SAFETY DATA SHEET
Safety Data Sheet according to Regulation (EC) No. 1907/2006 (REACH)

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

1.1. Product identifier
Product name: INGEO™ BIOPOLYMER
Product code: 3D870
EC-No: 618-575-7
CAS No: 9051-89-2
Unique Formula Identifier (UFI):
Product Information: This document is provided to communicate information in accordance with Article 32 of Regulation (EC) No 1907/2008 for a substance or mixture which does not legally require a safety data sheet (SDS)

1.2. Relevant identified uses of the substance or mixture and uses advised against
Product Use: A biopolymer to be used in 3D printing applications

1.3. Details of the supplier of the safety data sheet
Supplier: NatureWorks
17400 Medina Rd, Suite# 800
Plymouth, MN 55447
sdsinquiry@natureworksllc.com

1.4. Emergency telephone number
Emergency telephone numbers (24 hours a day):
(Medical Information) +1-(651)-632-9273
(Transportation Information) CHEMTREC: +1-(800)-424-9300 (in the United States)
(Transportation Information) CHEMTREC: +1-(703)-527-3887 (outside the United States)

Additional information:
Emergency telephone number Europe 112, CHEMTREC (Chemical Transportation Emergency Centre) +44 20 3885 0382

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SECTION 2: Hazards identification

2.1. Classification of the substance or mixture:

2.1.1. Classification according to Regulation (EC) No. 1272/2008 [CLP]
Not classified

2.2. Label elements:

Signal word: None
Hazard Statements: None
Precautionary Statements: None

2.3. Other hazards: May form combustible dust concentrations in air if small particles are generated during further processing, handling or by other means. Refer to protective measures listed in Sections 7 and 8.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

<table>
<thead>
<tr>
<th>Chemical name and CAS</th>
<th>EC-No</th>
<th>Weight-%</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polylactide resin</td>
<td>618-575-7</td>
<td>&gt; 85%</td>
<td>Not classified</td>
</tr>
<tr>
<td>9051-89-2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proprietary</td>
<td></td>
<td>10 - 20%</td>
<td>Not classified</td>
</tr>
</tbody>
</table>

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.

SECTION 4: First aid measures

Emergency telephone numbers (24 hours a day):

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+1-(800)-424-9300 (in the United States) (Transportation Information) CHEMTREC:

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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 doctor immediately.

Skin contact: Adverse human health effects and symptoms are not expected. After contact with skin, wash immediately with plenty of water. If skin irritation persists, call a doctor. Cool skin rapidly with cold water after contact with hot polymer. Do not try to remove solidified material from the skin. Do not remove clothing if adhering to skin. Call a doctor immediately.

Inhalation: Move to fresh air. Call a doctor 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 doctor immediately.

Notes to physician: Treat symptomatically.

4.2. Most important symptoms and effects, both acute and delayed: No data available.

4.3. Indication of any immediate medical attention and special treatment needed: No data available.

SECTION 5: Firefighting measures

Flammability:

Auto-ignition temperature: Not determined.

Flammability Limits in Air:

5.1. Extinguishing media

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.
5.2. Special hazards arising from the substance or mixture:
Hazardous decomposition products: Burning produces obnoxious and toxic fumes, Aldehydes, Carbon monoxide (CO), Carbon dioxide (CO2)

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

Fire-fighting measures: Cool containers / tanks with water spray. Water mist may be used to cool closed containers. Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air).

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 personal protection recommended in 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.

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
SECTION 8: Exposure controls/personal protection

8.1. Control parameters

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.

8.2. Exposure controls

8.2.1. Appropriate Engineering Controls:

Exposure limits: Not 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.

8.2.2. Personal protection equipment:

Eye protection: safety glasses with side-shields. Goggles
Skin and body protection: Impervious clothing
Hand protection: preventive skin protection.
Hygiene measures: Avoid contact with skin, eyes and clothing.

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

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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 us. 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.

**Special hazard:** Workers should be protected from the possibility of contact with molten material during fabrication. Contact with molten substance may cause severe burns to skin and eyes.

