

Safety Data Sheet

According to Japanese National Standard JIS Z 7253:2012

Initial preparation date: 03.24.2023

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Flame Retardant Resin V1

SECTION 1: Chemical product and company identification

Product identifier

Product name: Flame Retardant Resin V1

Product code: FLFRGR01

Recommended use of the product and restriction on use

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

GHS classification:

Skin irritation, category 2

Serious eye damage, category 1

Skin sensitization, category 1

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

Chronic aquatic hazard, category 2

Label elements

Hazard pictograms:



Signal Word: Danger

Hazard statements:

H315 Causes skin irritation

H317 May cause an allergic skin reaction

H318 Causes serious eye damage

H335 May cause respiratory irritation

H411 Toxic to aquatic life with long lasting effects

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Precautionary statements:

- 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.
- 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 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
- P362 Take off contaminated clothing
- P363 Wash contaminated clothing before reuse
- P391 Collect spillage
- 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

Substance: Not applicable

Mixture:

| Identification | Name | Wt. % |
|-----------------------------|---|-------|
| CAS number: 72869-86-4 | Urethane dimethacrylate | 30-50 |
| CAS number: Trade Secret | Methacrylate Monomer(s) | 15-25 |
| CAS number: Trade Secret | Acrylate Monomer(s) | 5-10 |
| CAS number: 868-77-9 | HEMA | 5-10 |
| CAS number: 84434-11-7 | Ethyl phenyl(2,4,6-trimethylbenzoyl)phosphinate | <2 |

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. If respiratory symptoms develop or persist, seek medical advice/attention.

After skin contact:

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Wash affected area with plenty of soap and water. Remove contaminated clothing and launder before reuse. If skin irritation develops or persists, seek medical advice/attention.

After eye contact:

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.

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:

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

Eye contact may result in irritation, redness, pain, inflammation, itching, burning, tearing, corneal damage and loss of vision.

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

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:

In case of eye contact, seek prompt medical attention while rinsing is continued.

If respiratory symptoms persist, seek medical attention.

Notes for the doctor:

Treat symptomatically.

SECTION 5: Fire-fighting 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).

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

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personal protective equipment (see Section 8). Avoid contact with skin, eyes and clothing. Avoid breathing 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).

Safe packaging material

Suitable material:

Not determined or not applicable.

Unsuitable material:

Not determined or not applicable.

SECTION 8: Exposure controls and 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:

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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:

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 | 1.18g/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 | Not determined or not available. |
| Kinematic viscosity | 5000 cps @ 25°C |
| 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.

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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.

Stable under recommended handling and storage conditions.

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.

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: Hazard 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 |
| | dermal | LD50 Rat: > 2000 mg/kg |
| Acrylate Monomer(s) | oral | LD50 Rat: >2000 mg/kg |
| HEMA | oral | LD50 Rat: 5564 mg/kg |
| Ethyl phenyl(2,4,6-trimethylbenzoyl)phosphinate | 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. |
| HEMA | Causes skin irritation. |

Serious eye damage/irritation

Assessment:

Causes serious eye damage.

Product data:

No data available.

Substance data:

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

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| Name | Result |
|---------------------|--------------------------------|
| Acrylate Monomer(s) | Causes serious eye damage. |
| HEMA | Causes serious eye irritation. |

Respiratory or skin sensitization

Assessment:

May cause an allergic skin reaction.

Product data:

No data available.

Substance data:

| Name | Result |
|---|--------------------------------------|
| Methacrylate Monomer(s) | May cause an allergic skin reaction. |
| HEMA | May cause an allergic skin reaction. |
| Ethyl phenyl(2,4,6-trimethylbenzoyl)phosphinate | May cause an allergic skin reaction. |
| Urethane dimethacrylate | 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 |
| Ethyl phenyl(2,4,6-trimethylbenzoyl)phosphinate | Not Applicable |
| Urethane dimethacrylate | 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. |

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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: 0.144 mg/L (96 hr) |
| | Aquatic Invertebrates EC50 Daphnia magna: 2.63 mg/L (48 hr [read-across]) |
| Acrylate Monomer(s) | Fish LC50 Danio rerio: 2.7 mg/L |
| | Aquatic Invertebrates EC50 Daphnia magna: 158.3 mg/L |
| | Aquatic Plants ErC50 Pseudokirchneriella subcapitata: 12.9 mg/L |
| Ethyl phenyl(2,4,6-trimethylbenzoyl)phosphinate | 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]) |
| 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]) |

Chronic (long-term) toxicity

Assessment:

Toxic to aquatic life with long lasting effects.

