

**SECTION 1 - IDENTIFICATION**

**COMPANY ADDRESS:**

The Virtual Foundry, Inc  
211 S Water St  
Stoughton, WI 53589  
USA

PRODUCT NAME: **High Carbon Iron Filamet™**

PRODUCT USE: Manufacture of metal parts by extrusion, injection-molding, or 3D printing.

**SECTION 2 - HAZARDS IDENTIFICATION SUMMARY**

(As defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200)

**PHYSICAL HAZARDS:** Material not intended for use at temperatures exceeding 250°C. Furthermore, there is a danger of burns while handling the heated or molten product.

**HAZARD STATEMENTS:** The components of this product are embedded in a polymer matrix and are therefore considered to present a negligible exposure risk under normal conditions of processing and handling, unless they are liberated during processing (fumes from melting, dusts).

**OTHER HAZARDS:** No toxicological studies have been performed so far on this compound. This material is NOT intended to be used for medical applications, and NOT intended to be used for applications in contact with food and/or drinking water.

**SECTION 3 - COMPOSITION, INFORMATION OF INGREDIENTS**

<b>Metal</b>	<b>CAS No.</b>	<b>%by Weight</b>
Iron	7439-89-6	>80.0
<b>Chemical Name</b>	<b>CAS No.</b>	<b>%by Weight</b>
2-Propenenitrile, polymer with 1,3-butadiene and ethenylbenzene	9003-56-9	trace
Binding Additive	Proprietary	trace
Polylactic Acid	9051-89-2	<20%

**SECTION 4 - FIRST AID MEASURES**

**IF SWALLOWED:** Call a poison control center or doctor immediately for treatment advice. Have a person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or consult a doctor if necessary.

**IF ON SKIN OR CLOTHING:** Wash hands and contact skin with soap and water. If irritation persists, consult a physician. Cool skin rapidly with cold water after contact with hot polymer. DO NOT attempt to remove hot polymer from skin or contaminated clothing as skin may be easily damaged. For molten polymer burns, get medical attention.

**IF IN EYES:** May cause eye irritation. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. If eye irritation persists, consult a physician.

**IF INHALED:** May cause respiratory tract irritation. Dust may be generated while sanding and cause irritation. If processing causes discomfort, move the victim to a well-ventilated area. Move people to fresh air. If symptoms persist, call a physician. If a person is not breathing, call 911 or an ambulance, then provide medical aid. Call a poison control center or doctor for further treatment advice.

**MAIN SYMPTOMS:** Redness, coughing and/or wheezing.

**NOTE TO PHYSICIAN:** Treat symptomatically.

## **SECTION 5 - FIRE FIGHTING MEASURES**

### **FLAMMABILITY**

**AUTOIGNITION TEMPERATURE:** 388°C

**SUITABLE EXTINGUISHING MEDIA:** Use foam, Carbon Dioxide (CO<sub>2</sub>), dry chemical, or alcohol resistant foams (preferred if available). General-purpose synthetic foams (including AFFF) or protein foams may function, but much less effectively.

**UNSUITABLE EXTINGUISHING MEDIA:** Do not use a solid water stream as it may scatter and spread fire.

**SPECIFIC HAZARDS ARISING FROM THE CHEMICAL:** Thermal decomposition can lead to release of irritating gasses and vapors. Do not breathe fumes in case of fire.

**HAZARDOUS COMBUSTION PRODUCTS:** Carbon oxides, Nitrogen oxides (NO<sub>x</sub>), Hydrocarbons.

### **EXPLOSION DATA**

**SENSITIVITY TO MECHANICAL IMPACT:** Not sensitive.

**SENSITIVITY TO STATIC DISCHARGE:** Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

**FIRE FIGHTING INSTRUCTIONS AND FIRE FIGHTING EQUIPMENT:** As in any fire, wear self-contained breathing apparatus pressure-demand, (MSHA/NIOSH approved or equivalent) and in full protective gear. Cool containers / tanks with water spray. Water mist may be used to cool closed containers.

