Specifcation and Safety Data Sheet
MCMB (MesoCarbon MicroBeads) Graphite Powder for Li-ion Battery Anode
EQ-Lib-MCMB

Battery Related Specification

- Chemical: MCMB (MesoCarbon MicroBeads)
- Container sealed in Al vacuumed bag.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Data</th>
<th>Testing Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>D10</td>
<td>µm</td>
<td>8.087</td>
<td>Mastersizer 2000</td>
</tr>
<tr>
<td>D50</td>
<td>µm</td>
<td>17.649</td>
<td>Mastersizer 2000</td>
</tr>
<tr>
<td>D90</td>
<td>µm</td>
<td>33.080</td>
<td>Mastersizer 2000</td>
</tr>
<tr>
<td>Tap Density</td>
<td>g/cm³</td>
<td>1.324</td>
<td>FZS4-4</td>
</tr>
<tr>
<td>Moisture</td>
<td>%</td>
<td>0.035</td>
<td>Sartorius HN101-Drying Tankder</td>
</tr>
<tr>
<td>Carbon (C)</td>
<td>%</td>
<td>99.96</td>
<td>Sartorius KSW-Heat Oven</td>
</tr>
<tr>
<td>Specific Surface Area</td>
<td>m²/g</td>
<td>2.022</td>
<td>ST-08 SSA</td>
</tr>
<tr>
<td>First Discharge Capacity</td>
<td>mAh/g</td>
<td>345.2</td>
<td>Half cell test</td>
</tr>
<tr>
<td>First Coulombic Efficiency</td>
<td>%</td>
<td>93.40</td>
<td>Half cell test</td>
</tr>
</tbody>
</table>

1. Product and Company Identification

Product Name: Graphite
CAS#: 7782-42-5
Chemical Formula: C
Identified uses: Laboratory chemicals, Manufacture of substances

Contact Information:
MTI Corporation
860 South 19th Street
Richmond, CA 94804, USA
Tel: 510-525-3070
Fax: 510-525-4705
Email: info@mtixtl.com
Website: www.mtixtl.com

Non-emergency assistance: 1-888-525-3070

Emergency assistance:
Company: CHEMTEL (MTI Contract# MIS2559467) Day or Night
Tel (Within USA and Canada): 1-800-255-3924
Tel (Outside USA and Canada): 1-813-248-0585
2. Hazards Identification

Emergency Overview: GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Not a hazardous substance or mixture.

HMIS Rating
Health hazard: 0
Chronic Health Hazard:
Flammability: 0
Physical Hazard 0

NFPA Rating
Health hazard: 0
Fire Hazard: 0
Reactivity Hazard: 0

GHS Label elements, including precautionary statements
Not a hazardous substance or mixture.

Hazards not otherwise classified (HNOC) or not covered by GHS
none

3. Composition/Information on Ingredients

Substance Name: Graphite
Formula: C
Molecular Weight: 12.01 g/mol
CAS-No.: 7782-42-5

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphite</td>
<td></td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

4. First Aid Measures

4.1 Description of first aid measures
If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
In case of skin contact
Wash off with soap and plenty of water.
In case of eye contact
Flush eyes with water as a precaution.
If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available
5. Firefighting Measures

5.1 Extinguishing media
   Suitable extinguishing media
   Use water spray, alcohol resistant-foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance mixture
   No data available

5.3 Advice for firefighters
   Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further Information
   Use water spray to cool unopened containers.

6. Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures
   Avoid dust formation. Avoid breathing vapors, mist or gas.
   For personal protection see section 8.

6.2 Environmental precautions
   Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
   Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
   For disposal see section 13.

7. Handling and Storage

7.1 Precautions for safe handling
   Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
   Provide appropriate exhaust ventilation at places where dust is formed.
   For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
   Keep container tightly closed in a dry and well-ventilated place.
   Keep in a dry place.

