



Safety Data Sheet

According to GB/T 16483, GB/T 17519

Initial preparation date: 04.09.2024

Tough 2000 V1.1 Resin

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

Product identifier

Chinese name:

English name: Tough 2000 V1.1 Resin

Product code: FLTO2011

Recommended and limited uses of the product

Relevant identified uses: For use in Formlabs SLA Printers

Uses advised against: Not determined or not applicable.

Reasons why uses advised against: Not determined or not applicable.

Manufacturer or supplier details

Manufacturer:

United States

Formlabs, Inc

35 Medford St

Suite 201 Somerville, MA 02143

+1 617 855 0762

sds@formlabs.com

Emergency telephone number:

APAC

CHEMTREC (APAC)

+65 3163 8374 (24/7)

SECTION 2 HAZARDS IDENTIFICATION

Emergency overview

Appearance	Grey Liquid
Odor	Characteristic acrylate
Health Hazards	No additional health hazards.
Safety Hazards	No additional physical hazards.
Environmental Hazards	No additional environmental hazards.

GHS hazard categories:

Skin irritation, category 2

Eye irritation, category 2A

Skin sensitization, category 1

Specific target organ toxicity - single exposure, category 3, respiratory tract irritation

Chronic aquatic hazard, category 2

Label elements

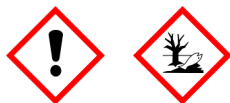
Pictograms:

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Signal Word: Warning

Hazard statements:

- H315 Causes skin irritation
- H317 May cause an allergic skin reaction
- H319 Causes serious eye irritation
- H335 May cause respiratory irritation
- H411 Toxic to aquatic life with long lasting effects

Precautionary statements:

Prevention:

- P261 Avoid breathing dust/fume/gas/mist/vapours/spray
- P264 Wash skin thoroughly after handling
- P271 Use only outdoors or in a well-ventilated area
- P272 Contaminated work clothing should not be allowed out of the workplace
- P273 Avoid release to the environment
- P280 Wear protective gloves, protective clothing and eye protection.

Response:

- P302+P352 IF ON SKIN: Wash with plenty of soap and water
- P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing
- P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
- P312 Call a POISON CENTER/doctor/ if you feel unwell
- P332+P313 If skin irritation occurs: Get medical advice/attention
- P333+P313 If skin irritation or rash occurs: Get medical advice/attention
- P337+P313 If eye irritation persists: Get medical advice/attention.
- P362+P364 Take off contaminated clothing and wash it before reuse
- P391 Collect spillage

Safe storage:

- P403+P233 Store in a well-ventilated place. Keep container tightly closed
- P405 Store locked up

Waste disposal:

- P501 Dispose of contents/container in accordance with local/regional/national regulations

Other hazards: None known

Physical and Chemical hazards	No additional physical hazards.
Health Hazards	No additional health hazards.
Environmental Hazards	No additional environmental hazards.

SECTION 3 COMPOSITION/INFORMATION ON INGREDIENTS

Name	Weight %	CAS number
Urethane Dimethacrylate	45-65	Trade Secret
Methacrylate Monomer(s)	15-25	Trade Secret
Methacrylate Monomer(s)	10-20	7534-94-3

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Photoinitiator(s)	<1.5	Trade Secret
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Additional information: None

SECTION 4 FIRST-AID MEASURES

Description of first aid measures

Inhalation:

Remove source of exposure or move person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms: Call a POISON CENTER or doctor.

Skin contact:

Wash off immediately with soap and plenty of water while removing contaminated clothing and shoes. Continue rinsing for at least 15 minutes. See a physician if irritation persists.

Eye contact:

Immediately flush eyes, under eyelids with water for 15 minutes. Remove contact lenses, if present to do so. Protect unexposed eye. Continue rinsing on the way to hospital.

Ingestion:

If swallowed, DO NOT induce vomiting unless told to do so by physician or poison control center. Rinse mouth with water. Never give anything to drink to an unconscious person. Seek medical advice.

Most important symptoms and health effects:

Symptoms may include blistering, irritation, burns and pain. Effects are dependent on exposure (dose, concentration, contact time).

Skin: Symptoms may cause irritation, redness, pain and rash. Respiratory: Symptoms may include difficulty breathing, coughing, wheezing and tightness/closure of airway.