**ADDITIONAL INFORMATION:** No information available.

**PERSONAL PROTECTIVE EQUIPMENT:** No information available.

**SECTION 6 - ACCIDENTAL RELEASE MEASURES**

**PERSONAL PRECAUTIONS:** Standard personal protection equipment (PPE). Avoid contact with eyes. Avoid dust formation. Remove all sources of ignition. Sweep up to prevent slipping hazards. Ensure adequate ventilation. Keep unnecessary personnel away.

**ENVIRONMENTAL PRECAUTIONS:** Avoid dispersal of spilled material, runoff and contact with soil, waterways, drains, and sewers. Should not be released into the environment, may be dangerous to birds and small animals.

**METHODS FOR CLEANING UP:** Vacuum or carefully scoop up spilled material and place in an appropriate container for disposal. Avoid creating dusty conditions and prevent wind dispersal.

**SECTION 7 - HANDLING AND STORAGE**

**HANDLING:** Use personal protective equipment, use caution when near molten resin. Avoid contact with eyes. Low hazard for usual industrial or commercial handling. Workers should be protected from the possibility of contact with molten material during fabrication. Avoid dust formation. If small particles are generated during further processing, handling or by other means, combustible dust concentrations in air may form.

**STORAGE:** Store at temperatures not exceeding 50°C. Keep tightly closed in a cool, dry and well-ventilated environment. Keep away from heat, sparks, and flames. No special restrictions on storage with other products.

**SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION**

**EXPOSURE LIMITS**

Metal	CAS No.	%by Weight	ACGIH TLV (Mg/M <sup>3</sup> )	OSHA PEL (Mg/M <sup>3</sup> )
Iron	7439-89-6	>80.0	-	10.0

COMPONENT	OSHA PEL	ACGIH TLV	NIOSH IDLH
2-Propenenitrile, polymer with 1,3-butadiene and ethenylbenzene 9003-56-9	-	-	-

**TLV:** Threshold Limit Value over 8 hours of work.

**PEL:** Permissible Exposure Limit

**ADDITIONAL PROTECTION:** No information available.

### ENGINEERING CONTROLS

**Engineering Measures:** Apply technical measures to comply with the occupational exposure limits. Where reasonably practicable this should be achieved by the use of local exhaust ventilation and good general extraction. Provide appropriate exhaust ventilation at places where dust is formed. Ensure that eyewash stations and safety showers are close to the workstation location.

### EXPOSURE MONITORING

**Exposure Limits:** See table above.

**Hygiene Measures:** Avoid contact with eyes.

### PERSONAL PROTECTIVE EQUIPMENT

**Eye protection:** Safety glasses with side-shields. Goggles. Avoid contact with eyes.

**Skin protection:** Avoid skin contact with molten polymer. Wear appropriate protective clothing to minimize risk of injury to the skin from contact with dust or physical abrasion. Long sleeved/impervious clothing if contact is probable and skin is sensitive. Protect contact with skin when processing; while material is hot, wear insulated safety gloves; wash hands after handling. Coveralls should be made from fire resistive materials which tend to not accumulate static charges. They should be designed in such a way as to avoid accumulation of dust in cuffs, pockets, etc.

**Respiratory protection:** Respirator must be worn if exposed to dust. Wear a respirator with a dust filter. Respiratory protection is needed if any of the exposure limits in Section 3 are exceeded. Consult an industrial hygiene professional prior to respirator selection and use. Use a positive-pressure air supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection. **WARNING:** Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

**Hand protection:** While material is hot, wear insulated safety gloves; wash hands after handling.

**Hygiene measures:** Provide regular cleaning of equipment, work area and clothing. Handle in accordance with good industrial hygiene and safety practices. Do not eat, drink or smoke when using this product. Wash hands before breaks and immediately after handling the product. Avoid contact with eyes. Do not breathe dust. Use personal protective equipment as required.

