

**SECTION 1 - IDENTIFICATION**

**COMPANY ADDRESS:**

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

PRODUCT NAME: **Copper 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:** Contact with product at elevated temperatures can result in thermal burns. Inhalation of dusts and vapors of melted material from this product may cause irritation of the eyes, nose, throat and respiratory system. May cause coughing or shortness of breath. Mechanical eye irritant. May cause tearing and redness. Mechanical skin irritant. Prolonged contact may cause skin abrasion, redness, itching. Irritating to the respiratory tract. Large overdoses may cause nervous system disturbances, and diarrhea. May cause nausea and vomiting. No long-term health effects are anticipated.

**HAZARD STATEMENTS:** Irritating to eyes and respiratory tract. Exposure may include persistent cough, shortness of breath.

**OTHER HAZARDS:** If small particles are generated during further processing, handling, or by other means, combustible dust concentrations in air may form.

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

<b>Metal</b>	<b>CAS No.</b>	<b>%by Weight</b>
Copper	7440-50-8	> 87.0
<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	< 13%

**SECTION 4 - FIRST AID MEASURES**

**IF SWALLOWED:** Not a probable route of exposure. Give 200-300 mL of water to drink. Do not induce vomiting.

**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 skin irritation persists, call a physician.

**IF IN EYES:** Flush eyes with large volumes of water for at least 15 minutes lifting upper and lower eyelids occasionally. Seek medical attention if irritation develops.

**IF INHALED:** Dust may be generated and cause irritation. If processing causes discomfort, remove to a well ventilated area.

**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, 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:** No information available.

**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:** Collect contaminated fire fighting water separately. It must not enter the sewer system.

**PERSONAL PROTECTIVE EQUIPMENT:** Wear self-contained breathing apparatus.

**SECTION 6 - ACCIDENTAL RELEASE MEASURES**

**PERSONAL PRECAUTIONS:** Wear appropriate personal protective equipment: coveralls, gloves & eye protection. Ensure adequate ventilation. Standard personal protection equipment (PPE). Avoid contact with skin and eyes. Avoid dust formation.

**ENVIRONMENTAL PRECAUTIONS:** Should not be released into the environment; may be dangerous to birds and small animals.

**METHODS FOR CLEANING UP:** Sweep up or vacuum and put into an approved waste container for disposal.

**SECTION 7 - HANDLING AND STORAGE**

**HANDLING:** Use personal protective equipment. Only use in a well-ventilated area and prevent the creation of dust. If concentrations exceed the occupational exposure limits, use suitable respiratory protection. Workers should be protected from the possibility of contact with molten material during fabrication. Avoid contact with eyes. Low hazard for usual industrial or commercial handling. Avoid dust formation.

**STORAGE:** Store in a cool, dry environment; keep away from heat, sparks, and flames. Store at temperatures not exceeding 50°C.

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

**EXPOSURE LIMITS**

COMPONENT	CAS No.	%by Weight	ACGIH TLV (Mg/M <sup>3</sup> )	OSHA PEL (Mg/M <sup>3</sup> )
Copper Powder	7440-50-8	> 87.0	1.0	1.0
Copper Fume	-	-	1.0	0.2

Note: Some or all of the alloying elements listed may be present

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

9003-56-9			
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**TLV:** Threshold Limit Value over 8 hours of work.

**PEL:** Permissible Exposure Limit

**ADDITIONAL PROTECTION:** No information available.

**ENGINEERING CONTROLS**

**Engineering Measures:** All personal protective equipment, including respiratory equipment, used to control exposure to hazardous substances must be selected to meet with requirements of national personal protective equipment regulations. 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.

**EXPOSURE MONITORING**

**Exposure Limits:** See table above.

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

**PERSONAL PROTECTIVE EQUIPMENT**

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

**Skin protection:** 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.

**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:** Do not allow to enter drains or watercourses.

**SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES**

<b>Physical State:</b>	Solid
<b>Appearance:</b>	Filament, Pellets
<b>Color:</b>	Reddish to Salmon Color
<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>	3.5-5g/cm <sup>3</sup>
<b>Relative Density:</b>	The only known value is 8.96g/cc (elemental copper)
<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>	Fine dust dispersed in air may ignite.
<b>Oxidizing Properties:</b>	No information available.
<b>Other Information:</b>	
Softening Point:	80-100°C
VOC Content (%)	negligible
Bulk Density:	No information available.

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

**INCOMPATIBILITY:** Strong oxidizers, reducing agents, and bases.

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

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

**CONDITIONS & MATERIALS TO AVOID:** Copper is explosively incompatible with sodium azide. Copper dusts may react to acetylene gas to form copper acetylides, which are sensitive to shock. Copper mists may react with magnesium to form flammable hydrogen gas. To avoid thermal decomposition, do not overheat. Avoid temperatures above 80°C. Avoid keeping resin molten for excessive periods of time at elevated temperatures. Prolonged exposure will cause polymer degradation. Dust formation. Oxidizing agents/materials, Strong bases.