7.3 Specific end use(s)
   Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. Exposure Control/ Personal Protection

8.1 Control parameters

Components with workplace control parameters

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control Parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphite</td>
<td>7782-42-5</td>
<td>TWA</td>
<td>15.000000 Million particles per cubic foot</td>
<td>USA. Occupational Exposure Limits (OSHA) – Table Z-3 Mineral Dusts</td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
<td></td>
<td>Based on impinger samples counted by light-field techniques. mppcf X 35.3 = million particles per cubic meter = particles per c.c</td>
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<td></td>
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<tr>
<td><strong>Exposure limits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TWA</td>
<td>2.500000 mg/m³</td>
<td>USA. NIOSH Recommended Exposure Limits</td>
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<tr>
<td>TWA</td>
<td>15.000000 mg/m³</td>
<td>USA. Occupational Exposure Limits (OSHA) – Table Z-1 Limits for Air Contaminants</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>TWA</td>
<td>5.000000 mg/m³</td>
<td>USA. Occupational Exposure Limits (OSHA) – Table Z-1 Limits for Air Contaminants</td>
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<td></td>
</tr>
<tr>
<td>TWA</td>
<td>2.000000 mg/m³</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
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<tr>
<td><strong>Pneumoconiosis</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>TWA</td>
<td>2.500000 mg/m³</td>
<td>USA. NIOSH Recommended Exposure Limits</td>
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<tr>
<td>TWA</td>
<td>15 Million particles per cubic foot</td>
<td>USA. Occupational Exposure Limits (OSHA) – Table Z-3 Mineral Dusts</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TWA</td>
<td>2 mg/m³</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
<td></td>
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<td><strong>Pneumoconiosis</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEL</td>
<td>10 mg/m³</td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEL</td>
<td>5 mg/m³</td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>PEL</td>
<td>2.5 mg/m³</td>
<td>California permissible exposure limits for chemical contaminants (Title 8, Article 107)</td>
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</table>

### 8.2 Exposure controls

**Appropriate engineering controls**
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

**Eye/face protection**
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**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.
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls.
If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Do not let product enter drains.

### 9. Physical and Chemical Properties

#### 9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Appearance</td>
<td>Form: powder</td>
</tr>
<tr>
<td></td>
<td>Color: grey</td>
</tr>
<tr>
<td>b) Odor</td>
<td>Odorless</td>
</tr>
<tr>
<td>c) Odor Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>d) pH</td>
<td>No data available</td>
</tr>
<tr>
<td>e) Melting point/freezing point</td>
<td>Melting point/range: 3,652 - 3,697 °C (6,606 - 6,687 °F) - lit</td>
</tr>
<tr>
<td>f) Initial boiling point and boiling range</td>
<td>No data available</td>
</tr>
<tr>
<td>g) Flash point</td>
<td>No data available</td>
</tr>
<tr>
<td>h) Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>i) Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td>j) Upper/lower flammability or explosive limits</td>
<td>No data available</td>
</tr>
<tr>
<td>k) Vapor pressure</td>
<td>No data available</td>
</tr>
<tr>
<td>l) Vapor density</td>
<td>No data available</td>
</tr>
<tr>
<td>m) Relative density</td>
<td>1.900 g/cm³</td>
</tr>
<tr>
<td>n) Water solubility</td>
<td>No data available</td>
</tr>
<tr>
<td>o) Partition coefficient: n-octanol/water</td>
<td>No data available</td>
</tr>
<tr>
<td>p) Auto-ignition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>q) Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>r) Viscosity</td>
<td>No data available</td>
</tr>
<tr>
<td>s) Explosive properties</td>
<td>No data available</td>
</tr>
<tr>
<td>t) Oxidizing properties</td>
<td>No data available</td>
</tr>
</tbody>
</table>
10. Stability and Reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. Toxicological Information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - female - > 2,000 mg/kg
(OECD Test Guideline 423)

LC50 Inhalation - Rat - male and female - 4 h - 2,000 mg/m3
(OECD Test Guideline 403)

Dermal: No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitization
- Mouse
Did not cause sensitization on laboratory animals.
(OECD Test Guideline 429)

Germ cell mutagenicity
in vitro assay
S. typhimurium
Result: negative

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**
No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
Repeated dose: Rat - male - Feed - NOAEL: 813 mg/kg
toxicity
RTECS: MD9659600

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

12. **Ecological Information**

12.1 **Toxicity**

**Toxicity to fish**
semi-static test LC50 - Danio rerio (zebra fish) - > 100 mg/l - 96 h (OECD Test Guideline 203)

**Toxicity to daphnia and other aquatic invertebrates**
static test EC50 - Daphnia magna (Water flea) - > 100 mg/l - 48 h (OECD Test Guideline 202)

**Toxicity to algae**
static test EC50 - Pseudokirchneriella subcapitata - > 100 mg/l - 72h (OECD Test Guideline 201)

12.2 **Persistence and degradability**
No data available

12.3 **Bioaccumulative 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**
No data available

13. **Disposal Considerations**

13.1 **Waste treatment methods**

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**
Dispose of as unused product.
14. Transport Information

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. Regulatory Information

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

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

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right to Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphite</td>
<td>7782-42-5</td>
<td>1989-08-11</td>
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</tbody>
</table>

Pennsylvania Right to Know Components

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New Jersey Right to Know Components

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</tbody>
</table>

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. Other Information

The information above is believed to be accurate and represents the best information currently available to us. However, it does not represent any guarantee of the properties of the product. We make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we shall not be held liable for any damage resulting from handling or from contact with the above product. Users should make their own investigations to determine the suitability of the information for their particular purposes.