Product data: No data available.

Substance data: No data available.

Persistence and degradability

Product data: No data available.

Substance data:

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| Name | Result |
|---|--|
| Methacrylate Monomer(s) | The substance is not readily biodegradable based on test results for an analogous substance. 28.1% degradation in water after 28 days. |
| Acrylate Monomer(s) | This substance is considered inherently biodegradable. |
| HEMA | This substance is considered readily biodegradable. |
| Ethyl phenyl(2,4,6-trimethylbenzoyl)phosphinate | The substance is not readily biodegradable. <10 % degradation in water, measured by O2 consumption, after 28 days. |
| Urethane dimethacrylate | The substance is not readily biodegradable (22% degradation in 28 days). |

Bioaccumulative potential

Product data: No data available.

Substance data:

| Name | Result |
|---|---|
| Methacrylate Monomer(s) | The substance is expected to bioaccumulate in organisms. BCF (aquatic species): 1 493 L/kg ww |
| HEMA | This substance has low potential to bioaccumulate. |
| Ethyl phenyl(2,4,6-trimethylbenzoyl)phosphinate | 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 |
|---|--|
| Methacrylate Monomer(s) | This substance moderate potential to be adsorbed by the soil. |
| Methacrylate Monomer(s) | The substance is slightly mobile in soil with a high potential for adsorption to soil and sediment. Koc at 20 °C: 8674 |
| Acrylate Monomer(s) | This substance is not expected to be adsorbed by the soil. |
| HEMA | This substance has low potential to be adsorbed by the soil. |
| Ethyl phenyl(2,4,6-trimethylbenzoyl)phosphinate | Based on a log Koc of 3.37, adsorption to solid soil phase is expected. |
| Urethane dimethacrylate | The substance has moderate potential to adsorb to organic soil and sediment particles (log Koc: 3.66 dimensionless). |

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:

| | |
|-------------------------|----------------------------|
| Methacrylate Monomer(s) | This substance is not PBT. |
| Acrylate Monomer(s) | This substance is not PBT. |
| HEMA | This substance is not PBT. |
| Urethane dimethacrylate | This substance is not PBT. |

vPvB assessment:

| | |
|-------------------------|-----------------------------|
| Methacrylate Monomer(s) | This substance is not vPvB. |
| Acrylate Monomer(s) | This substance is not vPvB. |
| HEMA | This substance is not vPvB. |
| Urethane dimethacrylate | This substance is not vPvB. |

Hazard to the ozone layer

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

Product data: No data available.

Substance data: No data available.

Other adverse effects: No data available.

SECTION 13: Notes on disposal

Disposal methods:

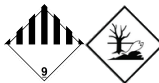
Do not discharge into public wastewater or surface waters. It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities.

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


International Carriage of Dangerous Goods by Road/Rail (ADR/RID)

| | |
|-------------------------------|--|
| 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 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 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 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 |
| UN proper shipping name | Environmentally hazardous liquid, N.O.S. Urethane dimethacrylate |
| UN transport hazard class(es) | 9  |
| Packing group | III |

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| | |
|-------------------------------------|---|
| 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 provided the packaging meets the general provisions of 5.0.2.4.1, 5.0.2.6.1 and 5.0.2.8. |

| | |
|--|------|
| 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

Japan regulations

Fire Service Law:

Not Applicable

Not Applicable

Japan Inventory of Existing and New Chemical Substances (ENCS): All ingredients are listed or exempt.

Chemical Substance Control Law

Priority Assessment Chemical Substance: None of the ingredients are listed.

Industrial Safety and Health Act (ISHA)

Existing Chemical Substances:

| | | | |
|--------------|---|--------|-----------|
| Trade Secret | Methacrylate Monomer(s) | Listed | 7-(1)-530 |
| Trade Secret | Acrylate Monomer(s) | Listed | (5)-1060 |
| 868-77-9 | HEMA | Listed | (2)-1044 |
| 84434-11-7 | Ethyl phenyl(2,4,6-trimethylbenzoyl)phosphinate | Listed | 4-(3)-117 |
| 72869-86-4 | Urethane dimethacrylate | Listed | 2-(5)-212 |

Cabinet Order Number for Chemical Substances Requiring Labeling: None of the ingredients are listed.

Ordinance on Prevention of Organic Solvent Poisoning: 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 Japanese National Standard JIS Z 7252:2014 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 specified in the text. The responsibility to provide a safe workplace remains with the user.

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End of Safety Data Sheet