Material Safety Data Sheet

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

Product name: NatureWorks Polylactide Resin
Product code: 2002D
Product trade name: N/A
Product Use: A thermoplastic coating with a variety of applications
Synonyms: NatureWorks PLA

Supplier: Cargill Dow LLC
15305 Minnetonka Blvd
Minnetonka, MN 55345 USA
Customer Information Center: 800-258-2436

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. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical name and CAS Number</th>
<th>Weight %</th>
<th>OSHA Exposure Limits:</th>
<th>ACGIH Exposure Limits:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polylactide resin 9051-89-2</td>
<td>90 – 100%</td>
<td>none</td>
<td>none</td>
</tr>
</tbody>
</table>

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.

The Information Herein Is Given In Good Faith, But No Warranty, Express Or Implied, Is Made. Consult Cargill Dow for Further Information.

NOTICE REGARDING MEDICAL APPLICATION RESTRICTIONS: Cargill Dow 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.
3. HAZARDS IDENTIFICATION

**EMERGENCY OVERVIEW**

CAUTION! May cause eye/skin irritation. Burning produces obnoxious and toxic fumes. Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

**Appearance:** Clear, translucent, opaque, pellets.
**Physical state:** Solid
**Odor:** Sweet

**Potential health effects:**

- **Eye contact:** Contact with eyes may cause irritation.
- **Skin contact:** Substance may cause slight skin irritation.
- **Ingestion:** Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.
- **Inhalation:** Inhalation of dust may cause shortness of breath, tightness of the chest, a sore throat and cough. Low hazard for usual industrial or commercial handling.

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

- **Specific hazards:** No information available
- **Flammability:** Fine dust dispersed in air may ignite.
- **Environmental precautions:** Not determined

**NFPA rating:**

- **Health:** 1
- **Flamm:** 1
- **Reactivity:** 0

**Special:** Not determined

**HMIS classification:**

The Information Herein Is Given In Good Faith, But No Warranty, Express Or Implied, Is Made. Consult Cargill Dow for Further Information.

NOTICE REGARDING MEDICAL APPLICATION RESTRICTIONS: Cargill Dow 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.
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:** Rinse immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician. Cool skin rapidly with cold water after contact with hot polymer.

**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.

5. FIRE FIGHTING MEASURES

**Flammability:**

- **Flash point:** None
- **Tested according to:** Not applicable
- **Autoignition temperature:** Not applicable

**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.

Extinguishing media which must not be used for safety reasons: No information available


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 spray water. Water mist may be used to cool closed containers.

Other information: 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 with proper personal protective equipment (see Section 8). Remove all sources of ignition. Avoid dust formation. Avoid contact with skin and eyes. 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: Shovel into suitable container for disposal.

The Information Herein Is Given In Good Faith, But No Warranty, Express Or Implied, Is Made. Consult Cargill Dow for Further Information.

NOTICE REGARDING MEDICAL APPLICATION RESTRICTIONS: Cargill Dow 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.
7. HANDLING AND STORAGE

Safe handling advice: Avoid contact with skin and eyes. Avoid dust formation. Workers should be protected from the possibility of contact with molten material during fabrication. Low hazard for usual industrial or commercial handling. Use with proper personal protective equipment (see Section 8).

Storage:
Store in cool place. Keep at temperatures below 122°F (50 °C).
No special restrictions on storage with other products

Precautions: No special precautions required

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

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.

Control parameters: None

PERSONAL PROTECTIVE EQUIPMENT:


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 2 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.
Hygiene measures: Avoid contact with skin, eyes and clothing.

Exposure limits: See Section 2.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance: Clear, translucent, opaque, pellets.
Physical state: Solid
Odor: Sweet
Odor threshold: No data available
pH: Not applicable
Vapor pressure: Not applicable
Vapor density: Not applicable
Evaporation rate: Not applicable
Partition coefficient (n-octanol/water): Not applicable
Density: 1.25
Decomposition temperature: 482°F (250°C)
Melting point/range: Crystalline melting point: 302-356°F (150-180°C), Tg (glass transition temperature): 131-149°F (55-65°C)
Water solubility: Insoluble
Solubility in other solvents: None known
Viscosity, kinematic (centistrokes) @ 20 °C: Not applicable

10. STABILITY AND REACTIVITY

Stability: Stable under recommended storage conditions.

Conditions to avoid: Temperatures above 446°F (230 °C).

Materials to avoid: Oxidizing agents. Strong bases.


The Information Herein Is Given In Good Faith, But No Warranty, Express Or Implied, Is Made. Consult Cargill Dow for Further Information.

NOTICE REGARDING MEDICAL APPLICATION RESTRICTIONS: Cargill Dow 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.
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:
May cause eye/skin irritation. Product dust may be irritating to eyes, skin and respiratory system. Caused mild to moderate conjunctival irritation in eye irritation studies using rabbits. Caused very mild redness in dermal irritation studies using rabbits (slightly irritating). Ingestion may cause gastro intestinal irritation, nausea, vomiting and diarrhoea.

Long term toxicity:
Did not cause skin allergic reactions in skin sensitization studies using guinea pigs.

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.

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

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

Carcinogenic effects:
None of the components of this product listed in Section 2 are classified as carcinogens by IARC, OSHA, or the NTP.

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

Medical conditions aggravated by exposure:

Skin: LD50/dermal/rabbit > 2000 mg/kg
Ingestion: LD50/oral/rat > 5000 mg/kg.

Further information:
No information available

12. ECOLOGICAL INFORMATION

Mobility: No data available

Bioaccumulation: Does not bioaccumulate. Inherently biodegradable.
Ecotoxicity effects: EC50/72h/algae > 1100 mg/L

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products:
In accordance with local and national regulations. Do not contaminate ponds, waterways or ditches with chemical or used container. Contact manufacturer.

CARGILL DOW LLC 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 AS DESCRIBED IN MSDS SECTION 2 (Composition/Information On Ingredients).

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.

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-No: None
Packing group: None

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

The Information Herein Is Given In Good Faith, But No Warranty, Express Or Implied, Is Made. Consult Cargill Dow for Further Information.

NOTICE REGARDING MEDICAL APPLICATION RESTRICTIONS: Cargill Dow 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.

Page 8 of 10
15. REGULATORY INFORMATION

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

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer’s responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous 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

Proposition 65 listed material: Not Listed

INTERNATIONAL INVENTORIES

Canada DSL Inventory List - Listed
Canada NDSL Inventory List - Listed
EU EINECS List - The components of this product listed in Section 2 are listed.
Japan (ENCS) - Listed
Australia (AICS): Listed
Korean chemical inventory: Not Listed
Phillippines (PICCS) inventory: Not Listed
China inventory of existing chemical substances list -: Not Listed

16. OTHER INFORMATION

Label information: NatureWorks Polylactide Resin
Product code: 2002D

The Information Herein Is Given In Good Faith, But No Warranty, Express Or Implied, Is Made. Consult Cargill Dow for Further Information.

NOTICE REGARDING MEDICAL APPLICATION RESTRICTIONS: Cargill Dow 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.
The Information Herein Is Given In Good Faith, But No Warranty, Express Or Implied, Is Made. Consult Cargill Dow for Further Information.

NOTICE REGARDING MEDICAL APPLICATION RESTRICTIONS: Cargill Dow 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.