1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product Identifiers

Product Name: Pyrograf III® Carbon Nanofiber, PS Grade
Product Number: N/A
Brand: Pyrograf Products, Inc.

1.2 Relevant Identified Uses of the Substance of Mixture and Uses Advised Against

Identified uses: Laboratory chemicals, synthesis of substances

1.3 Details of the Supplier of the Safety Data Sheet

Company: Pyrograf Products, Inc.
154 West Xenia Ave., PO Box 579
Cedarville, OH 45314-0579
USA

Telephone: (937)-766-2020
Fax: (937)-766-4878

1.4 Emergency Telephone Number

Emergency Phone Number: 1-800-222-1222 (National Poison Control Hotline)

2. HAZARDS IDENTIFICATION

2.1 Classification of the Substance or Mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Eye irritation (Category 2A), H319
Specific target organ toxicity – single exposure (Category 3), Respiratory system, H335

For full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label Elements, Including Precautionary Statements

Pictogram
Signal Word: WARNING
Hazard Statements
H319 Causes serious eye irritation
H335 May cause respiratory irritation

Precautionary Statement
Avoid inhalation of dusts/fumes/gases/mists/vapors/spray. Use in well-ventilated areas only. Thoroughly wash skin after handling. Wear eye and face protection.
IF INHALED: Remove person from contaminated area to fresh air for breathing and keep comfortable. Call the EMERGENCY TELEPHONE NUMBER (Poison Control, section 1.4) if are experiencing discomfort.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, seek medical attention. Store in a well-ventilated place. Keep container tightly closed and locked up. Dispose of contents to an approved waste disposal plant.
IF SWALLOWED: Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult physician.

2.3 Hazards Not Otherwise Classified (HNOC) or Covered by GHS
None.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances
Chemical Name: Carbon Nanofiber
Synonyms: PR-19/24/25-XT-PS-(AM)
Formula: C
Molecular Weight: 12.01 g/mol

<table>
<thead>
<tr>
<th>Hazardous Components</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Fiber</td>
<td>&gt; 98 wt %</td>
</tr>
<tr>
<td>Iron</td>
<td>&lt; 1.4 wt %</td>
</tr>
<tr>
<td>Sulfur</td>
<td>&lt; 0.8 wt %</td>
</tr>
<tr>
<td>Mineral content</td>
<td>&lt; 1 wt % from H₂O</td>
</tr>
</tbody>
</table>

4. FIRST-AID MEASURES

4.1 Description of First-Aid Measures

General
Exit contaminated area. Consult a physician. Show this safety data sheet (SDS) to your health care personnel.

If Inhaled
Move person into fresh air. If not breathing, give artificial respiration. Consult a physician or nearest health care personnel.

Skin Exposure
Rinse thoroughly with plenty of soap and water. Consult a physician or nearest health care personnel.
Eye Contact
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Consult a physician or nearest health care personnel.

If Swallowed
Never give anything to an unconscious person. Rinse mouth with water. Consult a physician or nearest health care personnel.

4.2 Most Important Symptoms and/or Effects: Both Acute and Delayed
The most important known symptoms and effects are described in the labelling (see section 2.2 and/or section 11).

4.3 Indication of Any Immediate Medical Attention and Special Treatment Needed
No data available.

5. FIRE-FIGHTING 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 or Mixture
No data available.

5.3 Recommendations for Firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal Precautions, Protective Equipment and Emergency Procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist, dust, or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. For personal protection, see section 8.

6.2 Environmental Precautions
Do not allow product to enter drainage systems.

6.3 Methods and Materials Used for Containment
Carefully pick up and arrange disposal without creating dust. 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
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventative fire protection.
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 area.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control Parameters

Components with Workplace Control Parameters
Contains no substances with occupational exposure limit values.

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 the work day.

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 should be inspected prior to use. Use proper glove removal technique by not touching the 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 thoroughly.

Full Contact
Material: Nitrile Rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 minutes
Molded Nitrile gloves impervious to nanomaterials (tested and passed with ASTM standard F739).

Splash Contact
Material: Nitrile Rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 minutes
If used in solution, or mixed with other substances, and other conditions, contact the supplier of the gloves. This recommendation is advisory only and must be determined by an industrial hygienist and/or safety officer familiar with the specific situation of anticipated use by our customers. It should not be constructed as offering an approval for any specific use scenario.

**Body**
Clothing impervious to nanomaterials, the type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace (passed ASTM standard F739)

**Respiratory**
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). The EPA mandates the use of full face respirators with minimum N100 grade cartridges if there is any risk of exposure to carbon nanomaterial dust.