Symptoms of overexposure may include disorientation, dizziness and confusion. May progress to unconsciousness, paralysis and convulsions. Effects are dependent on exposure (dose, concentration, contact time).

Symptoms of poisoning may appear several hours later.

Advices for first aid responders:

None known.

Notes for the doctor:

Treat symptomatically.

SECTION 5 FIRE-FIGHTING MEASURES

Extinguishing media

Suitable extinguishing media:

Alcohol- resistant foam, Dry chemical or Carbon dioxide

Water fog, carbon dioxide, dry chemical or foam

Unsuitable extinguishing media:

None known

Special hazards:

Evacuate all personnel to a predetermined safe location, no less than 2,500 feet in all directions. Can explode or detonate under fire conditions. Burning material may produce toxic vapors.

Firefighting precautions and protective measures:

Protective equipment:

Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA)

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Keep people away. Isolate fire and deny unnecessary entry. To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures:

Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. For personal protection see section 8.

Environmental precautions:

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and material for containment and cleaning up:

Contain and soak up spill with absorbent that does not react with spilled product. Place used absorbent into suitable, covered, labelled containers for disposal.

Additional advice:

For disposal see section 13.

SECTION 7 HANDLING AND STORAGE

Handling:

Avoid contact with skin, eyes, and clothing. Follow good hygiene procedures when handling chemical materials. Refer to Section 8. Follow proper disposal methods. Refer to Section 13. Do not eat, drink, smoke, or use personal products when handling chemical substances.

Storage:

Store in a cool, dry, well ventilated place. Store away from sources of heat or ignition. Store away from incompatible materials described in Section 10. Keep containers closed when not in use

Safe packaging material

Suitable material:

Not determined or not applicable.

Unsuitable material:

Not determined or not applicable.

Specific end use(s):

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Only those substances with limit values have been included below.

Occupational Exposure limit values:

No occupational exposure limits noted for the ingredient(s).

Biological limit values:

No biological exposure limits noted for the ingredient(s).

Information on monitoring procedures:

Not determined or not applicable.

Appropriate engineering controls:

Effective ventilation in all processing areas.

Personal protection equipment

Eye and face protection:

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Safety goggles or safety glasses with side shields

Skin and body protection:

Impervious clothing and chemical resistant gloves

Respiratory protection:

In case of insufficient ventilation, wear suitable respiratory protection

General hygienic measures:

Handle in accordance with good industrial hygiene and safety measures. Wash hands and face after handling chemical products. Wash hands before eating, drinking and smoking. Wash hands at the end of the workday.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Grey Liquid
Odor	Characteristic acrylate
Odor threshold	Not determined or not available.
pH	Not determined or not available.
Melting point/freezing point	Not determined or not available.
Initial boiling point/range	> 100°C
Flash point (closed cup)	> 93.5°C
Evaporation rate	Not determined or not available.
Flammability (solid, gas)	Not Flammable
Upper flammability/explosive limit	Not determined or not available.
Lower flammability/explosive limit	Not determined or not available.
Vapor pressure	Not determined or not available.
Vapor density	Not determined or not available.
Density	1.11 g/cm ³
Relative density	Not determined or not available.
Solubilities	Not determined or not available.
Partition coefficient (n-octanol/water)	Not determined or not available.
Auto/Self-ignition temperature	Not determined or not available.
Decomposition temperature	Not determined or not available.
Dynamic viscosity	1600 cps @ 25°C
Kinematic viscosity	Not determined or not available.
Explosive properties	Not determined or not available.
Oxidizing properties	Not determined or not available.

SECTION 10 STABILITY AND REACTIVITY

Reactivity:

Does not react under normal conditions of use and storage.

Stability:

Stable under normal storage and handling conditions.

Hazardous reactions:

Under normal conditions of storage and use, hazardous reactions will not occur.

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Conditions to avoid:

Incompatible materials.

Avoid storage >38°C (100°F) and exposure to light/direct sunlight and heat.

Incompatible materials:

Polymerization initiators, including peroxides, strong oxidizing agents, alcohols, copper, copper alloys, carbon steel, iron, rust, and strong bases.

