

Graphene Solutions

## SAFETY DATA SHEET

### SECTION 1 – HAZARDOUS INGREDIENTS

<b>Chemical Name:</b> Graphene Oxide (GO)			<b>Chemical Formula:</b> C <sub>x</sub> H <sub>y</sub> O <sub>z</sub>	
<b>Chemical Identity</b>	<b>Concentration</b>	<b>CAS Number</b>	<b>OSHA PEL</b>	<b>ACGIH TLV</b>
Graphite	>>99%	7782-42-5	15 mg/m <sup>3</sup> (total dust) 5 mg/m <sup>3</sup> (respirable fraction)	2.0 mg/m <sup>3</sup>

### SECTION 2 – IDENTIFICATION OF THE COMPANY

**Product Identifier:** High-Purity Graphene Oxide Powder

**Supplier's Address:**

ZEN Graphene Solutions Ltd.  
1205 Amber Drive, Unit 210  
Thunder Bay, Ontario  
P7B 6M4, Canada

**Telephone Number:**

(844) 730-9822

**E-mail:**

info@zengraphene.com

**Date of Preparation:**

October 1, 2019

**Product Use:** Test Sample.

### SECTION 3 – PHYSICAL & CHEMICAL PROPERTIES

<b>Physical State:</b> Solid Dark Brown Powder	<b>Odour and Appearance:</b> Odourless
<b>Specific Gravity (water = 1):</b> Not Available	<b>Odour Threshold:</b> Not Available
<b>pH (1% soln/water):</b> Not Available	<b>Vapour Pressure:</b> Not Available
<b>Percent Volatile (by volume):</b> Not Available	<b>Vapour Density (Air = 1):</b> Not Applicable
<b>Evaporation Rate (BuAc = 1):</b> Not Applicable	<b>Boiling Point (°C) Decomposition Temperature:</b> Not Available
<b>Solubility in Water:</b> Insoluble (dispersion only)	<b>Freezing Point/Melting Point (°C):</b> ~-3600°C
<b>Bulk Density:</b> 1.0 – 2.0 g/cm <sup>3</sup>	<b>Density:</b> 2.08 – 2.30 g/cm <sup>3</sup> (25°C)

### SECTION 4 – FIRE EXPLOSION HAZARD

**Suitable Extinguishing Media:**

Graphene Oxide is difficult to combust. Extinguishing measures to suit surroundings.

**Special Hazards Arising from the Substance or Mixture:**

In the event of fire, the following can be released: Carbon monoxide (CO); and Carbon dioxide (CO<sub>2</sub>).



Graphene Solutions

## SAFETY DATA SHEET

**Conditions of Flammability:**

May be combustible at high temperature.

**Means of Extinction:**

For small fires, use water spray, dry chemical, carbon dioxide or chemical foam.

**Fire Hazards in Presence of Various Substances:**

Slightly flammable to flammable in presence of open flames and sparks of heat, of oxidizing materials.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of moisture.

**Fire Fighting Media and Instructions:**

SMALL FIRE: Use dry chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

**Special Remarks on Fire Hazards:**

It will ignite on contact with chlorine trifluoride and fluorine. Graphite dust may ignite on contact with air. May re-ignite after fire is extinguished.

**Special Remarks on Explosion Hazards:**

Material in powder form, capable of creating an explosion on contact with water at high temperatures.

**Explosion Data****Sensitivity to Mechanical Impact:**

Not Available

**Sensitivity to Static Discharge:**

Not Available

**Flashpoint (°C) and Method:**

CLOSED CUP: Higher than 93.3°C

**Upper Flammable Limit %:**

Not Applicable

**Lower Flammable Limit %:**

Not Applicable

**Auto-Ignition Temperature (°C):** Dispersed dust cloud - >600°C, deposited dust - >365°C.

**Hazardous Combustion Products:** Possibly CO

### SECTION 5 – REACTIVITY DATA

**Stability:** The product is stable.

**Incompatible Materials:**

Reactive with strong oxidizing agents (e.g. chlorates, bromates, and nitrates, especially when heated), acids and alkalis. Incompatible with chlorinated paraffins, lead oxide, manganese oxide, iron oxide, liquid oxygen, oils, moisture, chlorine trifluoride, fluoride and potassium superoxide. Reacts at 300°C with potassium, sodium, rubidium and cesium to give intercalation compounds. These compounds ignite in air and may react explosively with water.



Graphene Solutions

## SAFETY DATA SHEET

**Conditions of Reactivity:**

Incompatible Materials (Fluorine and Chlorine Trifluoride).

**Hazardous Decomposition Products:**

On burning may release carbon dioxide and carbon monoxide.

