

Safety Data Sheet

According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

Initial Preparation Date: 09.05.2024

Page 1 of 12

Tough V1 Resin

SECTION 1: Identification

Product Identifier

Product Name: Tough V1 Resin

Product code: FLCRT001

Recommended Use of the Product and Restriction on Use

Relevant Identified Uses: For use in 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:

United States

CHEMTREC
1-800-424-9300 (24/7)

SECTION 2: Hazard(s) Identification

GHS Classification:

Skin irritation, category 2

Eye irritation, category 2A

Skin sensitization, category 1

Label elements

Hazard Pictograms:



Signal Word: Warning

Hazard statements:

H317 May cause an allergic skin reaction

H315 Causes skin irritation

H319 Causes serious eye irritation H335

Precautionary Statements:

P261 Avoid breathing dust/fume/gas/mist/vapors/spray

Safety Data Sheet

According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

Initial Preparation Date: 09.05.2024

Page 2 of 12

Tough V1 Resin

P272 Contaminated work clothing must not be allowed out of the workplace
P280 Wear protective gloves, protective clothing and eye protection.
P264 Wash skin thoroughly after handling
P271 Use only outdoors or in a well-ventilated area
P302+P352 IF ON SKIN: Wash with plenty of soap and water
P333+P313 If skin irritation or rash occurs: Get medical advice/attention
P363 Wash contaminated clothing before reuse
P332+P313 If skin irritation occurs: Get medical advice/attention
P362 Take off contaminated clothing and wash it before reuse
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337+P313 If eye irritation persists: Get medical advice/attention
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P312 Call a POISON CENTER/doctor if you feel unwell
P403+P233 Store in a well-ventilated place. Keep container tightly closed
P405 Store locked up
P501 Dispose of contents/container in accordance with local/regional/national regulations

Hazards Not Otherwise Classified: None

SECTION 3: Composition/Information on Ingredients

Identification	Name	Weight %
CAS Number: Trade Secret	Methacrylate Monomer(s)	30-40
CAS Number: Trade Secret	Urethane Dimethacrylate	25-35
CAS Number: Trade Secret	Methacrylate Monomer(s)	20-30
CAS Number: Trade Secret	Methacrylate Monomer(s)	5-15
CAS Number: Trade Secret	Photoinitiator(s)	<5

Additional Information: None

SECTION 4: First Aid Measures

Description of First Aid Measures

General Notes:

Show this Safety Data Sheet to the doctor in attendance.

After Inhalation:

If inhaled, remove person to fresh air and place in a position comfortable for breathing. Keep person at rest. If breathing is difficult, administer oxygen. If breathing has stopped, provide artificial respiration. If experiencing respiratory symptoms, seek medical advice/attention.

After Skin Contact:

Remove contaminated clothing and shoes. Rinse skin with copious amounts of water [shower] for several minutes. Launder contaminated clothing before reuse. If symptoms develop or persist, seek medical advice/attention.

After Eye Contact:

Safety Data Sheet

According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

Initial Preparation Date: 09.05.2024

Page 3 of 12

Tough V1 Resin

Rinse eyes with plenty of water for several minutes. Remove contact lenses if present and easy to do so. Protect unexposed eye. If symptoms develop or persist, seek medical advice/attention.

Rinse eyes with plenty of gently flowing lukewarm water for 15 minutes. Remove contact lenses if present and easy to do so. Protect unexposed eye. If symptoms develop or persist, seek medical advice/attention.

After Swallowing:

If swallowed, DO NOT induce vomiting unless told to do so by a physician or poison control center. Rinse mouth with water. Never give anything by mouth to an unconscious person. If spontaneous vomiting occurs, place on the left side with head down to prevent aspiration of liquid into the lungs. If symptoms develop or persist, seek medical advice/attention.

Most Important Symptoms and Effects, Both Acute and Delayed

Acute Symptoms and Effects:

Dermal exposure may cause an allergic skin reaction. Symptoms may include irritation, redness, pain, rash, inflammation, itching, burning and dermatitis.

