



## MATERIAL SAFETY DATA SHEET

### Trade name: xGnP® Graphene Nanoplatelets

Revised April, 2010

#### 1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: xGnP® Graphene Nanoplatelets

Common Names: natural graphite flakes, graphene sheets, exfoliated graphite, graphite powder

Manufacturer: XG Sciences, Inc.

5020 Northwind Drive, Ste. 212

East Lansing, MI 48823

Telephone: 01.517.203.1110

Fax: 01.517.203.4140

#### 2. HAZARD IDENTIFICATION

**EMERGENCY OVERVIEW: THIS MATERIAL MAY BE AN IRRITANT TO EYES, SKIN OR RESPIRATORY TRACT.**

##### **Potential Health Effects:**

Eyes – may cause eye irritation.

Skin – may cause skin irritation.

Respiratory tract/inhalation – may cause irritation.

Ingestion – not hazardous in normal industrial use circumstances.

Cancer – natural graphite may contain small amounts of impurities of 0% - 1% crystalline silica, which is listed as a Group 1 carcinogen by IARC and as a suspected human carcinogen by ACGIH. Inhalation of high concentrations of crystalline silica over prolonged periods of time has been linked to an increase in lung cancer. Inhalation of high concentrations of crystalline silica over prolonged periods of time may also cause silicosis. Inhalation of high concentrations of graphite dust over prolonged periods of time may cause pneumoconiosis.

##### **Physical Hazards:**

Graphite is electrically conductive. Care should be taken, therefore, to avoid accumulations of graphite dusts or powders in places where these accumulations could cause shorting of electrical switches, circuits or components.

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#### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Material: Graphite

CAS Registry No.: 7782-42-5

Concentration: > 97% by weight when shipped as a bulk powder

Physical appearance: a gray or black fine powder.

Density: 1.9 – 2.2 g/cc. However, the bulk density when shipped as a powder varies from .05 to 1.0 g/cc depending on particle size.

Melting point: > 3,600° C

Elemental composition: >99.5% Carbon

Potential Impurities or contaminants:

Material: Crystalline Silica

CAS Registry No.: 14808-60-7

Concentration: < .5% by weight

#### 4. FIRST AID MEASURES

**General:** In the case of prolonged irritation or other adverse effects, contact a physician.

**Inhalation:** Remove from exposure to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, begin artificial respiration immediately. Seek medical attention.

**Eye contact:** Flush eyes with water for 15 minutes.

**Skin contact:** Wash with soap and water.

**Ingestion:** Rinse mouth with water.

**Clothing:** contaminated clothing should be removed and washed thoroughly before re-use.

#### 5. FIRE FIGHTING MEASURES

In general, graphite is difficult to combust. Normal care should be taken to avoid dust explosion risk through high concentrations of dust or finely-suspended airborne particles, although graphite dust is not normally considered an explosion hazard.

**Suitable Extinguishing Media:** water, carbon dioxide, dry chemical powder or foam as appropriate for surroundings.

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**Other Combustion Hazards:** in the event of combustion or thermal decomposition, this material may release carbon monoxide (CO) or carbon dioxide (CO<sub>2</sub>) or other toxic gases. At temperatures over 300° C. this material may react with potassium, sodium, rubidium, or cesium to create intercalation compounds that may ignite and may react explosively with water.

**Protective Equipment:** As with any fire, wear self-contained breathing apparatus and protective clothing to prevent contact with skin, eyes or lungs.

#### 6. ACCIDENTAL RELEASE MEASURES

Spilled or released material should be collected mechanically and disposed of in suitable containers. Use care during cleanup to prevent the creation of concentrations of dust.

**Personnel:** Clean-up personnel should wear suitable protective equipment to prevent inhalation or skin contact. Cleanup personnel should beware of the risk of slippage due to the material's low coefficient of friction.

**Environmental:** Do not discharge into storm or sanitary sewers or groundwater.

#### 7. HANDLING AND STORAGE

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, since any dust can form a potentially explosive mixture in air. Graphite is electrically conductive. Care should be taken, therefore, to avoid accumulations of graphite dusts or powders in places where these accumulations could cause shorting of electrical switches, circuits or components.

**Advice on Safe Handling:** Provide good ventilation when handling. Personnel should take measures to avoid breathing dust created when handling and should wear suitable protective clothing to prevent skin and eye contact.

#### 8. EXPOSURE CONTROL/PERSONAL PROTECTION

##### Exposure Guidelines

Graphite (CAS no. 7782-42-5) TWA:  
ACGIH (TLV): 2.0 mg/m<sup>3</sup> respirable  
OSHA (PEL): 15 ml/m<sup>3</sup> respirable



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Crystalline Silica (CAS no. 14808-60-7) TWA:

ACGIH (TLV): 0.025 mg/m<sup>3</sup> respirable

OSHA (PEL): 10 mg/m<sup>3</sup> respirable

#### Personal Protective Equipment

**Respiratory protection:** Protect against inhalation. A respiratory protection program that meets applicable OSHA requirements should be maintained in the workplace.

**Eye protection:** Protect against contact with eyes by wearing suitable safety eyeglasses or chemical protective goggles or other face protection.

**Skin protection:** Protect against skin contact by wearing protective gloves. Protect against skin contact by wearing suitable clothing.

#### Engineering Controls

Provide adequate workplace ventilation. If dusts are generated through handling, local exhaust ventilation should be employed.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: a gray or black powder

Odor: odorless

Melting point: approximately 3,600° C

Flash point: not applicable

Boiling point: not applicable

Vapor density: not applicable

Bulk density: .05 – 1.0 g/c<sup>3</sup>

Solubility in water: negligible

Evaporation Rate: not applicable

Ignition temperature: dispersed dust cloud - >600° C, deposited dust - >365° C

### 10. STABILITY AND REACTIVITY

This material is stable.

Avoid contact with strong oxidizing agents, fluorine, or chlorine trifluoride.

There are no known hazardous decomposition products.

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### 11. TOXICOLOGICAL INFORMATION

#### Acute oral toxicity

Graphite: LD<sub>50</sub> Rat > 2g/kg

#### Irritant effect on skin

Graphite: non-irritant, rabbit, 4 hours exposure

#### Irritant effect on eyes

Graphite: slight irritant, rabbit

#### Carcinogenicity

This material may contain impurities of less than .5% crystalline silica, which is listed by IARC as a known human carcinogen and by ACGIH as A2 (suspected human carcinogen).

### 12. ECOLOGICAL INFORMATION

Graphite is a naturally-occurring substance that is found throughout the world. It is not biodegradable. To our knowledge, there is no reliable data regarding its bioaccumulation or mobility in environmental media, nor is there reliable data to suggest that it should be considered an environmental hazard.

### 13. DISPOSAL CONSIDERATIONS

Dispose of in accordance with all local, state, or federal regulations.

### 14. TRANSPORT INFORMATION

This material is not defined under US DOT, IMDG, GGVSee, or ICAO/IATA regulations as a hazardous substance. This material is not defined under Canadian Transport Dangerous Goods Directorate regulations as a hazardous substance.

### 15. REGULATORY INFORMATION

Graphite (CAS no. 7782-42-5) is not listed as a hazardous material under US Federal regulations. It is not listed under the Clean Air Act, the Clean Water Act, SARA (section 302, section 311/312, or section 313), HAPS, or IARC.

Graphite (CAS no. 7782-42-5) is listed on:



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US: TCSA

Canada: DSL

EC: EINECS

This product has WHMIS (Canada) classification D2A

### 16. OTHER INFORMATION

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. XG Sciences makes no representation 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.