### SECTION 6 – TOXICOLOGICAL PROPERTIES

**Route of Entry:**

Skin Contact       Skin Absorption       Eye Contact       Inhalation       Ingestion

**Effects of Acute Exposure to Product:**

Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

**Effects of Chronic Exposure to Product:**

CARCINOGENIC EFFECTS: Not available.  
MUTAGENIC EFFECTS: Not available.  
TERATOGENIC EFFECTS: Not available.  
DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to upper respiratory tract. The substance may be toxic to cardiovascular system. Repeated or prolonged exposure to the substance can produce target organs damage.

**Exposure Limits:**

Not Available

**Irritancy to Product:**

Eyes and Skin.

**Synergistic Products:**

Not Available.

**Evidence of Carcinogenicity, Reproductive Toxicity, Teratogenicity or Mutagenicity:**

**NIOSH:** Occupational carcinogen: Unknown  
**NTP:** Suspect carcinogen: Unknown  
**OSHA:** Possible Select carcinogen: Unknown  
**IARC:** Groups 1-4: Unknown

**Sensitivity to Product:**

Not Available.

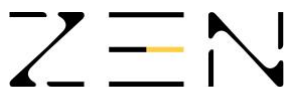
### SECTION 7 – PREVENTATIVE MEASURES

**Personal Protective Equipment:**

Safety glasses or goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

**Gloves (specify):** Latex or Nitrile.

**Respiratory (specify):** Dust respirator (approved/certified). Use NIOSH/MSHA approved mask for chemical products if ACGIH, OSHA and/or TWA limits will be exceeded.



Graphene Solutions

## SAFETY DATA SHEET

<b>Eye (specify):</b> Safety glasses or goggles.	<b>Footwear (specify):</b> As applicable to work requirements.
<b>Other Equipment (specify):</b> Lab coat.	<b>Special Shipping Information:</b> Not Applicable.
<b>Engineering Controls (e.g. ventilation, enclosed process, specify):</b> Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust use ventilation to keep exposure to airborne contaminants below the exposure limit.	
<b>Leak and Spill Procedure:</b> Carefully vacuum or sweep up material. Avoid generating dusty conditions. Wash floor with soap and water. Containerize for solid waste disposal. Use appropriate tools to put the spilled solid in a convenient waste disposal container. In case of large spill: Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and washing surface with soap. Place signs to indicate wet and slippery surfaces until affected surfaces are dry.	
<b>Waste Disposal:</b> Waste must be disposed of in accordance with federal, provincial and local environmental control regulations.	
<b>Handling Procedures and Equipment:</b> Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation. Do not ingest. Do not breathe dust. Avoid contact with eyes. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids.	
<b>Storage Requirements:</b> Keep containers tightly closed when not in use. Graphite causes slippery conditions. Graphite, being conductive, can cause short circuits and other electrical malfunctions.	
<b>SECTION 8 – FIRST AID MEASURES</b>	
<b>General Information:</b> In case of persisting adverse effects, consult a physician. Remove contaminated clothing and shoes immediately, and launder thoroughly before reusing.	
<b>Inhalation:</b> If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.	
<b>Ingestion:</b> If victim is conscious and alert, give 2-4 cup full of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.	



Graphene Solutions

## SAFETY DATA SHEET

### Eye Contact:

Check for and remove any contact lenses. Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid.

### Skin Contact:

Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.

## SECTION 9 – HANDLING AND STORAGE

### Advice on Safe Handling:

Provide good ventilation of working area (local exhaust ventilation, if necessary). If workplace exposure limits are exceeded, respiratory protection approved for this particular job must be worn.

### General Protective and Hygiene Measures:

Do not eat, drink or smoke during work time. Keep away from foodstuffs and beverages. Avoid contact with eyes and skin. Remove soiled or soaked clothing immediately. Wash hands before breaks and after work. Do not inhale dust. Provide eye wash fountain in work area.

### Advice on Protection Against Fire and Explosion:

Dust can form an explosive mixture with air. Take precautionary measures against static charges. Keep away from sources of heat and ignition.

### Technical measures and Storage Conditions:

Keep container tightly closed and dry.

### Requirements for Storage Rooms and Vessels:

Containers which are opened must be carefully resealed and kept upright to prevent leakage. Always keep in containers of same material as the original one.

## SECTION 10 – ADDITIONAL INFORMATION

### SDS Creation Date: 01/10/2019

*The information above is believed to be accurate and represents the best information currently available to ZEN Graphene Solutions Ltd. (ZEN). However, ZEN makes no warranty of merchantability or any other warranty, express or implied, with respect to such information, and it assumes no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purpose. In no way shall ZEN be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ZEN has been advised of the possibility of such damages.*