SAFETY DATA SHEET

Trade Name: Edge-Functionalized Graphene

Revision Date: July 2023
Original Date: July 2022

1. IDENTIFICATION

Product Identifier:
Edge-Functionalized Graphene (EFG), nanoform

Other Common Names:
Edge-oxidized graphene, edge-oxidized graphene oxide, graphene, graphene oxide, graphene nanoform, graphite powder, graphite oxide, or graphite flakes

Other means of Identification:
Not applicable

Recommended use of the chemical and restrictions on use:
Chemical can be used in a variety of applications. Most common applications include use as an additive to enhance the performance of composite materials. Please contact manufacturer for specific recommended uses. Chemical is electrically conductive and care should be taken to prevent the accumulation of material where it may lead to unwanted electrical short circuits.

Supplier's details:
Garmor Inc.
6210 Hoffner Ave, Suite 140
Orlando Florida, 32822

Emergency phone number:
407-540-0452

2. HAZARD IDENTIFICATION

This material is not considered hazardous in its solid form, but may create hazardous dust during shipping, handling and use. May form combustible dust concentrations in air. May form explosible dust-air mixture if dispersed. This material is classified as a graphene nanoform.

Classification of the substance/mixture:
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
For the full text of the H-Statements mentioned in this Section, see Section 16.

GHS label elements, including precautionary statements

Pictogram

Signal Word Warning
Hazard Statements

H319 Causes serious eye irritation.
H335 May cause respiratory irritation.

Precautionary Statements

- Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
- Wash skin thoroughly after handling.
- Use only outdoors or in a well-ventilated area.
- Wear eye protection/ face protection.
- IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
- IF IN EYES: 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.
- Store in a well-ventilated place. Keep container tightly closed.
- Store locked up.
- Dispose of contents/ container to an approved waste disposal plant.

Other hazards which do not result in the classification
None.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Substance:
Edge-Functionalized Graphene, nanoform

Other Common Names:
Edge-oxidized graphene, edge-oxidized graphene oxide, graphene, graphene nanoform, graphene oxide, graphite powder, graphite oxide, or graphite flakes

Ingredient	wt%	CAS	Classification
Graphene	95-100	1034343-98-0	H319 -- Eye Irrit. 2 H335 -- STOT SE 3 -- Resp Tract
Water*	0-5	7732-18-5	

* Water present is physisorbed and adsorbed water.

Nanoform characterization:
Crystalline, high-aspect-ratio flake
Surface area 255-325 m2/g (BET method)
Nominal flake (primary particle) width ~500 nm and nominal flake thickness ~10 nm but with an agglomerated particle size between 3.8 to 4.9 µm

4. FIRST AID MEASURES

Description of first aid measures

General advice:
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

Inhalation:
If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. When symptoms occur: go into open air and ventilate suspected area. Consult a physician.

Skin contact:
Wash off with soap and plenty of water. Consult a physician.

Eye contact:
Rinse thoroughly with plenty of water for at least 15 minutes occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Consult a physician.

Ingestion:
Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

Most important symptoms/effects, acute and delayed
The most important known symptoms and effects are described in the labeling (see section 2.2) and/or in Section 11.

Indication of any immediate medical attention and special treatment needed
No data available.

5. FIRE-FIGHTING MEASURES

Extinguishing Media:
Suitable:
Select media based on surroundings: water, carbon dioxide, dry chemical powder or foam as appropriate.

Not Suitable:
Do not use water jet when dust is present

Special hazards arising from the substance or mixture:
Material may release carbon monoxide (CO), carbon dioxide (CO2), other oxides of carbon, or other toxic gases.

Special protective equipment for fire-fighters:
Wear self-contained breathing apparatus and protective clothing to prevent contact with skin, eyes or lungs when fighting a fire.

6. ACCIDENTL RELEASE MEASURES

Minimize airborne dust and eliminate all sources of fire/ignition. Do not use air hoses for cleaning. Minimize dry sweeping to avoid generation of dust clouds. Vacuum dust accumulations. Vacuums with explosion proof motor should be used.

Personal precautions, protective equipment and emergency procedures:
No action shall be taken involving any personal risk or without suitable training. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid generating dust clouds. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. For personal protection see section 8.

Environmental precautions:
Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up:
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling:
Provide good ventilation when handling. Personnel should take measures to avoid generating and breathing dust created when handling and should wear suitable protective clothing to prevent skin and eye contact. Graphene oxide is electrically conductive and care should be taken to prevent the accumulation of material where it may lead to unwanted electrical short circuits.

Conditions for safe storage, including any incompatibilities:
Keep container tightly closed in a dry and well-ventilated place. This material is stable at room temperature and does not pose a significant risk of combustion. This material should be stored in labeled, closed containers away from sources of ignition or heat. Care should be taken to avoid creating accumulations or concentrations of dust.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control Parameters:

Component	CAS	VALUE	CONTROL PARAMETERS
Graphite	7782-42-5	8 hr TWA TLV	2 mg/m^3 respirable
		8 hr TWA	15 mg/m^3 total dust 5 mg/m^3 respirable fraction

Consult local authorities for acceptable exposure limits.

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Good general ventilation should be sufficient to control worker exposure to airborne contaminants. Wash hands before breaks and at the end of workday.

Personal Protective Equipment:
Eye protection:
Protect against contact with eyes by wearing suitable safety eyeglasses or chemical protective goggles or other face protection. Safety glasses with side shields recommended.

Skin protection:
Handle with 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.

Body protection:
Impervious clothing, the type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory:
A respiratory protection program that meets applicable OHSA requirements (NIOSH approved) should be maintained in the workplace and used if exposures exceed established limits.

