

MATERIAL SAFETY DATA SHEET

GRAPHENE OXIDE

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

1.1 Product Details

Name	Graphene Oxide
REACH NO.	A registration number is not available for this substance as the substance or its uses are exempted from registration or the annual tonnage does not require a registration.

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

Identified Uses:

Additive material for energy, coating, electronics, composites, etc. For professional use only. For R&D and industrial use only.

1.3 Supplier Details

Supplied By:	Stanford Advanced Materials 23661 Birtcher Dr., Lake Forest, CA 92630 U.S.A.
Telephone:	(949) 407-8904
Email:	sales@samaterials.com

SECTION 2: Hazards Identification

2.1 Classification of the substance or mixture

Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008. Substance properties have been derived from graphite (bulk substance); the properties of the single/few-layer nanomaterial is under evaluation and to some extent not known.

2.2 Label elements

No label required.

2.3 Other hazards

Exposure may aggravate pre-existing eye, skin, or respiratory conditions.

SECTION 3: Composition/Information on Ingredients

3.1 Substances

Name	Product Identifier	%	GHS-US Classification
Carbon	(CAS-No.) 7440-44-0	>85.0	Comb. Dust
Oxygen	(CAS-No.) 7782-44-7	>14.95	Not Classified

Synonyms:	GO, Graphene Oxide
Formula:	C _x H _y O _z
Molecular Weight:	N/A

SECTION 4: First Aid Measures

4.1 Description of first aid measures

After Inhalation

Using proper respiratory protection, move the exposed person to fresh air at once. Encourage exposed person to cough, spit out, and blow nose to remove dust. Immediately call a poison center, physician, or emergency medical service.

After skin contact

Drench affected area with water for at least 5 minutes. Remove contaminated clothing. Obtain medical attention if irritation develops or persists.

After eye contact

Rinse cautiously with water for at least 5 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Obtain medical attention if irritation develops or persists.

After Ingestion

Rinse mouth. Do NOT induce vomiting. Obtain medical attention.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in section 11.

4.3 Indication of any immediate medical attention and special treatment needed

If exposed or concerned, get medical advice and attention. If medical advice is needed, have product container or label at hand.

SECTION 5: Firefighting

5.1 Extinguishing media

Suitable extinguishing media: Dry chemical, alcohol-resistant foam, carbon dioxide or water spray. Consult with local fire authorities before attempting large scale firefighting operations.

5.2 Special hazards arising from the substance of mixture

Hazardous combustion products: Carbon oxides (CO, CO₂)

5.3 Advice for firefighters

Precautionary Measures Fire: Exercise caution when fighting any chemical fire.
Firefighting Instructions: Use water spray or fog for cooling exposed containers.
Protection During Firefighting: Do not enter fire area without proper protective equipment, including respiratory protection.

SECTION 6: Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

General Measures: Avoid prolonged contact with eyes, skin and clothing. Avoid breathing dust. Avoid generating dust. Remove ignition sources. Keep away from heat, hot surfaces, sparks, open flames, and other ignition sources. No smoking.

6.2 Environmental precautions

Prevent entry to sewers and public waters.

6.3 Containment and cleaning

For Containment: Contain solid spills with appropriate barriers and prevent migration and entry into sewers or streams. Avoid generation of dust during clean-up of spills.
Methods for Cleaning Up: Clean up spills immediately and dispose of waste safely. Use explosion proof vacuum during cleanup, with appropriate filter. Do not mix with other materials. Vacuum clean-up is preferred. If sweeping is required use a dust suppressant. Use only non-sparking tools. Contact competent authorities after a spill.

SECTION 7: Handling and Storage

7.1 Precautions for safe handling

Additional Hazards When Processed: Accumulation and dispersion of dust with an ignition source can cause a combustible dust explosion. Keep dust levels to a minimum and follow applicable regulations.

Precautions for Safe Handling: Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Avoid prolonged contact with eyes, skin and clothing. Avoid breathing dust. Avoid creating or spreading dust. Keep away from heat, sparks, open flames, hot surfaces. – No smoking. **Hygiene Measures:** Handle in accordance with good industrial hygiene and safety procedures

7.2 Conditions for safe storage, including any incompatibilities

Technical Measures: Comply with applicable regulations. Avoid creating or spreading dust. Use explosion-proof electrical, ventilating, lighting equipment. Proper grounding procedures to avoid static electricity should be followed.

Storage Conditions: Keep container closed when not in use. Store in a dry, cool place. Keep/Store away from direct sunlight, extremely high or low temperatures and incompatible materials.

Incompatible Materials: Strong acids, strong bases, strong oxidizers.

7.3 Specific end uses

Additive material for energy, coating, electronics etc. For professional use only. For research & development use only.

