Clear
Photoreactive Resin for Formlabs 3D printers

SAFETY DATA SHEET
Prepared: 15/10/2016
Version: 1

GHS/CLP Labelling
Hazard pictograms:

Signal word: Warning

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier
Product name: Clear Photoreactive Resin for Formlabs 3D printers.
Product code: Not available.
Product description: Mixture of methacrylic acid esters and photoinitiator.
Product type: Liquid.
Other means of identification: Not available.

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses: For use in Formlabs 3D printers.

1.3 Details of the supplier of the safety data sheet
Supplier's details: Formlabs, Inc.
35 Medford Street, Suite #201
Somerville, MA
USA
E-mail address of person responsible for this SDS: sds@formlabs.com

1.4 Emergency telephone number
National advisory body/Poison Centre
Telephone number: North America call +1 800 255 3924
Worldwide Int'l. call +01 813 248 0585
Hours of operation: 24/7

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
Product definition: Mixture.
Classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]
Eye Irrit. 2, H319
Skin Sens. 1, H317
The product is classified as hazardous according to Regulation (EC) 1272/2008 as amended.
See Section 16 for the full text of the H statements declared above.
See Section 11 for more detailed information on health effects and symptoms.

2.2 Label elements
Hazard pictograms:

Warning
Hazard statements: H319 - Causes serious eye irritation.
H317 - May cause an allergic skin reaction.

Precautionary statements

General : Not applicable.


Response : P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Storage : Not applicable.

Disposal : P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazardous ingredients : Diphenyl(2,4,6-trimethylbenzoyl)phosphine oxide.

Supplemental label elements

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles : Not applicable.

Special packaging requirements

Containers to be fitted with child-resistant fastenings : Not applicable.

Tactile warning of danger : Not applicable.

2.3 Other hazards

Other hazards which do not result in classification : None known.

SECTION 3: Composition/information on ingredients

3.2 Mixtures : Mixture.

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Identifiers</th>
<th>%</th>
<th>Regulation (EC) n. 1272/2008 [CLP]</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methacrylated oligomer</td>
<td>-</td>
<td>≥75 - ≤90</td>
<td>Skin Sens. 1, H317</td>
<td>[1]</td>
</tr>
<tr>
<td>Methacrylated monomer</td>
<td>-</td>
<td>≥25 - ≤50</td>
<td>Eye Irrit. 2, H319</td>
<td>[1]</td>
</tr>
<tr>
<td>Diphenyl (2,4,6-trimethylbenzoyl) phosphine oxide</td>
<td>EC: 278-355-8 CAS: 75980-60-8 Index: 015-203-00-X</td>
<td>&lt;1</td>
<td>Repr. 2, H361f (Fertility, causing atrophy of the testes)</td>
<td>[1]</td>
</tr>
</tbody>
</table>

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment, are PBTs, vPvBs or Substances of equivalent concern, or have been assigned a workplace exposure limit and hence require reporting in this section.

Type

[1] Substance classified with a health or environmental hazard
[2] Substance with a workplace exposure limit
[5] Substance of equivalent concern

Occupational exposure limits, if available, are listed in Section 8.
SECTION 4: First aid measures

4.1 Description of first aid measures

Eye contact: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 20 minutes. Get medical attention.

Inhalation: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact: Wash with plenty of soap and water. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 20 minutes. Get medical attention. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion: Wash out mouth with water. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately.

Protection of first-aiders: No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

4.2 Most important symptoms and effects, both acute and delayed

Potential acute health effects

Eye contact: Causes serious eye irritation.
Inhalation: No known significant effects or critical hazards.
Skin contact: May cause an allergic skin reaction.
Ingestion: No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact: Adverse symptoms may include the following:
- pain or irritation
- watering
- redness

Inhalation: No known significant effects or critical hazards.
Skin contact: Adverse symptoms may include the following:
- irritation
- redness

Ingestion: No known significant effects or critical hazards.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician: In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments: No specific treatment.
SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media: Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media: None known.

5.2 Special hazards arising from the substance or mixture

Hazard from the substance or mixture: No specific fire or explosion hazard.