**Special hazard:** Workers should be protected from the possibility of contact with molten material during fabrication.

**Environmental Protection:** No information available.

## SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

**Physical State:** Solid

**Appearance:** Filament, Pellets

<b>Color:</b>	Black, gray
<b>Odor:</b>	Slight
<b>Odor Threshold:</b>	No information available.
<b>Melting/Freezing Point:</b>	150-180°C (302- 356°F)
<b>Boiling Point:</b>	No information available.
<b>Flash Point:</b>	No information available.
<b>Evaporation Rate:</b>	No information available.
<b>Flammability:</b>	No information available.
<b>Flammability Limits:</b>	No information available.
<b>Vapor Pressure:</b>	Not applicable
<b>Vapor Density:</b>	Not applicable
<b>Specific gravity:</b>	3.5 - 5.0 (H2O=1)
<b>Relative Density:</b>	The only known value is 7.8 (Iron)
<b>Water Solubility:</b>	Negligible (<0.1%), Insoluble in cold and hot water
<b>Percent Volatile (v/v):</b>	0%
<b>Chemical Stability:</b>	No information available.
<b>Conditions to avoid:</b>	No information available.
<b>Solubility in other solvents:</b>	Insoluble
<b>Partition Coefficient:</b>	No information available.
<b>Auto-Ignition Temperature:</b>	388°C
<b>Hazardous Decomposition Products:</b>	No information available.
<b>Possibility of Hazardous Reactions:</b>	No information available.
<b>Hazardous Polymerization:</b>	No information available.
<b>Decomposition Temperature:</b>	250°C
<b>Viscosity:</b>	No information available.
<b>Explosive Properties:</b>	No information available.
<b>Oxidizing Properties:</b>	No information available.
<b>Other Information:</b>	

Softening Point:	80-100°C
VOC Content (%)	negligible
Bulk Density:	No information available.
MEC:	No information available.
MIE:	No information available.
KST:	No information available.
MIT (layer):	No information available.

## **SECTION 10 - STABILITY AND REACTIVITY**

**INCOMPATIBILITY:** No information available.

**CHEMICAL STABILITY:** Stable under recommended storage conditions.

**HAZARDOUS POLYMERIZATION:** Will not undergo hazardous polymerization.

### **CONDITIONS & MATERIALS TO AVOID:**

**HAZARDOUS DECOMPOSITION PRODUCTS:** Burning produces noxious and toxic fumes, Carbon monoxide (CO), Carbon Dioxide (CO<sub>2</sub>). Exothermic reaction with water, acids, alkalis, to generate hydrogen and heat.

## **SECTION 11 - TOXICOLOGICAL INFORMATION**

**Principal routes of exposure:** Skin contact.

### **PRODUCT INFORMATION:**

**Acute toxicity:** None established.

**Chronic toxicity:** None established.

**Specific effects:** Product dust may be irritating to eyes, skin and respiratory system. Particles, like other inert materials, are mechanically irritating to eyes. Ingestion may cause gastrointestinal irritation, nausea, vomiting, and diarrhea. May cause skin irritation and/or dermatitis. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. Inhalation of dust may cause shortness of breath, tightness of chest, a sore throat and cough. Burning produces irritant fumes.

**Long term toxicity:** None established.

**Mutagenic effects:** None established.

**Reproductive toxicity:** None established.

**Carcinogenic effects:** This product contains one or more substances which are classified by IARC as carcinogenic to humans (Group I), probably carcinogenic to humans (Group 2A) or possibly carcinogenic to humans (Group 2B).

COMPONENT	ACGIH	IARC	NTP	OSHA
2-Propenenitrile, polymer with 1,3-butadiene and ethenylbenzene 9003-56-9	-	Group 3	-	--

**Target organ effects:** Eyes, Respiratory system.

**Ingestion:** May cause gastrointestinal discomfort if consumed in large amounts. Not an expected route of exposure.

**Inhalation:** Inhalation of dust in high concentration may cause irritation of the respiratory system.

**Eye Contact:** Dust contact with the eyes can lead to mechanical irritation.

**Symptoms related to the physical, chemical, and toxicological characteristics:** Redness. Coughing and/or wheezing.

**Delayed and immediate effects and also chronic effects from short and long term exposure:**

**Irritation:** Product dust may be irritating to eyes, skin, and respiratory system.

## **SECTION 12 - ECOLOGICAL INFORMATION**

**Ecotoxicity:** Pellets may be eaten by wildlife and should be swept up and placed in closed containers. EC50/72h/algae > 1100 mg/L