Environmental Exposure Controls:
To not let product enter drains. Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance Form: solid powder, black
Odor: No data available
Odor Threshold: No data available
pH: No data available
Melting point: ~3,600°C
Initial boiling point and boiling range: No data available
Flash point: No data available

Evaporation rate: No data available
Flammability (solid, gas) No data available
Upper/lower flammability or explosive limits: No data available
Explosion Severity (K_{st} Value): 120 bar.m / s
Minimum Ignition Energy: > 10 J
Vapor pressure: No data available
Vapor density: No data available
Absolute density: 1.8 g/cm^3
Water solubility: No data available
Partition coefficient: n-octanol/water: No data available
Auto-ignition temperature: No data available
Decomposition temperature: No data available
Viscosity: No data available
Particle size range (mean diameter over volume): 3.8 to 4.9 µm
Particle characteristics:
Classified as a nanoform material (per EU Commission Recommendation of 18 October 2011)
Crystalline, high-aspect-ratio flake
Surface area 255-325 m2/g (BET method)
Nominal flake (primary particle) width ~500 nm and nominal flake thickness <20 nm, but with an agglomerated particle size between 3.8 to 4.9 µm

10. STABILITY AND REACTIVITY

Reactivity:
Reacts with excessive heat or contact with incompatible materials.

Chemical stability:
Stable under recommended storage conditions.

Possibility of hazardous reactions:
No data available.

Conditions to avoid:
No data available.

Incompatible materials:
Strong oxidizing agents, fluorine, or chlorine trifluoride.

Hazardous Decomposition Products:
There are no known hazardous decomposition products.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:
No data available.

Skin corrosion/irritation: No data available
Serious Eye Damage/Irritation: No data available
Respiratory or Skin Sensitization: No data available
Germ Cell Mutagenicity: No data available
Teratogenicity: No data available
Carcinogenicity: No data available
Specific Target Organ Toxicity (repeated exposure): No data available
Reproductive Toxicity: No data available
Specific Target Organ Toxicity (Single Exposure): No data available
Aspiration Hazard: No data available
Potential Adverse Human Health Effects and Symptoms: No known significant effects or critical hazards.
Symptoms/Injuries After Inhalation: No known significant effects or critical hazards.
Symptoms/Injuries After Skin Contact: No known significant effects or critical hazards.
Symptoms/Injuries After Eye Contact: No known significant effects or critical hazards.
Symptoms/Injuries After Ingestion: No known significant effects or critical hazards.
Chronic Symptoms: No known significant effects or critical hazards.

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

Ecotoxicity:
No data available.

Persistence and degradability:
No data available.

Bioaccumulative potential:
No data available.

Mobility in the soil:
No data available.

Other adverse effects:
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

13. DISPOSAL CONSIDERATIONS

Waste disposal:

The generation of waste should be avoided or minimized wherever possible. Disposal of this product and any by-products should at all times comply with the requirements of

environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

14. TRANSPORT INFORMATION

This material is not regulated for transport under US DOT, IMDG, TDG, or ICAO/IATA regulations.

UN Number: The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

UN proper shipping name: Not classified for transportation.

Transport hazard class: Not classified for transportation.

Packing group: Not classified for transportation.

Environmental hazards: Environmentally hazardous substances / marine pollutant: no

Transport in bulk: Not classified for transportation.

Special precautions: Not classified for transportation.

15. REGULATORY INFORMATION

Toxic Substances Control Act (TSCA):
Material is included on or exempted from listing on the TSCA Inventory of Chemical Substances.

SARA 302 Components:
Not listed.

SARA 311/312 Components:
Acute health hazard.

SARA 313 Components:
This material does not contain any chemical components with known CAS numbers that exceed the threshold reporting levels established by SARA Title III, Section 313.

Massachusetts Right To Know Components:
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components:

Component	CAS	Revision Date
Graphene Oxide	n/a	

New Jersey Right To Know Components:

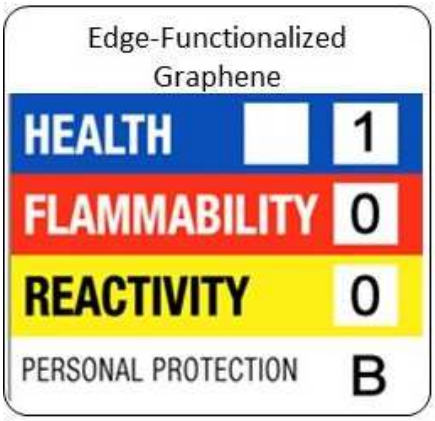
Component	CAS	Revision Date
Graphene Oxide	n/a	

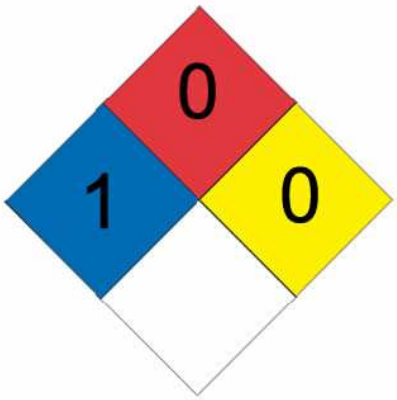
California Prop 65 Components:
This material does not contain any chemical known to the State of California to cause cancer, birth defects, or other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.
Eye Irrit. Eye irritation
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
STOT SE Specific target organ toxicity - single exposure

HMIS – Hazardous Materials Identification System
Health – 1 Flammability – 0 Physical Hazard – 0 PPE – B





Further Information:
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