Hazardous decomposition:

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11 TOXICOLOGICAL INFORMATION

Acute toxicity

Assessment: Based on available data, the classification criteria are not met.

Product data: No data available.

Substance data:

Name	Route	Result
Methacrylate Monomer(s)	oral	LD50 Rat: >2000 mg/kg
		LD50 Rat: 3160 mg/kg
	dermal	LD50 Rabbit: >5000 mg/kg
		LD50 Rabbit: >3000 mg/kg
Photoinitiator(s)	oral	LD50 Rat: >5000 mg/kg
	dermal	LD50 Rat: >=2000 mg/kg

Skin corrosion/irritation

Assessment:

Causes skin irritation.

Product data:

No data available.

Substance data:

Name	Result
Methacrylate Monomer(s)	Causes skin irritation

Serious eye damage/irritation

Assessment:

Causes serious eye irritation.

Product data:

No data available.

Substance data:

Name	Result
Methacrylate Monomer(s)	Causes serious eye irritation.
	Causes serious eye irritation

Respiratory or skin sensitization

Assessment:

May cause an allergic skin reaction.

Product data:

No data available.

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Substance data:

Name	Result
Urethane Dimethacrylate	May cause an allergic skin reaction.
Methacrylate Monomer(s)	May cause an allergic skin reaction.
Photoinitiator(s)	May cause an allergic skin reaction.

Carcinogenicity

Assessment: Based on available data, the classification criteria are not met.

Product data: No data available.

Substance data: No data available.

International Agency for Research on Cancer (IARC):

Name	Classification
Methacrylate Monomer(s)	Not Applicable
Photoinitiator(s)	Not Applicable

National Toxicology Program (NTP): None of the ingredients are listed.

Germ cell mutagenicity

Assessment: Based on available data, the classification criteria are not met.

Product data:

No data available.

Substance data: No data available.

Reproductive toxicity

Assessment: Based on available data, the classification criteria are not met.

Product data:

No data available.

Substance data: No data available.

Specific target organ toxicity (single exposure)

Assessment:

May cause respiratory irritation.

Product data:

No data available.

Substance data:

Name	Result
Methacrylate Monomer(s)	May cause respiratory irritation

Specific target organ toxicity (repeated exposure)

Assessment: Based on available data, the classification criteria are not met.

Product data:

No data available.

Substance data: No data available.

Aspiration toxicity

Assessment: Based on available data, the classification criteria are not met.

Product data:

No data available.

Substance data: No data available.

Information on likely routes of exposure:

No data available.

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Symptoms related to the physical, chemical and toxicological characteristics:

No data available.

Other information:

No data available.

SECTION 12 ECOLOGICAL INFORMATION

Acute (short-term) toxicity

Assessment: Based on available data, the classification criteria are not met.

Product data: No data available.

Substance data:

Name	Result
Methacrylate Monomer(s)	Fish LC50 Danio rerio: 1.79 mg/L (96 hr)
	Aquatic Invertebrates EC50 Daphnia magna: 2.57 mg/L (48 hr [mobility])
	Aquatic Plants EC50 Pseudokirchneriella subcapitata: 2.28 mg/L (72 hr [growth rate])
Photoinitiator(s)	Aquatic Plants EC50 Pseudokirchneriella subcapitata: >2.01 mg/L (72 hr [growth rate; read-across])
	Fish LC50 Danio rerio: 1 mg/L (96 hr [read-across])
	Aquatic Invertebrates EC50 Daphnia magna: 3.53 mg/L (48 hr [read-across])

Chronic (long-term) toxicity

Assessment:

Toxic to aquatic life with long lasting effects.

Product data: No data available.

Substance data:

Name	Result
Methacrylate Monomer(s)	Aquatic Invertebrates EC50 Daphnia magna: 0.658 mg/L (21 d [reproduction])

Persistence and degradability

Product data: No data available.

Substance data:

Name	Result
Urethane Dimethacrylate	This substance is not readily biodegradable.
Methacrylate Monomer(s)	This substance is readily biodegradable.
Methacrylate Monomer(s)	The substance is readily biodegradable. 70% degradation in water, measured by CO2 evolution, after 28 days.
Photoinitiator(s)	The substance is not readily biodegradable. <10 % degradation in water, measured by O2 consumption, after 28 days.