Skin contact may result in redness, pain, burning and inflammation.

Eye contact may result in irritation, redness, pain, inflammation, itching, burning and tearing.

Inhalation may have adverse effects on the respiratory tract. Symptoms may include cough, breathing difficulties, sore throat and inflammation of the mucous membrane lining the respiratory tract.

Delayed Symptoms and Effects:

Effects are dependent on exposure (dose, concentration, contact time).

Immediate Medical Attention and Special Treatment

Specific Treatment:

If respiratory symptoms persist, seek medical attention.

Notes for the Doctor:

Treat symptomatically.

SECTION 5: Firefighting Measures

Extinguishing Media

Suitable Extinguishing Media:

Water mist/fog, carbon dioxide, dry chemical or alcohol resistant foam.

Unsuitable Extinguishing Media:

Do not use water jet.

Specific Hazards During Fire-Fighting:

Thermal decomposition may produce irritating/toxic fumes/gases.

Special Protective Equipment for Firefighters:

Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full-face piece operated in positive pressure mode.

Special precautions:

Avoid contact with skin, eyes, hair and clothing. Do not breathe fumes/gas/mists/aerosols/vapors/dusts.

Move containers from fire area if safe to do so. Use water spray/fog for cooling fire exposed containers.

Avoid unnecessary run-off of extinguishing media which may cause pollution.

SECTION 6: Accidental Release Measures

Personal Precautions, Protective Equipment, and Emergency Procedures:

Evacuate unnecessary personnel. Ventilate area. Extinguish any sources of ignition. Wear recommended personal protective equipment (see Section 8). Avoid contact with skin, eyes and clothing. Avoid breathing

Safety Data Sheet

According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

Initial Preparation Date: 09.05.2024

Page 4 of 12

Tough V1 Resin

mist, vapor, dust, fume and spray. Do not walk through spilled material. Wash thoroughly after handling.

Environmental Precautions:

Prevent further leakage or spillage if safe to do so. Prevent from reaching drains, sewers and waterways. Discharge into the environment must be avoided.

Methods and Material for Containment and Cleaning Up:

Do not touch damaged containers or spilled material unless wearing appropriate personal protective clothing. Stop leak if you can do it without risk. Contain and collect spillage and place in suitable container for future disposal. Dispose of in accordance with all applicable regulations (see Section 13).

Reference to Other Sections:

For personal protective equipment see Section 8. For disposal see Section 13.

SECTION 7: Handling and Storage

Precautions for Safe Handling:

Use appropriate personal protective equipment (see Section 8). Use only with adequate ventilation. Avoid breathing mist/vapor/spray/dust. Do not eat, drink, smoke, or use personal products when handling chemical substances. Avoid contact with skin, eyes and clothing. Wash affected areas thoroughly after handling. Keep away from incompatible materials (See Section 10). Keep containers tightly closed when not in use.

Conditions for Safe Storage, Including Any Incompatibilities:

Store in cool, dry, well-ventilated location out of direct sunlight. Keep away from food and beverages. Protect from freezing and physical damage. Store away from heat, open flames and other sources of ignition. Keep container tightly sealed. Store away from incompatible materials (See Section 10).

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:

Emergency eye wash stations and safety showers should be available in the immediate vicinity of use or handling. Provide adequate ventilation to maintain the airborne concentrations of vapor, mists, and/or dusts below the applicable workplace exposure limits, while observing recognized national standards (or equivalent).

Personal Protection Equipment

Eye and Face Protection:

Safety glasses or goggles. Use eye protection equipment that has been tested and approved by recognized national standards (or equivalent).

Skin and Body Protection:

Chemical resistant, impervious gloves approved by the appropriate standards. Gloves must be inspected prior to use. Avoid skin contact with used gloves. Appropriate techniques should be used to remove used gloves and contaminated clothing. Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Ensure that all personal protective equipment is approved by recognized national standards (or equivalent).