**8.2.3. Environmental exposure controls:** Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system.

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SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Solid</td>
</tr>
<tr>
<td>Appearance</td>
<td>pellets</td>
</tr>
<tr>
<td>Colour</td>
<td>Opaque, Light brown, Beige</td>
</tr>
<tr>
<td>Odour</td>
<td>Sweet</td>
</tr>
<tr>
<td>pH</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>Not determined</td>
</tr>
<tr>
<td>Vapour density</td>
<td>Not determined</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>Not determined</td>
</tr>
<tr>
<td>Density</td>
<td>1.22 g/cc @ 20 °C, 101.3 kPa</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>Not determined</td>
</tr>
<tr>
<td>Boiling point / boiling range</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Melting point / melting range</td>
<td>Tg (Glass Transition Temperature), 131-140°F / 55-60°C, @ 101.3 kPa</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>Not determined</td>
</tr>
<tr>
<td>Flash point</td>
<td>Not determined</td>
</tr>
<tr>
<td>Flammability</td>
<td>Fine dust dispersed in air may ignite</td>
</tr>
<tr>
<td>Flammability Limits in Air</td>
<td>No information available</td>
</tr>
<tr>
<td>Water solubility</td>
<td>Insoluble</td>
</tr>
<tr>
<td>Solubility in other solvents</td>
<td>Not determined</td>
</tr>
<tr>
<td>Solubility</td>
<td>Not determined</td>
</tr>
<tr>
<td>Particle characteristics</td>
<td>No information available</td>
</tr>
</tbody>
</table>

9.2. Other information

9.2.1. Information with regards to physical hazard classes

Workers should be protected from the possibility of contact with molten material during fabrication. Contact with product at elevated temperatures can result in thermal burns.

9.2.2. Other safety characteristics:

See section 8 for more information

SECTION 10: Stability and reactivity

10.1. Reactivity:

None under normal use conditions

10.2. Chemical stability:

Stable under recommended storage conditions.

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

10.4. Conditions to avoid:
Temperatures above 446°F (230 °C). Avoid keeping resin molten for excessive periods at temperatures above 230 °C. Prolonged exposure above 230 °C will cause polymer degradation.

10.5. Incompatible materials:
oxidising agents. Strong bases.

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

SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity: No data is available on the product itself.

<table>
<thead>
<tr>
<th>Principle routes of exposure:</th>
<th>Skin:</th>
<th>Polylactide Resin LD50/dermal/rabbit &gt; 2000 mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingestion:</td>
<td></td>
<td>Polylactide Resin Oral LD50 (rat) &gt;5000 mg/kg</td>
</tr>
</tbody>
</table>

Skin corrosion/irritation: Based on available data, the classification criteria are not met

Long term toxicity: No data available

Serious eye damage/eye irritation: Based on available data, the classification criteria are not met

Respiratory or skin sensitisation: Based on available data, the classification criteria are not met

Germ cell mutagenicity: No data is available on the product itself.

Carcinogenic effects: No data is available on the product itself.

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Reproductive toxicity: No data is available on the product itself.

STOT - single exposure; STOT - repeated exposure: Based on available data, the classification criteria are not met

Target organ effects: No data is available on the product itself.

Aspiration hazard: Based on available data, the classification criteria are not met

11.2. Information on other hazards

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.

11.2.1. Endocrine disrupting properties: No data is available on the product itself.

11.2.2. Other information:

SECTION 12: Ecological information

12.1. Toxicity: No data is available on the product itself.

12.2. Persistence and degradability: No data is available on the product itself.

12.3. Bioaccumulative potential: No data is available on the product itself.

12.4. Mobility in soil: No data available

12.5. Results of PBT and vPvB assessment:

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12.6. Endocrine disrupting properties: No data is available on the product itself.

12.7. Other adverse effects:

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Compliance with technical regulations Regulation (EC) No 2008/98

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.

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SECTION 14: Transport information

Applicable:
  ADR/RID:
  ICAO/IATA:
  IMDG:
  US DOT (Department of Transportation):

14.1. UN number: None
14.2. UN proper shipping name: None
14.3. Transport hazard class(es): None

Packaging group: None
14.5. Environmental hazards: None
14.6. Special precautions for user: None
14.7. Maritime transport in bulk according to IMO instruments: None
SECTION 15: Regulatory information

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

15.2. Chemical safety assessment:
Not applicable.

Regulatory Information:

(Not meant to be all inclusive--selected regulations represented)

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U.S. REGULATIONS
SARA Title III Rules: Not Listed
US TSCA Inventory listing: Listed

State Regulations

International Inventories
Canada DSL Inventory List : Listed
REACH/EU EINECS List : Compliance with technical regulations
ENCS (Japan): Listed
Australian Industrial Chemicals Introduction Scheme (AICIS): Listed
Korean chemical inventory: Listed
China inventory of existing chemical substances list : Listed

SECTION 16: Other information

Label information: INGEÔ™ BIOPOLYMER
Product code: 3D870

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