

# MATERIAL SAFETY DATA SHEET

V2.10

**Product Name:** PLA (Polylactic Acid)

**Product Use:** Filament for material extrusion used in Fused Filament Fabrication (FFF) and Fused Deposition Modelling (FDM).

**Manufacturer:** 3D Print Works, Nasmyth Building, Nasmyth Avenue, East Kilbride, Scotland, UK

**Phone:** +44 (0) 1355 272438

**Email:** print@3d-print-works.com

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Regulation (EC) No. 1907/2006 COMMISSION REGULATION (EU) No. 830/2015 of 20 May 2015

## SECTION 1: Identification of the substance/mixture and of the company/undertaking

### 1.1. Product identifier

**Product name:** Ingeo™ biopolymer

**Product code:** 4032D

### 1.2. Relevant identified uses of the substance or mixture and uses advised against

**Product Use:**

A biopolymer which can be used for thermoformed, coating, injection molded, blow molded, and fiber applications.

### 1.3. Details of the supplier of the safety data sheet

**Supplier:**

NatureWorks LLC, 15305 Minnetonka Blvd, Minnetonka, MN 55345

sdsinquiry@natureworksllc.com

952-562-3450

### 1.4. Emergency telephone number

Emergency telephone numbers (24 hours a day):

(Medical Information) (651) 632-9273

(Transportation Information) CHEMTREC: 800-424-9300 (in the United States)

(Transportation Information) CHEMTREC: (703) 527-3887 (outside the United States)

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## SECTION 2: Hazards identification

### 2.1. Classification of the substance or mixture

Classification: Not classified

### 2.2. Label elements

Symbols/Pictograms None

Signal word: None

Hazard Statements: None required

Precautionary Statements None

### 2.3. Other hazards

No information available

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The information in this Safety Data Sheet (SDS) is provided in good faith and believed to be accurate. This SDS contains a general summary of hazards known to NatureWorks, but does not purport to describe every hazard that exists. NatureWorks and its subsidiaries ("NatureWorks") expect each customer or user of its products (each, a "User") to study this SDS carefully and consult appropriate expertise to become aware of any hazards associated with NatureWorks products. NATUREWORKS MAKES NO WARRANTY, EXPRESS OR IMPLIED, REGARDING THE INFORMATION CONTAINED HEREIN OR ITS PRODUCTS, INCLUDING BUT NOT LIMITED TO ANY WARRANTY AS TO ACCURACY OR COMPLETENESS OF INFORMATION, OR ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

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## SECTION 3: Composition/information on ingredients

Chemical name and CAS	Weight %
Polylactide resin 9051-89-2	>98

**Other standards:** This material can generate Particulates Not Otherwise Classifiable (PNOC). The Occupational Safety and Health Administration (OSHA) PEL/TWA for PNOC is 15 mg/m<sup>3</sup> for total dust and 5 mg/m<sup>3</sup> for the respirable fraction. The American conference of Governmental Industrial Hygienists (ACGIH) TLV/TWA for PNOC is 10 mg/m<sup>3</sup> for inhalable particulates and 3 mg/m<sup>3</sup> for respirable particulates.

**Additional Information:** No information available

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## SECTION 4: First aid measures

### Emergency telephone numbers (24 hours a day):

- (Medical Information) (651) 632-9273
- (Transportation Information) CHEMTREC: 800-424-9300 (in the United States)
- (Transportation Information) CHEMTREC: (703) 527-3887 (outside the United States)

### 4.1. Description of first aid measures

#### Eye contact:

Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes Call a physician immediately

#### Skin contact:

Adverse effects are not expected from accidental skin contact following occupational exposure. After contact with skin, wash immediately with plenty of water If skin irritation persists, call 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. Call a physician immediately.

#### Inhalation:

Move to fresh air. Call a physician immediately.

#### Ingestion:

Drink water as a precaution. Never give anything by mouth to an unconscious person. Do not induce vomiting without medical advice. Call a physician immediately.

**Notes to physician:** Treat symptomatically

### 4.2. Most important symptoms and effects, both acute and delayed

No information available

### 4.3. Indication of any immediate medical attention and special treatment needed

No information available

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## SECTION 5: Firefighting measures

### Flammability:

Autoignition temperature: 388C

### Flammability Limits in Air:

Flammable limits in air - lower (%): Not applicable

Flammable limits in air - upper (%): Not applicable

### 5.1. Extinguishing media

**Suitable extinguishing media:** Foam. Water. Carbon dioxide (CO<sub>2</sub>). Dry chemical. Alcohol resistant foams are preferred if available. General-purpose synthetic foams (including AFFF) or protein foams may function, but much less effectively.

