

PLA Filament

1. Chemical product and company information

a	Chemical product	Polylactic acid
b	Usage	For industrial conversion as a raw material for manufacture of articles or goods.
c	Chemical type	Thermoplastic
d	Company information	3D4Makers BV, Waarderweg 56, 2031 BP Haarlem, The Netherlands
e	Telephone number	+ 31 (0) 238200584

2. Hazards identification

a	Classification of the mixture	This product is NOT classified according to 29 CFR 1910.1200 Hazard Communication Standard 2012
b	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.

3. Composition/information on ingredients

a Mixture

CAS-No. / EC-No. / Index	Amount	OSHA Exposure Limits	ACGIH Exposure Limits
Poly lactide resin 9051-89-2	>=98.0 %	None	None

4. First aid measures

a Description of first aid measures

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.

Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. 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.
Inhalation	Move to fresh air. Call a physician immediately.
Notes to physician	Treat symptomatically.

5. Firefighting measures

a Flammability	Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam.
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
b 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.

6. Accidental release measures

a Personal precautions, protective equipment and emergency procedures	Use personal protective equipment. Avoid contact with skin and eyes. Avoid dust formation. Remove all sources of ignition. Sweep up to prevent slipping hazard.
b Environmental precautions	Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system.
b Methods and materials for containment and cleaning up	Clean up promptly by scoop or vacuum. Sweep up and shovel into suitable containers for disposal.

7. Handling and storage

- | | | |
|----------|-----------------------------|---|
| a | Safe handling advice | Use personal protective equipment. 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. |
| b | Storage | Store at temperatures not exceeding 50°C/ 122°F. Keep cool. No special restrictions on storage with other products. |
| c | Precautions | No special precautions required. |

8. Exposure controls/personal protection

- | | | |
|----------|--------------------------------------|---|
| a | Exposure control | None established |
| | 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/m ³ for total dust and 5 mg/m ³ for the respirable fraction. 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. |
| b | 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. |
| c | Hygiene measures | Avoid contact with skin, eyes and clothing. |
| d | Special hazard | Workers should be protected from the possibility of contact with molten material during fabrication. |

9. Physical and chemical properties

a Information on basic physical and chemical properties

Appearance	Filament
Colour	Clear
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
Water solubility	Insoluble
Solubility in other solvents	Not determined

10. Stability and reactivity

a Reactivity	None expected under conditions of normal use.
b Chemical stability	Stable under recommended storage conditions.
c 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
d Materials to avoid	Oxidizing agents, Strong bases
e Hazardous decomposition products	Burning produces obnoxious and toxic fumes, Aldehydes, Carbon monoxide (CO), carbon dioxide (CO2)
f Principle routes of exposure	Eye contact, Skin contact, Inhalation, Ingestion.
g Acute toxicity	There were no target organ effects noted following ingestion or dermal exposure in animal studies.
h 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.

i	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.
j	Long term toxicity	Did not cause skin allergic reactions in skin sensitization studies using guinea pigs.
k	Mutagenic effects	Not mutagenic in AMES Test.
l	Reproductive toxicity	No data is available on the product itself.
m	Carcinogenic effects	None of the components of this product are listed as carcinogens by IARC, NTP, or OSHA.
n	Target organ effects	There were no target organ effects noted following ingestion or dermal exposure in animal studies.
o	Skin	LD50/dermal/rabbit > 2000 mg/kg
p	Ingestion	LD50/ oral/ rat > 5000 mg/kg

11. Toxicological information

a	Ecotoxicity effects	EC50/72h/algae > 1100 mg/L
b	Persistence and degradability:	Inherently biodegradable under industrial composting conditions
c	Bioaccumulation	Not expected to bioconcentrate or bioaccumulate.
d	Mobility:	No data available

12. Ecological information

a	Toxicity	Not expected to be acutely toxic, but material in pellet or bead form may mechanically cause adverse effects if ingested by waterfowl or aquatic life.
b	Persistence and Degradability	This water-insoluble polymeric solid is expected to be inert in the environment. Surface photodegradation is expected with exposure to sunlight. No appreciable biodegradation is expected.
c	Bioaccumulative potential	No bioconcentration is expected because of the relatively high molecular weight (MW greater than 1000).
d	Mobility in soil	In the terrestrial environment, material is expected to remain in the soil., In the aquatic environment, material will sink and remain in the sediment.
e	Results of PBT and vPvB assessment	This mixture has not been assessed for persistence, bioaccumulation and toxicity (PBT).
f	Other adverse effects	No relevant data found.

13. Disposal considerations

- | | | |
|----------|--|--|
| a | 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. |
| b | 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

- | | | |
|----------|--|----------------------|
| a | U.S. Department of Transportation (DOT) | |
| | Proper shipping name | None |
| | Hazard class | Not regulated |
| | Packaging group | None |
| | Hazardous substances (RQ) | None |
| b | IMDG | |
| | Proper shipping name | None |
| | Hazard class | Not regulated |
| | UN/Id No. | None |
| | Packing group | None |
| c | ICAO/IATA | |
| | Proper shipping name | None |
| | Hazard Class | Not regulated |
| | UN-No. | None |
| | Packing group | None |

15. Regulatory information

- | | | |
|----------|----------------------------------|-------------------|
| a | U.S. REGULATIONS | |
| | Sara 313 title III | Not listed |
| | TSCA Inventory List | Listed |
| b | STATE REGULATIONS | |
| | California Proposition 65 | Not listed |

c INTERNATIONAL INVENTORIES

Canada DSL Inventory List	Listed
REACH/EU EINECS List	Components are in compliance with and/or are listed.
Japan (ECL)	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 Informaton

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.