MATERIAL SAFETY DATA SHEET

1 PRODUCT AND COMPANY IDENTIFICATION

Product Name: Graphite and Carbon By-Product

Synonyms: Graphite/Carbon

Manufacturer Name: UCAR Carbon Company Inc.
a GrafTech International Ltd. company
12900 Snow Road
Parma, Ohio 44130
+1 216-676-2000

Emergency Telephone: +1 800-424-9300 or +1 703-527-3887

Contact Person: Dave A. Mieskowski, CSP,
+1 216-676-2304

Intended Use: Carbon based additive

2 HAZARDS IDENTIFICATION

Emergency Overview
Physical State: Solid (granules)
Color: Gray-black
Odor: No characteristic odor

CAUTION!
May cause eye, skin and respiratory tract irritation.

Potential Health Effects

Inhalation: Dust and fumes generated from the material can enter the body by inhalation. High concentrations of dust and fumes may irritate the throat and respiratory system and cause coughing. Frequent inhalation of fume/dust over a long period of time increases the risk of developing lung diseases.

Eye Contact: Dust in the eyes will cause irritation. Exposed individuals may experience eye tearing, redness, and discomfort.

Skin Contact: Dust may irritate skin. Prolonged skin contact may cause redness, irritation and dry skin. May cause eczema-like skin disorders (dermatitis).

Ingestion: Ingestion of dusts generated during working operations may cause nausea and vomiting.

Chronic Health Effects: Prolonged and repeated overexposure to dust can lead to pneumoconiosis. Pre-existing pulmonary disorders, such as emphysema, may possibly be aggravated by prolonged exposure to high concentrations of graphite and/or carbon dusts. Skin contact may aggravate an existing dermatitis.
Target Organ(s):  |  Eye  |  Skin  |  Lung  |

Potential Physical / Chemical Effects:  Bulk material is non-combustible. The material may form dust and can accumulate electrostatic charges, which may cause an electrical spark (ignition source). High dust levels may create potential for explosion. Care should be taken to seal electrical circuits and switches that may be affected. Dusts should not be emitted to the atmosphere where they may settle on and cause shorting of outside electrical equipment.

OSHA Regulatory Status:  This product is hazardous according to OSHA 29CFR 1910.1200.

Environment:  The environmental hazard of the product is considered to be limited.

### 3  COMPOSITION / INFORMATION ON INGREDIENTS

General Information:  Please note that the amount of each ingredient can vary.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No.</th>
<th>Concentration*</th>
</tr>
</thead>
<tbody>
<tr>
<td>†Carbon</td>
<td>7440-44-0</td>
<td>5 - 45%</td>
</tr>
<tr>
<td>†Coke, Coal (Metallurgical Coke)</td>
<td>65996-77-2</td>
<td>1 - 15%</td>
</tr>
<tr>
<td>†Synthetic Graphite</td>
<td>7782-42-5</td>
<td>40 - 90%</td>
</tr>
</tbody>
</table>

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.
† This chemical is hazardous according to OSHA/WHMIS criteria.

### 4  FIRST AID MEASURES

**Inhalation:**  If breathing stops, provide artificial respiration. For breathing difficulties, oxygen may be necessary. Move the exposed person to fresh air at once. In case of persistent throat irritation or coughing: Seek medical attention and take along these instructions.

**Eye Contact:**  Flush thoroughly with water for at least 15 minutes. Do not rub eye. If irritation occurs, get medical assistance.

**Skin Contact:**  Wash skin with soap and water. Get medical attention if irritation develops and persists. If skin rash or an allergic skin reaction develops, get medical attention.

**Ingestion:**  Rinse nose, mouth and throat with water. Get medical attention if any discomfort continues.

### 5  FIRE-FIGHTING MEASURES

**Extinguishing Media:**  Dust:  Extinguish with foam, carbon dioxide, dry powder or water fog.

**Unsuitable Extinguishing Media:**  None.

**Special Fire Fighting Procedures:**  Cool material exposed to heat with water spray and remove it if no risk is involved.
Unusual Fire & Explosion Hazards: Thermal decomposition may produce smoke, oxides of carbon and lower molecular weight organic compounds whose composition have not been characterized. Explosive dust mixtures can be formed at concentrations as low as 25 g/m³ when carbon/graphite dusts are milled to less than 50 microns.

Hazardous Combustion Products: Carbon Oxides, Unidentified organic compounds

Protective Measures: Self-contained breathing apparatus, operated in positive pressure mode and full protective clothing must be worn in case of fire.

Flammability Class: NFPA Rating Fire = 1.