**Unsuitable extinguishing media** - None known

### 5.2. Special hazards arising from the substance or mixture

Burning produces obnoxious and toxic fumes Aldehydes, Carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>)

### 5.3. Advice for firefighters

**Special protective equipment for firefighters:** As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

**Under fire conditions:** Cool containers / tanks with water spray Water mist may be used to cool closed containers Fine dust dispersed in air may ignite. Risks of ignition followed by flame propagation or secondary explosions shall be prevented by avoiding accumulation of dust, e.g. on floors and ledges.

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## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

#### 6.1.1. For non-emergency personnel

- Use personal protective equipment as required
- Avoid contact with skin and eyes
- Avoid dust formation
- Remove all sources of ignition
- Sweep up to prevent slipping hazard

#### 6.1.2. For emergency responders

- Use with proper personal protective equipment (see Section 8).

## 6.2. Environmental precautions

- Do not flush into surface water or sanitary sewer system
- Do not allow material to contaminate ground water system.

## 6.3. Methods and material for containment and cleaning up

- Clean up promptly by scoop or vacuum.
- Sweep up and shovel into suitable containers for disposal

## 6.4. Reference to other sections

- No information available
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# SECTION 7: Handling and storage

## 7.1. Precautions for safe handling

- Use personal protective equipment as required
- Avoid contact with skin and 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

## 7.2. Conditions for safe storage, including any incompatibilities

- Store at temperatures not exceeding 50 °C/ 122 °F. Keep cool
- No special restrictions on storage with other products.

## 7.3. Specific end use(s)

- No data available
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# SECTION 8: Exposure controls/personal protection

## 8.1. Control parameters

- None established.
- This material can generate Particulates Not Otherwise Classifiable (PNOC). The Occupational Safety and Health Administration (OSHA) PEL/TWA for PNOC is 15 mg/m<sup>3</sup> for total dust and 5 mg/m<sup>3</sup> for the respirable fraction. The American Conference of Governmental Industrial Hygienists (ACGIH) TLV/TWA for PNOC is 10 mg/m<sup>3</sup> for inhalable particulates and 3 mg/m<sup>3</sup> for respirable particulates.
- 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.

## 8.2. Exposure controls

### Eye protection:

Safety glasses with side-shields. Goggles

### Skin and body protection:

Impervious clothing

### Respiratory protection:

Respirator must be worn if exposed to dust. Wear respirator with 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:

Preventive skin protection.

### Hygiene measures:

Avoid contact with skin, eyes and clothing.

### Special hazard:

Workers should be protected from the possibility of contact with molten material during fabrication.

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## SECTION 9: Physical and chemical properties

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

**Physical state:** Solid

**Appearance:** Clear, translucent, opaque, pellets.

**Color:** Clear Translucent Opaque

**Odor:** Sweet

**pH:** Not applicable

**Vapor pressure:** Not determined

**Vapor density:** Not determined

**Evaporation rate:** Not determined

**Density:** 1.25

**Decomposition temperature:** 482F (250C)

**Boiling point / boiling range:** Not applicable

**Melting point / melting range:** 150-180C (302- 356F)

Tg (Glass Transition Temperature): 55-60C (131-140F)

**Autoignition temperature:** 388C

**Flammability:** Fine dust dispersed in air may ignite

**Flammability Limits in Air:** No information available

**Water solubility:** Insoluble

**Solubility in other solvents:** Not determined

**Solubility:** Not determined

## 9.2. Other information

No information available

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## SECTION 10: Stability and reactivity

### 10.1. Reactivity

None expected under conditions of normal use.

### 10.2. Chemical stability

Stable under recommended storage conditions

### 10.3. Possibility of hazardous reactions

None expected under conditions of normal use

### 10.4. Conditions to avoid

Temperatures above 446F (230 °C)

Avoid keeping resin molten for excessive periods of time at elevated temperatures.

Prolonged exposure will cause polymer degradation

### 10.5. Incompatible materials

Oxidizing agents

Strong bases

### **10.6. Hazardous decomposition products**

Burning produces obnoxious and toxic fumes

Aldehydes, Carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>)

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## **SECTION 11: Toxicological information**

### **11.1. Information on toxicological effects**

#### **Principle routes of exposure:**

Eye contact, Skin contact, Inhalation Ingestion

#### **Acute toxicity:**

There were no target organ effects noted following ingestion or dermal exposure in animal studies.