**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:** Copper is an essential element of mammalian metabolism. Copper metal has little or no toxicity.

**Chronic toxicity:** None established.

**Specific effects:** Inhalation of copper fume or dust may result in metal fume fever, which is characterized by upper respiratory irritation, chills, metallic or sweet taste, nausea, and aching muscles. Attacks usually begin after 4-8 hours of exposure and last only 24-48 hours. Inhalation of fumes has been reported to sometimes cause discoloration of the skin and hair. Nausea and vomiting may result if larger amounts of copper are ingested. This is probably due to the conversion of the swallowed metal

copper to its irritating salts. It is unlikely that poisoning by ingestion in industry would progress to a serious point because small amounts induce vomiting, emptying of the stomach of copper salts. High airborne concentrations of copper metal would be expected to cause mechanical irritation of the eyes and respiratory tract. Metallic copper may cause keratinization of the hands and soles of the feet, but it is not commonly associated with industrial dermatitis. Inhalation of dust may cause shortness of breath, tightness of chest, a sore throat and cough. Ingestion may cause gastrointestinal irritation. Product dust may be irritating to the eyes.

**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:** Dispose of in accordance with procedures applying to the disposal of the product, in accordance with local and national regulations. Should not be released into the environment. Do not contaminate ponds, waterways or ditches with product or used containers.

**CONTAMINATED PACKAGING:** Dispose of surplus and contaminated materials (including sawdust) at an approved landfill or in accordance with other national or regional provisions. Empty remaining contents. Do not re-use empty containers. Empty containers should be transported/delivered using a registered waste carrier to local recyclers for disposal.

### SECTION 14 - TRANSPORT INFORMATION

**DOT:** Not regulated. Class 9 materials do not require placarding for U.S.A. ground transport (49 CFR 172.504(f)(9)). Exceptions, except when all or part of the transportation is by vessel, the requirements specific to marine pollutants do not apply to non-bulk packagings transported by motor vehicle, rail car, or aircraft (49 CFR 171.4(c)). Permissive labeling is allowed by U.S.A. DOT (49 CFR 172.401(c)).

**MEX:** Not regulated.

**ICAO:** Not regulated.

**IATA:** Not regulated.

**IMDG:** Not regulated.

**UN NUMBER:** N/A.

**PROPER SHIPPING NAME:** UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S (copper), Class 9, PG III, MARINE POLLUTANT

#### Land transport ADR/RID (cross-border) Excluding U.S.A. Ground Transport



- **ADR/RID class:** 9 (M7) Miscellaneous dangerous substances and articles
- **Danger code (Kemler):** 90
- **UN Number:** 3077
- **Packaging group:** III
- **Hazard label:** 9
- **Proper shipping name:** 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (copper)
- **Tunnel Restriction Code:** E



**Maritime transport IMDG:**



- **IMDG Class:** 9
- **UN Number:** 3077
- **Hazard Label:** 9
- **Packaging group:** III
- **Marine pollutant:** yes
- **Proper shipping name:** 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (copper)
- **EmS Code:** F-A, S-F

**Air transport ICAO-TI and IATA-DGR:**



- **ICAO/IATA Class:** 9
- **UN/ID Number:** 3077
- **Hazard Label:** 9
- **Packaging group:** III
- **Proper shipping name:** 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (copper)

**SECTION 15 - REGULATORY INFORMATION**

**DOT:** This product is not regulated by USDOT as a Hazardous Material (49 CFR 172.101). No UN code assigned. No placard required for transportation.

**SARA (TITLE III):** Under applicable definitions, this material may meet the criteria for a delayed (chronic) health hazard.

**SARA (SECTION 313):** Not Listed.

**CALIFORNIA PROP. 65:** Not Listed.

**TSCA:** Not Listed.

**DSCL (EEC):** Listed on the DSCL inventory.

**RCRA HAZARDOUS WASTE NUMBER:** Not Listed.

COMPONENT	SARA 313 – Threshold Values %
1,3-butadiene 106-99-0	0.1

**SARA 311/312 HAZARD CATEGORIES:**

- Acute Health Hazard: No
- Chronic Health Hazard: No
- Fire Hazard: No
- Sudden Release of Pressure Hazard: No
- Reactive Hazard: No

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

**U.S STATE REGULATIONS:**

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

COMPONENT	CALIFORNIA Prop. 65
1,3-butadiene	Carcinogen Developmental Female Reproductive

**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.

**US FEDERAL REGULATIONS:**

**U.S EPA EPCRA REPORTABLE PRODUCT:** Contains copper

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

**LABEL REQUIREMENTS:** Keep out of the reach of children. Read and follow all label instructions. Not expected to produce significant adverse health effects when the recommended instructions for use are followed.

<b>NFPA HAZARD RATINGS</b>	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	0
	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