**Persistence and degradability:** Not readily biodegradable.

**Bioaccumulation:** Not expected to bioconcentrate or bioaccumulate.

**Mobility:** Is not likely mobile in the environment.

**Other adverse effects:** This substance is not considered to be persistent, bioaccumulating nor toxic (PBT).

**Ozone:** Not applicable.

## **SECTION 13 - DISPOSAL CONSIDERATIONS**

**WASTE DISPOSAL METHODS:** In accordance with local and national regulations. Do not contaminate ponds, waterways or ditches with product or used containers. This product is not classified as a hazardous waste as defined under US EPA 40 CFR part 261. The generation of waste should be

avoided or minimized whenever possible. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Empty containers or liners may retain some product residues. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor.

**CONTAMINATED PACKAGING:** No information available.

**SECTION 14 - TRANSPORT INFORMATION**

**DOT:** Not regulated.  
**MEX:** Not regulated.  
**ICAO:** Not regulated.  
**IATA:** Not regulated.  
**IMDG:** Not regulated.  
**UN NUMBER:** N/A.

**SECTION 15 - REGULATORY INFORMATION**

**TSCA:** Complies  
**DSL/NDSL:** Complies  
**EINECS/ELINCS:** Exempt  
**ENCS:** Complies  
**IECSC:** Complies  
**KECL:** Complies  
**PICCS:** Complies  
**AICS:** Complies

**US FEDERAL REGULATIONS:**

**CLEAN WATER ACT:** This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42):

COMPONENT	CWA – Reportable Quantities	CWA – Toxic Pollutants	CWA – Priority Pollutants	CWA – Hazardous Substances
Iron	-	-	-	X

Electrical equipment must be suitable for use in hazardous atmospheres involving Group E combustible dusts in accordance with 29CFR1910.307. Refer to the National Electrical Code (NFPA 70) for guidance in determining the type and design of equipment and installation which meets this requirement.

**CLEAN AIR ACT, TITLE VI (1990):** This product does not contain, nor was it manufactured using ozone depleting chemicals.

**CALIFORNIA PROPOSITION 65:** This product contains the following Proposition 65 chemicals:

COMPONENT	CALIFORNIA Prop. 65
1,3-butadiene	Carcinogen



	Developmental Female Reproductive
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**Inventory Status:**

- TSCA (USA): Listed\*
- DSL (Canada): Listed\*
- NDSL (Canada): Not Listed
- EINECS (Europe): Listed\*
- AICS (Australia): Listed\*
- ENCS (Japan): Not Identified\*\*
- IECSC (People’s Republic of China): Listed\*
- PICCS (Philippines): Listed\*
- ECL (Korea): Listed\*
- ECN (Taiwan): Listed\*

\*\*Listed” indicates that all components of this product comply with the inventory requirements administered by the governing country(s).

\*\* Pure metals are not specifically identified by CAS or ENCS number.

**SECTION 16 - OTHER INFORMATION, INCLUDING THE DATE OF PREPARATION OF THE LAST REVISION**

**LABEL REQUIREMENTS:** Not expected to produce significant adverse health effects when the recommended instructions for use are followed.

NFPA HAZARD RATINGS	HEALTH	0
	FLAMMABILITY	1
	PHYSICAL HAZARD	0
	INSTABILITY	-
	4=Severe   3=Serious   2=Moderate   1=Slight   0=Minimal	

HMIS HAZARD RATINGS	HEALTH	0
	FLAMMABILITY	1
	PHYSICAL HAZARD	1
	PERSONAL PROTECTION	X
	4=Severe   3=Serious   2=Moderate   1=Slight   0=Minimal	

**DISCLAIMER:** The information provided in this SDS is based on available data from reliable sources and is correct to the best of The Virtual Foundry, Inc’s knowledge. The Virtual Foundry, Inc makes no warranty, express or implied, regarding the accuracy of the data or the results obtained from the use of

this product. Nothing herein may be construed as recommending any practice or any product in violation of any law or regulations. The user is solely responsible for determining the suitability of any material or product for a specific purpose and for adopting any appropriate safety precautions. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

**REVISED DATE:**

December 2021