SECTION 8: Exposure Controls/Personal Protection

8.1 Control parameters

Exposure limit sources

UK – EH40 Workplace Exposure Limits (WEL).

Component	CAS #	Control Parameters
Graphite - inhalable dust	7782-42-5	10 mg/m ³ (TWA)
Graphite - respirable dust	7782-42-5	4 mg/m ³ (TWA)

Inhalable dust is the fraction of material that is available for deposition in the respiratory tract; respirable dust is the fraction that penetrates into the gas exchange region of the lung.

Biological occupational exposure limits

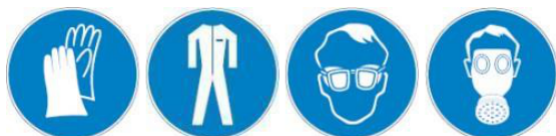
This product does not contain any hazardous materials with biological limits.

8.2 Exposure controls

Engineering measures

Suitable eye/body wash equipment should be available in the vicinity of any potential exposure. Ensure adequate ventilation, especially in confined areas. Use local exhaust or general dilution ventilation or other suppression methods to maintain dust levels below exposure limits. Power equipment should be equipped with proper dust collection devices. Proper grounding procedures to avoid static electricity should be followed. Use explosion-proof equipment. It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen-deficient environment. Ensure all national/local regulations are observed.

Personal protective equipment



Eyes: Wear safety glasses with side-shields conforming to appropriate government standards such as NIOSH (US) or EN166 (EU).

Skin: Handle with appropriate gloves and use proper glove removal technique to avoid skin contact. Dispose of gloves in accordance with applicable laws. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Clothing: Wear complete suit protecting against chemicals; the type of equipment should be appropriate for the concentration and amount of dangerous substance used.

Respirators: Where protection from nuisance dusts is needed, use type N95 (US) or type P1 (EN 143) dust masks or those approved under appropriate government standards such as NIOSH (US) or CEN (EU).

General hygiene measures

Wash thoroughly after handling. Wash contaminated clothing before reuse.

SECTION 9: Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance	Black/Dark Brown powder
Odour	Odourless
Odour threshold	No data available
pH	Neutral
Melting point	3500°C (6332°F)
Freezing point	No data available
Boiling point	>6000°C (10832°F)
Flash point	>1900°C (3452°F)
Evaporation rate	No data available
Flammability	No data available
Explosive limits	No data available
Vapour pressure	No data available
Vapour density	No data available
Bulk density	0.5 g/cm ³
Solubility	Very low (solubility standard)
Partition coefficient: <i>n</i> -octanol/water	No data available
Autoignition temperature	No data available
Decomposition temperature	No data available
Viscosity	No data available
Explosive properties	No data available
Oxidizing properties	No data available

9.2 Other safety information

No data available.

SECTION 10: Stability and Reactivity

10.1 Reactivity

Hazardous reactions will not occur under normal conditions.

10.2 Chemical stability

Stable under recommended handling and storage conditions (see section 7).

10.3 Possibility of hazardous reactions

Hazardous polymerization will not occur.

10.4 Conditions to avoid

Direct sunlight, extremely high or low temperatures, and incompatible materials. Sparks, heat, open flame and other sources of ignition. Dust accumulation (to minimize explosion hazard).

10.5 Incompatible materials

Strong acids, strong bases, strong oxidizers.

10.6 Hazardous decomposition products

None expected under normal conditions of use.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

No data available.

Skin corrosion/irritation

Prolonged exposure may cause skin irritation.

Serious eye damage/eye irritation

May cause eye irritation.

Chronic Symptoms

None expected under normal conditions of use.

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

Routes of exposure

Eye contact, ingestion, inhalation, skin contact.

Signs and Symptoms of Exposure

No data available.

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

SECTION 12: Ecological information

12.1 Toxicity

No data available.

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 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/
not conducted.

12.6 Other adverse effects

Avoid release to the environment.

SECTION 13: Disposal

13.1 Waste treatment methods

Waste Disposal Recommendations: Dispose of contents/container in accordance with local, regional, national, and international regulations.

Additional Information: Container may remain hazardous when empty. Continue to observe all precautions.

Ecology - Waste Materials: Avoid release to the environment.

SECTION 14: Transport

Non-hazardous for road, air and sea transport.

IATA: Not regulated as a hazardous material.

IMO: Not regulated as a hazardous material.

RID/ADR: Not regulated as a hazardous material.

SECTION 15: Regulatory Information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006, the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

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

No data available.

15.2 Chemical safety assessment

No chemical safety report/assessment was carried out for this product.

SECTION 16: Other Information

Warranty

This material is for research and development use only. The information provided here is based upon the available information from material suppliers but not warranted as complete and is provided only as a guide. Stanford Advanced Materials shall not be held responsible for any damage resulting from use or handling of this product.