SAFETY DATA SHEET
In accordance with 29 CFR 1910.1200:2012, ANSI Z400.1-2010, and ISO 11014-1: 2009. In accordance with WHMIS 2015.

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

Product name: Ingeo™ biopolymer
Product code: 3D850
Product Use: A biopolymer to be used in 3D printing applications.

Supplier:
NatureWorks LLC
15305 Minnetonka Blvd
Minnetonka, MN 55345

sdsinquiry@naturewo
rksllc.com 952-
562-3450

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)

2. HAZARDS IDENTIFICATION

Classification: This product is NOT classified according to 29 CFR 1910.1200

Hazard Communication Standard 2012 or WHMIS 2015.

Hazard Statements:
None **Precautionary Statements:** None
Signal word: None
Symbols/Pictograms: None

Potential health effects: See Section 11 for more information

Environmental precautions: See Section 12 for more information

Other Hazards: If small particles are generated during further processing,

handling, or by other means,combustible dust concentrationsin air may form. See Section 7 and 8 for additional information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical name and CAS	Weight %	OSHA Exposure Limits:	ACGIH Exposure Limits:
Polylactide resin 9051-89-2	>98	None	None

All ingredients in quantities > 1.0% (0.1% for carcinogens) that are potentially hazardous per OSHAdefinitions.

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^3 for total dust and 5 mg/m^3 for the respirable fraction. The American Conference of Governmental Industrial Hygienists (ACGIH) TLV/TWAfor PNOC is 10 mg/m^3 for inhalable particulates and 3 mg/m^3 for respirable particulates.

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)**

Eye contact: Rinse immediately with plenty of water, also under the eyelids, for atleast 15 minutes. Call a physician immediately.

Skin contact: Adverse effects are not expected from accidental skin contact followingoccupational exposure. After contact with skin, wash immediately with plenty of water.If skin irritation persists, call a physician. Cool skin rapidly with cold water aftercontact 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 unconsciousperson. Do not induce vomiting without medical advice. Call a physician immediately.

Notes to physician: Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Flammability:
Autoignition temperature: 388 °C

Flammability Limits in Air:
Flammable limits in air - lower (%): Not applicable
Flammable limits in air - upper (%): Not applicable

Suitable extinguishing media: Foam, Water, Carbon dioxide (CO2), Dry chemical, Alcoholresistant foams are preferred if available. General-purpose synthetic foams (includingAFFF) or protein foams may function, but much less effectively.

Unsuitable extinguishing media: None known

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

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

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Use personal protective equipment. Avoid contact with skin andeyes. Avoid dust formation. Remove all sources of ignition. Sweep up to prevent slipping hazard.

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

Methods for cleaning up: Clean up promptly by scoop or vacuum. Sweep up and shovelinto suitable containers for disposal.

7. HANDLING AND STORAGE

Safe handling advice: Use personal protective equipment as required. Avoid contactwith 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 procecssing, handling, or by other means, combustible dust concentrations in air mayform.

Storage: Store at temperatures not exceeding 50 °C/ 122 °F. Keep cool. No specialrestrictions on storage with other products.

Precautions: No special precautions required.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Control:

Engineering measures: Where reasonably practicable this should be achieved by theuse of local exhaust ventilation and good general extraction. Provide appropriateexhaust ventilation at places where dust is formed.

Exposure limits: 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^3 for total dust and 5 mg/m^3 for the respirablefraction. The American Conference of Governmental Industrial Hygienists (ACGIH) TLV/TWA for PNOC is 10 mg/m^3 for inhalable particulates and 3 mg/m^3 for respirable particulates.

Personal protective equipment:

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 respiratorwith dust filter. Respiratory protection is needed if any of the exposure limits inSection 3 are exceeded. Consult an industrial hygiene professional prior to respirator selection and use. Use a postive-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 withmolten material during fabrication.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state: Solid
Appearance: Clear, translucent, opaque, pellets.
Color: Clear, Translucent, Opaque
Odor: Sweet
pH: No information available
Vapor pressure: Not determined
Vapor density: Not determined
Evaporation rate: Not determined
Partition Coefficient (n-octanol/water): 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 TransitionTemperature): 55-60C (131-140F)
Autoignition temperature: 388 °C
Freezing point °C: Not determined
Flash point: Not determined
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

10. STABILITY AND REACTIVITY

Reactivity: None expected under conditions of normal use.

Chemical stability: Stable under recommended storage conditions.

Conditions to avoid: Temperatures above 446F (230 °C). Avoid keeping resin molten forexcessive periods of time at elevated temperatures. Prolonged exposure will cause polymer degradation.

Materials to avoid: Oxidizing agents, Strong bases

Hazardous decomposition products: Burning produces obnoxious and toxic fumes,Aldehydes, Carbon monoxide (CO), carbon dioxide (CO2)

Possibility of hazardous reactions: None expected under conditions of normal use.

Polymerization: Not applicable

11. TOXICOLOGICAL INFORMATION

Principle routes of exposure: Eye contact, Skin contact, Inhalation, Ingestion.

Acute toxicity: There were no target organ effects noted following ingestion or dermalexposure 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 diarrhea.

Specific effects: May cause skin irritation and/or dermatitis. Ingestion may causegastrointestinal irritation, nausea, vomiting and diarrhea. Inhalation of dust maycause shortness of breath, tightness of the chest, a sore throat and cough. Burningproduces irritant fumes.

Long term toxicity: Did not cause skin allergic reactions in skin sensitizationstudies 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 potentialcarcinogens as listed by OSHA, IARC or NTP.

Target organ effects: There were no target organ effects noted following ingestion ordermal exposure in animal studies.

Skin: LD50/dermal/rabbit > 2000 mg/kg

Ingestion: LD50/ oral/ rat > 5000 mg/kg

Further information: No information available

12. ECOLOGICAL INFORMATION

Ecotoxicity effects: EC50/72h/algae > 1100 mg/L

Persistence and degradability: No data available.

Bioaccumulation: Not expected to bioconcentrate or

bioaccumulate.**Mobility:** No data available

13. DISPOSAL CONSIDERATIONS

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 tolocal recyclers for disposal.

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

14. TRANSPORT INFORMATION

U.S. Department of Transportation (DOT):Proper shipping name:
None
Hazard class: Not regulated
UN-No: None
Packing group: None
Hazardous substances (RQ): None

IMDG:
Proper shipping name: None**Hazard class:** Not regulated**UN/Id No.:** None
Packing group: None

ICAO/IATA:
Proper shipping name: None**Hazard Class:** Not regulated**UN-No.:**
None
Packing group: None

15. 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 andregulations. 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

TSCA Inventory List: Listed

Sara 313 title III: Not 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.
China inventory of existing chemical substances list: Listed

16. OTHER INFORMATION INCLUDING INFORMATION ON PREPARATION AND REVISION OF THE SDS

Label information: Ingeo™ biopolymer
Product code: 3D850

Reason for revision: Not applicable

Revision Number: 4
Revision date: 06/15/2018

Print date: 06/15/2018

Recommended restrictions: None
Prepared by: NatureWorks LLC Health and Safety

NOTICE REGARDING APPLICATION RESTRICTIONS:

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