6 ACCIDENTAL RELEASE MEASURES

Personal Precautions: Avoid generation and spreading of dust. Avoid inhalation of dust and contact with skin and eyes. Remove sources of ignition. Wear suitable protective clothing and gloves. See Section 8 of the MSDS for Personal Protective Equipment.

Spill Cleanup Methods: Collect dust using a vacuum cleaner equipped with HEPA filter. If not possible, gently moisten dust with water fog before it is collected with shovel, broom or the like. Collect in approved containers and seal securely. Containers must be labeled. For waste disposal, see section 13 of the MSDS.

Environmental Precautions: No specific precautions. Do not allow material to enter storm or sanitary sewers, groundwater or soil.

Notification Procedures: In the event of accidental release, notify relevant authorities in accordance with all applicable regulations.

7 HANDLING AND STORAGE

Handling: Use work methods which minimize dust production. Avoid inhalation of dust and contact with skin and eyes. Wear appropriate personal protective equipment. Carbon, coal and graphite dusts are electrically conductive. Take precautionary measures against static discharges when there is a risk of dust explosion. Use explosion-proof electrical equipment if airborne dust levels are high. Keep away from heat, spark, open flames and other sources of ignition. Keep the workplace clean. Observe good industrial hygiene practices.

Storage: Keep away from heat, spark, open flames and other sources of ignition. Keep container closed.
8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Limits:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Source</th>
<th>Type</th>
<th>Exposure Limits</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon (Respirable dust.)</td>
<td>ACGIH</td>
<td>TWA</td>
<td>3 mg/m³</td>
<td>General dust</td>
</tr>
<tr>
<td>Carbon (Inhalable dust.)</td>
<td>ACGIH</td>
<td>TWA</td>
<td>10 mg/m³</td>
<td>General dust</td>
</tr>
<tr>
<td>Carbon (Total dust.)</td>
<td>US. OSHA</td>
<td>TWA</td>
<td>15 mg/m³</td>
<td>General dust</td>
</tr>
<tr>
<td>Carbon (Respirable fraction.)</td>
<td>US. OSHA</td>
<td>TWA</td>
<td>5 mg/m³</td>
<td>General dust</td>
</tr>
<tr>
<td>Synthetic Graphite (Respirable</td>
<td>ACGIH</td>
<td>TWA</td>
<td>2 mg/m³</td>
<td></td>
</tr>
<tr>
<td>fraction.)</td>
<td>NIOSH Guide</td>
<td>IDLH</td>
<td>1250 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Synthetic Graphite</td>
<td>OSHA Z3</td>
<td>TWA</td>
<td>15 Mppcf</td>
<td></td>
</tr>
<tr>
<td>Synthetic Graphite (Respirable</td>
<td>US. OSHA</td>
<td>TWA</td>
<td>5 mg/m³</td>
<td></td>
</tr>
<tr>
<td>fraction.)</td>
<td>Table Z-1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Consult Canadian Provincial Regulations and/or Mexican Regulations on exposure limits, if applicable.

Engineering Controls: Provide adequate ventilation. Mechanical ventilation or local exhaust ventilation may be required. Provide explosion-proof ventilation for high dust concentrations. Observe occupational exposure limits and minimize the risk of inhalation of dust and fumes. Provide access to washing facilities including soap, skin cleanser and fatty cream.

Respiratory Protection: If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA Standard 63 FR 1152, January 8, 1998. Respirator type: Use a NIOSH–approved respirator if there is a potential for exposure to dust exceeding exposure limits (See 29 CRF 1910.134, respiratory protection standard). Seek advice from supervisor on the company's respiratory protection standards.

Eye Protection: Wear safety glasses with side shields (or goggles).

Hand Protection: Wear suitable protective gloves to prevent cuts and abrasions. Suitable gloves can be recommended by the glove supplier.

Skin Protection: Wear appropriate clothing to prevent repeated or prolonged skin contact.

Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

Environmental Exposure Controls: Environmental manager must be informed of all significant spillages.
9 PHYSICAL AND CHEMICAL PROPERTIES

Color: Gray-black
Odor: No characteristic odor
Odor Threshold: Not applicable.
Physical State: Solid (granules)
pH: Not applicable.
Melting Point: >2760°C (5000°F)
Freezing Point: Not applicable.
Boiling Point: Not applicable.
Flash Point: Not applicable.
Evaporation Rate: Not applicable.
Flammability Limit - Upper (%): Not applicable.
Flammability Limit - Lower (%): Not applicable.
Vapor Pressure: Not applicable.
Vapor Density (Air=1): Not applicable.
Specific Gravity: 1.7
Solubility in Water: Insoluble
Solubility (Other): No data available.
Partition Coefficient (n-Octanol/water): No data available.
Autoignition Temperature: Not applicable.
Decomposition Temperature: >2760°C (5000°F)

10 STABILITY AND REACTIVITY

Stability: Material is stable under normal conditions.
Conditions to Avoid: Dust is combustible, avoid sources of ignition and strong oxidizing agents.
Incompatible Materials: Strong oxidizing agents.