Respiratory Protection:

Safety Data Sheet

According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

Initial Preparation Date: 09.05.2024

Page 5 of 12

Tough V1 Resin

If engineering controls do not maintain airborne concentrations below the applicable workplace exposure limits, or to an acceptable level (if exposure limits have not been established), a respirator approved by recognized national standards (or equivalent) must be worn.

General Hygienic Measures:

When handling chemical products, do not eat, drink or smoke. Wash hands after handling, before breaks, and at the end of the workday. Avoid contact with skin, eyes and clothing. Wash contaminated clothing before reuse. Perform routine housekeeping.

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	1.08 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	328 cps @ 25°C; 174 cps @ 35°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:

Not reactive under recommended handling and storage conditions.

Chemical Stability:

Stable under recommended handling and storage conditions.

Possibility of Hazardous Reactions:

Hazardous reactions are not anticipated under recommended conditions of handling and storage.

Conditions to Avoid:

Extreme heat, open flames, hot surfaces, sparks, ignition sources and incompatible materials.

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

Safety Data Sheet

According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

Initial Preparation Date: 09.05.2024

Page 6 of 12

Tough V1 Resin

Incompatible Materials:

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

Hazardous Decomposition Products:

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: >5000 mg/kg
		LD50 Rat: 3160 mg/kg
	dermal	LD50 Rabbit: >3000 mg/kg
		LD50 Rabbit: >5000 mg/kg
Photoinitiator(s)	oral	LD50 Rat: >5000 mg/kg
	dermal	LD50 Rat: >=2000 mg/kg
Urethane Dimethacrylate	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.
	Causes skin irritation
	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
	Cause serious eye irritation.

Respiratory or Skin Sensitization

Assessment:

May cause an allergic skin reaction.

Product Data:

Safety Data Sheet

According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

Initial Preparation Date: 09.05.2024

Page 7 of 12

Tough V1 Resin

No data available.

Substance Data:

Name	Result
Urethane Dimethacrylate	May cause an allergic skin reaction.
Methacrylate Monomer(s)	May cause an allergic skin reaction.
	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
Urethane Dimethacrylate	Not Applicable
Methacrylate Monomer(s)	Not Applicable
	Not Applicable
	Not Applicable
Photoinitiator(s)	Not Applicable

National Toxicology Program (NTP):

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

OSHA Carcinogens: Not applicable

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:

Safety Data Sheet

According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

Initial Preparation Date: 09.05.2024

Page 8 of 12

Tough V1 Resin

Name	Result
Methacrylate Monomer(s)	May cause respiratory irritation
	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.

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])
	Fish LC50 Oryzias latipes: >100 mg/L (96 hr)
	Aquatic Invertebrates EC50 Daphnia magna: 380 mg/L (48 hr [mobility])
	Aquatic Plants EC50 Pseudokirchneriella subcapitata: 2.28 mg/L (72 hr [growth rate])
	Aquatic Plants EC50 Algae: 345 mg/L (72 hr [growth rate])
Urethane Dimethacrylate	Fish LC50 Danio rerio: 10.1 mg/L (96 hr)
	Aquatic Invertebrates EC50 Daphnia magna: > 1.2 mg/L (48 hr [mobility])
	Aquatic Plants EC50 Desmodesmus subspicatus: > 0.68 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: Based on available data, the classification criteria are not met.

Product Data: No data available.

Substance Data:

Safety Data Sheet

According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

Initial Preparation Date: 09.05.2024

Page 9 of 12

Tough V1 Resin

Name	Result
Methacrylate Monomer(s)	Aquatic Invertebrates EC50 Daphnia magna: 0.658 mg/L (21 d [reproduction])
	Aquatic Invertebrates NOEC Daphnia magna: 24.1 mg/L (21 d [reproduction])

Persistence and Degradability

Product Data: No data available.