Bioaccumulative potential

Product data: No data available.

Substance data:

Name	Result
Methacrylate Monomer(s)	The substance has low potential to bioaccumulate because of log Kow value (0.97 at 20 deg C).

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Name	Result
Methacrylate Monomer(s)	Bioaccumulation can be assumed based on a log Pow value of 5.09. However, due to expected rapid metabolism and non-bioaccumulative potential of the metabolites, bioaccumulation in organisms is not expected.
Photoinitiator(s)	The substance has a low potential for bioaccumulation based on a log Kow of 2.91.

Mobility in soil

Product data: No data available.

Substance data:

Name	Result
Urethane Dimethacrylate	This substance is expected to distribute between the water column and organic soil and sediment particles.
Methacrylate Monomer(s)	The substance has a low potential for adsorption to soil
Methacrylate Monomer(s)	The substance is slightly mobile in soil with a high potential for adsorption to soil and sediment. Log Koc: 3.71
Photoinitiator(s)	Based on a log Koc of 3.37, adsorption to solid soil phase is expected.

Results of PBT and vPvB assessment

Product data:

PBT assessment: This product does not contain any substances that are assessed to be a PBT.

vPvB assessment: This product does not contain any substances that are assessed to be a vPvB.

Substance data:

PBT assessment:

Urethane Dimethacrylate	This substance is not PBT.
Methacrylate Monomer(s)	This substance is not PBT.
Methacrylate Monomer(s)	This substance is not PBT.

vPvB assessment:

Urethane Dimethacrylate	This substance is not vPvB.
Methacrylate Monomer(s)	This substance is not vPvB.
Methacrylate Monomer(s)	This substance is not vPvB.

Other adverse effects: No data available.

SECTION 13 DISPOSAL CONSIDERATIONS

Waste chemicals:

Do not discharge into public wastewater or surface waters. It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities.

Contaminated packages:

Dispose contaminated packages in a safe manner in accordance with local and national regulations. Do not allow the product to be released into the environment.

SECTION 14 TRANSPORT INFORMATION

China GB 6944/12268

UN number	UN 3082
UN proper shipping name	Environmentally hazardous liquid, N.O.S. Urethane dimethacrylate

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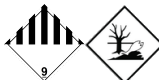
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UN transport hazard class(es)	9	
Packing group	III	
Environmental hazards	Marine Pollutant	
Special precautions for user	None	
Additional Information	This product is not regulated as a dangerous good when transported in sizes of ≤5L or ≤5 kg	

International Maritime Dangerous Goods (IMDG)

UN number	UN 3082	
UN proper shipping name	Environmentally hazardous liquid, N.O.S. Urethane dimethacrylate	
UN transport hazard class(es)	9	
Packing group	III	
Environmental hazards	Marine Pollutant	
Special precautions for user	None	

International Air Transport Association Dangerous Goods Regulations (IATA-DGR)

UN number	UN 3082	
UN proper shipping name	Environmentally hazardous liquid, N.O.S. Urethane dimethacrylate	
UN transport hazard class(es)	9	
Packing group	III	
Environmental hazards	Marine Pollutant	
Special precautions for user	None	

Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Bulk Name	None
Ship type	None
Pollution category	None

SECTION 15 REGULATORY INFORMATION

China regulations

Inventory of Existing Chemical Substances in China (IECSC): All ingredients are listed or exempt.

Inventory of Prohibited Chemicals: None of the ingredients are listed.

Catalog of Hazardous Chemicals: None of the ingredients are listed.

List of Toxic Chemicals Restricted to be Imported and Export in China: None of the ingredients are listed.

List of Hazardous Chemicals for Priority Management - SAWS: None of the ingredients are listed.

Additional information: Not determined

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SECTION 16 OTHER INFORMATION

Abbreviations and Acronyms: None

Disclaimer:

This product has been classified in accordance with GB/T 16483-2008, GB 17519-2013 and GB 13690-2009. The information provided in this SDS is correct, to the best of our knowledge, based on information available. The information given is designed only as a guidance for safe handling, use, storage, transportation and disposal and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials, unless specified in the text. The responsibility to provide a safe workplace remains with the user.

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End of Safety Data Sheet