Hazardous Decomposition Products:
At Elevated Temperatures: Carbon Oxides, Unidentified organic compounds

Possibility of Hazardous Reactions: Will not occur.

11 TOXICOLOGICAL INFORMATION

Listed Carcinogens: None.

Product Information
Acute Toxicity: High concentrations of dust may irritate throat and respiratory system and cause coughing. May cause eye irritation. May dry the skin leading to discomfort and dermatitis.

Chronic Toxicity: Frequent inhalation of fume/dust over a long period of time increases the risk of developing lung diseases. Prolonged and repeated overexposure to dust can lead to pneumoconiosis. Pre-existing pulmonary disorders, such as emphysema, may possibly be aggravated by prolonged exposure to high concentrations of graphite dusts. Skin contact may aggravate an existing dermatitis.
12 ECOLOGICAL INFORMATION

Ecotoxicity: The product is not expected to be hazardous to the environment.

Mobility: The product is insoluble in water and will sediment in water systems.

Persistence and Degradability: The degradability of the product has not been stated.

Bioaccumulation Potential: No data available on bioaccumulation.

Other Adverse Effects: None known.

13 DISPOSAL CONSIDERATIONS

General Information: Dispose of waste and residues in accordance with local authority requirements.

Disposal Methods: Disposal recommendations are based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal. Recover and reclaim or recycle, if practical.

Container: Since emptied containers retain product residue, follow label warnings even after container is emptied.

14 TRANSPORT INFORMATION

DOT Not regulated.

TDG Not regulated.

IATA Not regulated.

IMDG Not regulated.

15 REGULATORY INFORMATION

Canadian Controlled Products Regulations: This product has been classified according to the hazard criteria of the Canadian Controlled Products Regulations, Section 33, and the MSDS contains all required information.

WHMIS Classification: Not classified.

Mexican Dangerous Statement: This product is dangerous according to Mexican regulations.

Inventory Status

This product or all components are listed on the following inventory: EINECS, DSL, PICCS, AICS, CHINA, TSCA, KECI
US Regulations

- : No reportable quantity.

SARA Title III

Section 311/312 (40 CFR 370):
X Acute (Immediate)  X Chronic (Delayed)  □ Fire  □ Reactive  □ Pressure Generating

Section 313 Toxic Release Inventory (40 CFR 372): Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):
Not regulated.


Drug Enforcement Act: Not regulated.

TSCA:
TSCA Section 4(a) Final Test Rules & Testing Consent Orders: Not regulated.


TSCA Section 5(e) PMN-Substance Consent Orders: Not regulated.


State Regulations

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):
Not regulated.

Massachusetts Right-To-Know List: Synthetic Graphite


Minnesota Hazardous Substances List: Synthetic Graphite

New Jersey Right-To-Know List: Not regulated.

Pennsylvania Right-To-Know List: Carbon; Synthetic Graphite

Rhode Island Right-To-Know List: Synthetic Graphite
HAZARD RATINGS

<table>
<thead>
<tr>
<th>NFPA</th>
<th>Health Hazard</th>
<th>Fire Hazard</th>
<th>Instability</th>
<th>Special Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>--</td>
</tr>
</tbody>
</table>

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe
NFPA Label colored diamond code: Blue - Health; Red - Flammability; Yellow - Instability; White - Special Hazards

<table>
<thead>
<tr>
<th>HMIS</th>
<th>Health Hazard</th>
<th>Flammability</th>
<th>Physical Hazard</th>
<th>Personal Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1*</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>B</td>
</tr>
</tbody>
</table>

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe
Personal Protection codes: B - Safety Glasses, Gloves
HMIS Label colored bar code: Blue - Health; Red - Flammability; Orange - Physical Hazards; White - Special

General Information: UCAR CARBON COMPANY INC. ADVISES THE USERS OF THIS PRODUCT TO STUDY THIS MATERIAL SAFETY DATA SHEET (MSDS) AND BECOME AWARE OF PRODUCT HAZARDS AND SAFETY INFORMATION. TO PROMOTE SAFE USE OF THIS PRODUCT, USERS SHOULD NOTIFY THEIR EMPLOYEES, AGENTS AND CONTRACTORS OF THE INFORMATION ON THIS MSDS AND ANY PRODUCT HAZARDS AND SAFETY INFORMATION.

Issue Date: 23-Jul-2007
Supercedes Date: 23-Jul-2007
SDS No.: 1147 NA
Disclaimer: This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.