Substance Data:

Name	Result
Urethane Dimethacrylate	The substance is not readily biodegradable. 22% degradation, measured by CO2 evolution, after 28 days.
Methacrylate Monomer(s)	The substance is readily biodegradable (92 - 100% degradation after 14 days, measured by Oxygen consumption).
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 (log kow: <=3).
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	The substance has moderate potential to adsorb to organic soil and sediment particles (log Koc: 3.66 dimensionless).
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	The substance is not PBT.
Methacrylate Monomer(s)	The substance is not PBT.
Methacrylate Monomer(s)	This substance is not PBT

vPvB assessment:

Safety Data Sheet

According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

Initial Preparation Date: 09.05.2024

Page 10 of 12

Tough V1 Resin

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

Other Adverse Effects: No data available.

SECTION 13: Disposal Considerations

Disposal Methods:

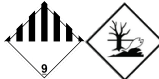
As supplied, this material is not considered a hazardous waste under RCRA. If the material has been altered or contaminated, or it has exceeded its recommended shelf life, the guidance may be inapplicable. Do not discharge into public waste water or surface waters. It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities.

Contaminated packages:

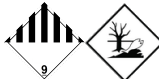
Dispose in a safe manner in accordance with local and national regulations. Do not allow the product to be released into the environment

SECTION 14: Transport Information

United States Transportation of Dangerous Goods (49 CFR DOT)

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
Additional Information	DOT: 49 CFR 171.4(c)(2) Not regulated as dangerous goods when transported in single or inner packaging of 5 L or less for liquids or net mass of 5 Kg or less for solids provided the packaging meets the requirements of 49 CFR 173.24(a)

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
Additional Information	This product is not regulated as a dangerous good when transported in sizes of ≤5L or ≤5 kg provided the packaging meets the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8.

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

UN Number	UN 3082
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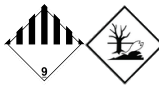
Safety Data Sheet

According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

Initial Preparation Date: 09.05.2024

Page 11 of 12

Tough V1 Resin

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	
Additional Information	This product is not regulated as a dangerous good when transported in sizes of ≤5L or 5≤ kg provided the packaging meets the general provisions of 5.0.2.4.1, 5.0.2.6.1 and 5.0.2.8.	

SECTION 15: Regulatory Information

United States Regulations

Inventory Listing (TSCA):

Trade Secret	Urethane Dimethacrylate	Listed - Active
Trade Secret	Methacrylate Monomer(s)	Listed - Active
Trade Secret	Methacrylate Monomer(s)	Listed - Active
Trade Secret	Photoinitiator(s)	Listed - Active
Trade Secret	Methacrylate Monomer(s)	Listed - Active

Significant New Use Rule (TSCA Section 5): None of the ingredients are listed.

Export Notification under TSCA Section 12(b): None of the ingredients are listed.

SARA Section 302 Extremely Hazardous Substances: None of the ingredients are listed.

SARA Section 313 Toxic Chemicals: None of the ingredients are listed.

CERCLA: None of the ingredients are listed.

RCRA: None of the ingredients are listed.

Section 112(r) of the Clean Air Act (CAA): None of the ingredients are listed.

Massachusetts Right to Know: None of the ingredients are listed.

New Jersey Right to Know: None of the ingredients are listed.

New York Right to Know: None of the ingredients are listed.

Pennsylvania Right to Know: None of the ingredients are listed.

California Proposition 65: None of the ingredients are listed.

Additional information: Not determined.

SECTION 16: Other Information

Abbreviations and Acronyms: None

Disclaimer:

This product has been classified in accordance with OSHA HCS 2012 guidelines. 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

Safety Data Sheet

According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

Initial Preparation Date: 09.05.2024

Page 12 of 12

Tough V1 Resin

specified in the text. The responsibility to provide a safe workplace remains with the user.

NFPA: 2-1-0

HMIS: 2-1-0

Initial Preparation Date: 09.05.2024

End of Safety Data Sheet