Hazardous thermal decomposition products: Decomposition products may include the following materials:
- carbon dioxide
- carbon monoxide
- nitrogen oxides
- phosphorus oxides

5.3 Advice for firefighters

Special protective actions for fire-fighters: No special measures are required.

Special protective equipment for fire-fighters: Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Clothing for fire-fighters (including helmets, protective boots and gloves) conforming to European standard EN 469 will provide a basic level of protection for chemical incidents.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel: No action shall be taken involving any personal risk or without suitable training. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders: If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

6.2 Environmental precautions: Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

6.3 Methods and material for containment and cleaning up

Small spill: Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
6.4 Reference to other sections:
See Section 1 for emergency contact information.
See Section 8 for information on appropriate personal protective equipment.
See Section 13 for additional waste treatment information.

SECTION 7: Handling and storage

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

7.1 Precautions for safe handling

Protective measures:
Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapour or mist. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene:
Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. See also Section 8 for additional information on hygiene measures.

7.2 Conditions for safe storage, including any incompatibilities
Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

7.3 Specific use(s)
Recommendations:
Not available.

Industrial sector specific solutions:
Not available.

SECTION 8: Exposure controls/personal protection

The information in this section contains generic advice and guidance. Information is provided based on typical anticipated uses of the product. Additional measures might be required for bulk handling or other uses that could significantly increase worker exposure or environmental releases.

8.1 Control parameters

Occupational exposure limits

No PNEC available.

Recommended monitoring procedures

If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to monitoring standards, such as the following: European Standard EN 689 (Workplace atmospheres - Guidance for the assessment of exposure by inhalation to chemical agents for comparison with limit values and measurement strategy) European Standard EN 14042 (Workplace atmospheres - Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents) European Standard EN 482 (Workplace atmospheres - General requirements for the performance of procedures for the measurement of chemical agents) Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

DNEL/DMEL

No DNELs/DMELs available.

PNEC

No PNEC available.

8.2 Exposure controls

Appropriate engineering controls

Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Individual protection measures

Hygiene measures

Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection

Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection

Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
### 9.1 Information on basic physical and chemical properties

- **Appearance**
  - Physical state: Liquid.
  - Colour: Yellow. [Light]
  - Odour: Light/Characteristic/Acrylate.
  - Odour threshold: Not available.
  - pH: Not available.
  - Melting point/freezing point: Not available.
  - Initial boiling point and boiling range: >100°C
  - Flash point: Closed cup: >93.333°C [Setaflash.]
  - Evaporation rate: Not available.
  - Flammability (solid, gas): Not available.
  - Vapour pressure: Not available.
  - Vapour density: Not available.
  - Relative density: 1.09 to 1.12
  - Solubility(ies): Very slightly soluble in the following materials: cold water and hot water. Soluble in organic solvents.
  - Partition coefficient: n-octanol/water: Not available.
  - Auto-ignition temperature: Not available.
  - Decomposition temperature: Not available.
  - Viscosity: Dynamic (room temperature): 850 to 900 mPa·s
  - Explosive properties: Not available.
  - Oxidising properties: Not available.

### 9.2 Other information

No additional information.
SECTION 10: Stability and reactivity

10.1 Reactivity: No specific test data related to reactivity available for this product or its ingredients.

10.2 Chemical stability: The product is stable.

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

10.4 Conditions to avoid: No specific data.

10.5 Incompatible materials: Reactive or incompatible with the following materials: oxidising materials and alkalis.

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

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Dose</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methacrylated monomer</td>
<td>LD50 Oral</td>
<td>Rat</td>
<td>11200 mg/kg</td>
<td>-</td>
</tr>
</tbody>
</table>

Irritation/Corrosion
There is no data available.

Sensitisation
There is no data available.

Mutagenicity
There is no data available.

Carcinogenicity
There is no data available.

Reproductive toxicity
There is no data available.

Teratogenicity
There is no data available.

Specific target organ toxicity (single exposure)
There is no data available.

Specific target organ toxicity (repeated exposure)
There is no data available.

Aspiration hazard
There is no data available.

Information on likely routes of exposure: Dermal contact. Eye contact. Inhalation. Ingestion.

