of any immediate medical attention and special treatment needed

Treat symptomatically. Contact medical center immediately in case of ingestion or inhalation of a large amount of product. Specific treatment: No specific treatment.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media: The substance is not combustible, use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

5.2 Special hazards arising from the substance or mixture

In the event of combustion or thermal decomposition, this material may release carbon monoxide (CO) or carbon dioxide (CO2) or other toxic gases. At temperatures over 180-300ºC, this material may react with potassium, sodium, rubidium, or cesium to create intercalation compounds that may ignite and may react explosively with water.

5.3 Advice for firefighters

In general, reduced graphene oxide is difficult to combust. Normal care should be taken to avoid dust explosion risk caused by high concentrations of dust or finely suspended airborne particles (although graphite dust is not normally considered to have an explosive hazard). Use respiratory protective equipment.

SECTION 6: Accidental release measures

6.1 Personal precautions protective equipment and emergency procedures

Emergency responders should wear suitable protective equipment to prevent inhalation or skin contact. In case of spills beware of slippery floors and surfaces.

6.2 Environmental precautions

Do not allow to enter drains sewers or watercourses. The product should not be dumped in nature but collected and delivered according to local regulations.

6.3 Methods and material for containment and cleaning up

Spilled or released material should be collected mechanically and disposed of in suitable containers. Prevent dust generation.

6.4 Reference to other sections

For personal protection see section 8.
For waste disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Wear personal protective equipment to prevent skin and eye contact. Do not wear contact lenses when using this product. Prevent dust generation. Avoid dust inhalation using local ventilation or appropriate filters.

7.2 Conditions for safe storage including any incompatibilities

This material should be stored in labeled closed containers in a dry and well-ventilated place. Care should be taken to avoid creating accumulations or concentrations of dust.

7.3 Specific end use(s)

Industrial and research use

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Substance: Graphite (CAS 7782-42-5)				
	Limit value - Eight hours		Limit value - Short term	
	ppm	mg/m^3	ppm	mg/m^3
Australia Belgium Canada - Ontario Canada - Quebec Denmark Finland France Germany (DFG)		3 (1)(2)(3)(4) 2 2 (1) 2 2, 5 respirable aerosol 2 2 respirable aerosol 4 inhalable aerosol 1,5 respirable aerosol		5 respirable aerosol
Ireland		10 (1) 4 (2)		
Latvia		2 (1)		
New Zealand		3 (1)(2)		
People's Republic of China		4 (1) 2 (2)		

Singapore		2 respirable aerosol		
South Korea		2 (1)(2)		
Spain		2 inhalable aerosol		
Sweden Switzerland USA – NIOSH USA – OSHA United Kingdom		5 inhalable aerosol 5 inhalable aerosol 2,5 respirable aerosol 2,5 (1) 15 total dust 5 respirable dust 10 inhalable aerosol 4 respirable aerosol		

8.2 Exposure controls

Protective equipment	
 **P3**	
Engineering measures	
Provide adequate ventilation. Observe Occupational Exposure Limits and minimize the risk of inhalation of dust. Local exhaust ventilation should be employed if dust is generated when handling. Provide eyewash station.	
Personal Protective Equipment	
Respiratory equipment	Respiratory protection must be used if the general level exceeds the recommended occupational exposure limit. A respiratory protection program that meets applicable OHSA (USA) or CEN (UE) requirements should be maintained in the workplace.
Hand protection	Wear protective gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.
Eye protection	Wear approved safety goggles. Use face shield in case of splash risk.
Body protection	Wear full body industrial type work clothing – Impervious clothing recommended.
Environmental exposure controls	
All ventilation systems should be filtered before discharge to atmosphere. Avoid releasing to the environment. Avoid uncontrolled releases. Inform competent authorities in case	

large spillage into water courses.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	Powder
Color	Dark Brownish to Black
Odor	Odorless
Initial boiling point and boiling range (ºC)	Not applicable
Melting point (ºC)	No data available
Vapor density (air=1)	Not applicable
Vapor pressure	Not applicable
Evaporation rate	Not applicable
pH value, conc. solution	Not applicable
Viscosity 40ºC	Not applicable
Bulk Density	1.0 – 2.0 g/cm^3
Solubility value	Negligible in water
Decomposition temperature (°C)	-
Flash point (°C)	Not applicable
Auto Ignition Temperature (°C)	No data available
Oxidizing properties	Not applicable (the substance is incapable of reacting exothermically with combustible materials on the basis of chemical structure).

9.2 Other Safety Information

None.

SECTION 10: Stability and reactivity

10.1 Reactivity

There are no known reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions.

10.3 Possibility of hazardous reactions

At temperatures over 180ºC, this material may react with potassium, sodium, rubidium, or cesium to create intercalation compounds that may ignite and may react explosively with water.

10.4 Conditions to avoid

Not known

10.5 Incompatible materials

Avoid contact with strong oxidizing agents fluorine or chlorine trifluoride.

10.6 Hazardous decomposition products

Under fire conditions this material may release carbon monoxide (CO) or carbon dioxide (CO2) or other toxic gases.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Absorption, distribution, metabolism	
Absorption	No data available
Distribution	No data available
Potential for accumulation	No data available
Toxicologically significant metabolite	No data available
Acute toxicity	
Rat LD50 oral	No data available
Rat LD50 dermal	No data available
Rat LD50 inhalation	No data available
Skin irritation	No data available
Eye irritation	No data available
Skin sensitization	No data available
Genotoxicity	
No data available	
Carcinogenicity	
IARC (International Agency for Cancer and Research): No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC	

OSHA (Occupational Safety and Health Administration): No component of this product present at levels greater than or equal to 0.1% is identified as carcinogen or potential carcinogen by OSHA
Reproductive toxicity
No data available

SECTION 12: Ecological information

12.1 Toxicity

See Section 11

12.2 Persistence and degradability

No data available

12.3 Bio accumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Other adverse effects

No Data Available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

General information
When handling waste, consideration should be made to the safety precautions applying to handling of the product. Waste should not be disposed of by release to sewers. Uncleaned packaging: Disposal must be made according to official regulations. Product: Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material Contaminated packaging: Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number

Not classified as a dangerous good for transport under DOT, IMDG, ADR, RID, or ICAO/IATA

14.2 UN proper shipping name

No information required.

14.3 Transport hazard class(es)

No information required.

14.4 Packing group

No information required.

14.5 Environmental hazards

No information required.

14.6 Special precautions for user

No information required.

SECTION 15: Regulatory information

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

SARA 302 Components: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
SARA 313 Components: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.
SARA 311/312 Hazards: No SARA Hazards
Massachusetts Right To Know Components: No components are subject to the Massachusetts Right to Know Act.
New Jersey Right To Know Components: CAS-No. Water 7732-18-5
Pennsylvania Right To Know Components: CAS-No. Water 7732-18-5
California Prop. 65 Components: This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

SECTION 16: Other information

Advice on any training appropriate for workers	To ensure protection of human health and environment, workers must be provided with proper training about how to handle and store chemicals used at work.
Revision Date	May 14 2019
HMS Ration Health Hazard: **Chronic Health Hazard:** **Flammability:** **Physical Hazard:**	0 0 0 0

This information is based on our present state of knowledge and our research into available scientific literature as well as information obtained from our vendors. GOLeafe makes no responsibility regarding the accuracy of the scientific literature or any third party information and, therefore, cannot guarantee any specific material properties. Use of this information shall not establish a legally binding relationship.
The information provided in this MSDS must be considered as a starting point for a comprehensive program of health and safety in your company. If further data on the product is required to perform your risk assessment, contact us and we will try to assist as much as possible.