



Product name:
Ingeo™ biopolymer

Product code:
3D850

Revision Number: 4

Revision date:
06/15/2018

Print date:
06/15/2018

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@natureworksllc.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 concentrations in air may form. See Section 7 and 8 for additional information.

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 OF COMPLETENESS OF INFORMATION, OR ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Ingeo and the Ingeo logo are trademarks or registered trademarks of NatureWorks LLC in the USA and other countries.

Product name:
Ingeo™ biopolymer
Product code:
3D850

Revision Number: 4

Revision date:
06/15/2018

Print date:
06/15/2018

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 OSHA definitions.

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/m³ for total dust and 5 mg/m³ for the respirable fraction. The American Conference of Governmental Industrial Hygienists (ACGIH) TLV/TWA for PNOC is 10 mg/m³ for inhalable particulates and 3 mg/m³ 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 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.

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 OF COMPLETENESS OF INFORMATION, OR ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Ingeo and the Ingeo logo are trademarks or registered trademarks of NatureWorks LLC in the USA and other countries.

Product name:
Ingeo™ biopolymer
Product code:
3D850

Revision Number: 4

Revision date:
06/15/2018

Print date:
06/15/2018

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, 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

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.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Use personal protective equipment. Avoid contact with skin and eyes. 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 shovel into suitable containers for disposal.

7. HANDLING AND STORAGE

Safe handling advice: Use personal protective equipment as required. Avoid contact with skin and eyes. Low hazard for usual industrial or commercial handling. Workers

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 OF COMPLETENESS OF INFORMATION, OR ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Ingeo and the Ingeo logo are trademarks or registered trademarks of NatureWorks LLC in the USA and other countries.

Product name:
Ingeo™ biopolymer
Product code:
3D850

Revision Number: 4

Revision date:
06/15/2018

Print date:
06/15/2018

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/ 122 °F. Keep cool. No special restrictions 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 the use of local exhaust ventilation and good general extraction. Provide appropriate exhaust 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/m³ for total dust and 5 mg/m³ for the respirable fraction. The American Conference of Governmental Industrial Hygienists (ACGIH) TLV/TWA for PNOC is 10 mg/m³ for inhalable particulates and 3 mg/m³ 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 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.

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 OF COMPLETENESS OF INFORMATION, OR ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Ingeo and the Ingeo logo are trademarks or registered trademarks of NatureWorks LLC in the USA and other countries.

Product name:
Ingeo™ biopolymer
Product code:
3D850

Revision Number: 4

Revision date:
06/15/2018

Print date:
06/15/2018

Special hazard: Workers should be protected from the possibility of contact with molten 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 Transition Temperature): 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 for excessive 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)

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 OF COMPLETENESS OF INFORMATION, OR ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Ingeo and the Ingeo logo are trademarks or registered trademarks of NatureWorks LLC in the USA and other countries.

Product name:
Ingeo™ biopolymer
Product code:
3D850

Revision Number: 4

Revision date:
06/15/2018

Print date:
06/15/2018

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 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 diarrhea.

Specific effects: 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 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

12. ECOLOGICAL INFORMATION

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

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 OF COMPLETENESS OF INFORMATION, OR ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Ingeo and the Ingeo logo are trademarks or registered trademarks of NatureWorks LLC in the USA and other countries.

Product name:
Ingeo™ biopolymer
Product code:
3D850

Revision Number: 4

Revision date:
06/15/2018

Print date:
06/15/2018

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 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.

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

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 OF COMPLETENESS OF INFORMATION, OR ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Ingeo and the Ingeo logo are trademarks or registered trademarks of NatureWorks LLC in the USA and other countries.

Product name:
Ingeo™ biopolymer
Product code:
3D850

Revision Number: 4

Revision date:
06/15/2018

Print date:
06/15/2018

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 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

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

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 OF COMPLETENESS OF INFORMATION, OR ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Ingeo and the Ingeo logo are trademarks or registered trademarks of NatureWorks LLC in the USA and other countries.



Product name:
Ingeo™ biopolymer
Product code:
3D850

Revision Number: 4

Revision date:
06/15/2018

Print date:
06/15/2018

Print date: 06/15/2018

Recommended restrictions: None
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.

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 OF COMPLETENESS OF INFORMATION, OR ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Ingeo and the Ingeo logo are trademarks or registered trademarks of NatureWorks LLC in the USA and other countries.