**Local effects:** Product dust may be irritating to eyes, skin and respiratory system Resin particles, like other inert materials, are mechanically irritating to eyes. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea

#### **Specific effects:**

May cause skin irritation and/or dermatitis Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea Inhalation of dust may cause shortness of breath, tightness of the chest, a sore throat and cough Burning produces irritant fumes.

#### **Long term toxicity**

Did not cause skin allergic reactions in skin sensitization studies using guinea pigs.

#### **Mutagenic effects:**

Not mutagenic in AMES Test

#### **Reproductive toxicity:**

No data is available on the product itself.

#### **Carcinogenic effects:**

This product does not contain any carcinogens or potential carcinogens as listed by OSHA, IARC or NTP

#### **Target organ effects:**

There were no target organ effects noted following ingestion or dermal exposure in animal studies.



**Skin:**

LD50/dermal/rabbit > 2000 mg/kg

**Ingestion:**

LD50/ oral/ rat > 5000 mg/kg

**Further information:**

No information available

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## SECTION 12: Ecological information

### 12.1. Toxicity

EC50/72h/algae > 1100 mg/L

### 12.2. Persistence and degradability

Inherently biodegradable under industrial composting conditions

### 12.3. Bio accumulative potential

Not expected to bioconcentrate or bioaccumulate.

### 12.4. Mobility in soil

No data available

### 12.5. Results of PBT and vPvB assessment

Not applicable

### 12.6. Other adverse effects

No information available

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## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

#### In compliance with the requirements of Directive 2008/98/EC

#### Waste from residues / unused products:

In accordance with local and national regulations Should not be released into the environment Do not contaminate ponds, waterways or ditches with chemical or used container. Contact manufacturer.

#### Contaminated packaging:

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.

THE COMPANY HAS NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION

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## SECTION 14: Transport information

**Applicable to: ADR/RID: IMDG: ICAO/IATA: ADN**

**14.1. UN number** None

**14.2. UN proper shipping name** None

**14.3. Transport hazard class(es)** None

**14.4. Packaging group** None

**14.5. Environmental hazards** None

**14.7. Transport in bulk according to Annex II of Marpol and the IBC Code**  
None

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## SECTION 15: Regulatory information

**15.1. Safety, health and environmental regulations/legislation specific for the substance of mixture**

No information available

**15.2. Chemical safety assessment**

Not applicable

### **Regulatory Information:**

(not meant to be all inclusive - selective regulations represented)

Regulatory requirements are subject to change and may differ between locations. It is the User's responsibility to ensure that all activities comply with all federal, state or provincial and local laws and regulations. The following specific information is made for the purpose of complying with numerous national, federal, state or provincial, and local laws and regulations. See other sections for health and safety information.

### **U.S. REGULATIONS**

**Sara 313 title III:** Not Listed

**TSCA Inventory List:** Listed

### **STATE REGULATIONS**

**California Proposition 65:** Not Listed

### **INTERNATIONAL INVENTORIES**

**Canada DSL Inventory List :** Listed

**REACH/EU EINECS List** : Components are in compliance with and/or are listed.

**Japanese inventory (ENCS)**: Listed

**Australia (AICS)**: Listed

**Korean chemical inventory**: Listed

**Phillipines (PICCS) inventory**: Contact NatureWorks for additional information.

**Taiwan Chemical Substance inventory (TCSI)**: Listed

**China inventory of existing chemical substances list** : Listed

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## SECTION 16: Other information

**Label information**: Ingeo™ biopolymer

**Product code**: 4032D

**Reason for revision**: Updated to be compliant with 2015/830/EC

**Revision Number**: 22

**Revision date**: 10/14/2016

**Print date**: 10/14/2016

**Prepared by**: NatureWorks LLC Health and Safety

### NOTICE REGARDING APPLICATION RESTRICTIONS:

The company does not recommend any of its products, including samples, for use: (A) in any application which is intended for any internal contact with human body fluids or body tissues (B) as a critical component in any medical device that supports or sustains human life; and (C) specifically pregnant women or in any applications designed specifically to promote or interfere with human reproduction. Components of products intended for human or animal consumption.