### 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>Black powder/agglomerates, nanoparticles</td>
</tr>
<tr>
<td>b. Odor</td>
<td>No data available</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</td>
<td>3,652 – 3,697 °C (6,606 – 6,687 °F)</td>
</tr>
<tr>
<td>f. Freezing point</td>
<td>No data available</td>
</tr>
<tr>
<td>g. Initial boiling point/range</td>
<td>No data available</td>
</tr>
<tr>
<td>h. Flash point</td>
<td>No data available</td>
</tr>
<tr>
<td>i. Flammability</td>
<td>No data available</td>
</tr>
<tr>
<td>j. Evaporation Rate</td>
<td>No data available</td>
</tr>
<tr>
<td>k. Upper/lower flammability or explosive limit</td>
<td>No data available</td>
</tr>
<tr>
<td>l. Vapor pressure</td>
<td>No data available</td>
</tr>
<tr>
<td>m. Vapor density</td>
<td>No data available</td>
</tr>
<tr>
<td>n. Relative density</td>
<td>2 - 20 lbs/ft³</td>
</tr>
<tr>
<td>o. Nanofiber density</td>
<td>1.55 – 1.70 g/cc</td>
</tr>
<tr>
<td>p. Water solubility</td>
<td>No data available</td>
</tr>
<tr>
<td>q. Partition coefficient: n-octal/water</td>
<td>No data available</td>
</tr>
<tr>
<td>r. Auto-ignition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>s. Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>t. Viscosity</td>
<td>No data available</td>
</tr>
<tr>
<td>u. Explosive properties</td>
<td>No data available</td>
</tr>
<tr>
<td>v. Oxidizing properties</td>
<td>No data available</td>
</tr>
</tbody>
</table>
9.2 **Other Information**

Particle diameter: 0.2 micron
The nanofiber density includes with volumes of the hollow core of the nanofiber. The density of the nanofiber wall is 2.0 - 2.1 g/cc.

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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 formed under fire conditions. The exact nature of decomposition is unknown.
Other decomposition products: No data available
In the event of a fire, see section 5.

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11. **TOXICOLOGICAL INFORMATION**

11.1 **Information on Toxicological Effects**

**Acute Toxicity**
No data available
Inhalation: No data available
Dermal: No data available

**Skin Corrosion/Irritation**
No data available

**Serious Eye Damage/Eye Irritation**
No data available

**Respiratory or Skin Sensitization**
No data available

**Germ Cell Mutagenicity**
No data available
Carcinogenicity

IRAC  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 IRAC.

NTP  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 NTP.

OSHA  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 OSHA.

Reproductive Toxicity
No data available

Specific Target Organ Toxicity
May cause respiratory irritation via inhalation.

Specific Target Organ Toxicity – Repeated Exposure
No data available

12. ECOLOGICAL INFORMATION
No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste Treatment Methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company according to applicable federal, state and local environmental regulations. May be placed in an industrial hazardous waste incineration process.

Contaminated Packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

Land transport (DOT)  Not dangerous goods
Sea Transport (IMDG)  Not dangerous goods
Air Transport (ICAO/IATA)  Not dangerous goods

15. REGULATORY INFORMATION

US Toxic Substances Control Act
Product is listed on the TSCA chemical inventory.
The TSCA Section 5(e) Consent Order issued for this product has set provisions for the end user when this product is used in a commercial application. It is important that Pyrograf Products, Inc. be notified prior to placing this product into a commercial application, as information may be needed to determine the extent of regulatory oversight. This product is subject to an Order issued under Section 5(e) of TSCA, to the TSCA Section 12(b) export notice requirement, and to the TSCA Section 8(b) chemical inventory.

16. OTHER INFORMATION

H-Statements

Eye. Irrit.  Eye irritation
H319   Causes serious eye irritation.
H335   May cause respiratory irritation.
STOT SE  Specific target organ toxicity – single exposure

HMIS Rating

Health Hazard:  2
Chronic Health Hazard:  0
Flammability:  0
Physical Hazard:  0

NFPA Rating

Health Hazard:  2
Chronic Health Hazard:  0
Flammability:  0
Physical Hazard:  0

Further Information

All carbon nanofibers are solid particles. Carbon nanofibers and their associated dust/shards may cause temporary irritation of the skin, eye, nasal passages, throat, upper respiratory tract, or gastrointestinal tract.

All forms of Pyrograf-III carbon nanofiber meet the definition of a respirable fiber (i.e. containing a length greater than 5 microns, a largest cross-sectional width less than 3 microns, and a length to cross-sectional width ratio greater than 3:1). Respirable fibers, dusts and shards may cause lung damage or disease.

During operations involving moving or mechanically working with this product, airborne fibers, shards, and dust may be generated. Any recipients of this product should assess their workplaces, processes, and material/products to determine if handling, processing, and/or incorporating Pyrograf-III carbon nanofibers in anyway allows for these fibers to become airborne in an open atmosphere. If so, recipients should take necessary precautions to protect people who may be exposed to Pyrograf-III carbon nanofibers.

This SDS is based upon data, information and other resources available at the time of the revision date listed. The information contained within this SDS is considered accurate, to
the extent known by Pyrograf Products, Inc. Pyrograf Products, Inc. assumes no legal responsibility for reliance or use of the information in this SDS.