Potential acute health effects

Eye contact: Causes serious eye irritation.
Inhalation : No known significant effects or critical hazards.
Skin contact : May cause an allergic skin reaction.
Ingestion : No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

**Eye contact**
- Adverse symptoms may include the following:
  - pain or irritation
  - watering
  - redness

Inhalation : No known significant effects or critical hazards.
Skin contact : Adverse symptoms may include the following:
  - irritation
  - redness
Ingestion : No known significant effects or critical hazards.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

**Short term exposure**
- **Potential immediate effects** : No known significant effects or critical hazards.
- **Potential delayed effects** : No known significant effects or critical hazards.

**Long term exposure**
- **Potential immediate effects** : No known significant effects or critical hazards.
- **Potential delayed effects** : No known significant effects or critical hazards.

**Potential chronic health effects**

- **General** : Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.
- **Carcinogenicity** : No known significant effects or critical hazards.
- **Mutagenicity** : No known significant effects or critical hazards.
- **Teratogenicity** : No known significant effects or critical hazards.
- **Developmental effects** : No known significant effects or critical hazards.
- **Fertility effects** : No known significant effects or critical hazards.

**Other information** : Not available.

SECTION 12: Ecological information

12.1 Toxicity
There is no data available.

12.2 Persistence and degradability
There is no data available.

12.3 Bioaccumulative potential

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>LogP&lt;sub&gt;ow&lt;/sub&gt;</th>
<th>BCF</th>
<th>Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methacrylated oligomer</td>
<td>3</td>
<td>-</td>
<td>low</td>
</tr>
<tr>
<td>Methacrylated monomer</td>
<td>0.97</td>
<td>-</td>
<td>low</td>
</tr>
<tr>
<td>diphenyl(2,4,6-trimethylbenzoyl) phosphine oxide</td>
<td>-</td>
<td>53 to 72</td>
<td>low</td>
</tr>
</tbody>
</table>

12.4 Mobility in soil

Soil/water partition coefficient (KOC)

Mobility

: Not available.

12.5 Results of PBT and vPvB assessment

PBT

: Not applicable.

vPvB

: Not applicable.

12.6 Other adverse effects

: No known significant effects or critical hazards.

SECTION 13: Disposal considerations

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

13.1 Waste treatment methods

Product

Methods of disposal

: The generation of waste should be avoided or minimised wherever possible. Disposal of this product, solutions and any by-products should comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction.

Hazardous waste

: The classification of the product may meet the criteria for a hazardous waste.

Packaging

Methods of disposal

: The generation of waste should be avoided or minimised wherever possible. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

Special precautions

: This material and its container must be disposed of in a safe way. Care should be taken when handling empty containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.
SECTION 14: Transport information

<table>
<thead>
<tr>
<th>14.1 UN number</th>
<th>ADR/RID</th>
<th>ADN</th>
<th>IMDG</th>
<th>IATA</th>
</tr>
</thead>
</table>

14.2 UN proper shipping name
- - - -

14.3 Transport hazard class(es)
- - - -

14.4 Packing group
- - - -

14.5 Environmental hazards
No. No. No. No.

Additional information
- - - -

14.6 Special precautions for user
Transport within user’s premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

EU Regulation (EC) No. 1907/2006 (REACH)
Annex XIV - List of substances subject to authorisation
Annex XIV
None of the components are listed.
Substances of very high concern
None of the components are listed.

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles
Not applicable.

Other EU regulations

Europe inventory
Product/ingredient name | Carcinogenic effects | Mutagenic effects | Developmental effects | Fertility effects
--- | --- | --- | --- | ---
Diphenyl(2,4,6-trimethylbenzoyl) phosphine oxide | - | - | - | Repr. 2, H361f (Fertility, causing atrophy of the testes)

All components are listed or exempted.

Ozone depleting substances (1005/2009/EU)
Not listed.

Prior Informed Consent (PIC) (649/2012/EU)
Not listed.

Seveso Directive
This product is not controlled under the Seveso Directive.

National regulations
D.Lgs. 152/06 : Not classified.

15.2 Chemical safety assessment : This product contains substances for which Chemical Safety Assessments are still required.

SECTION 16: Other information

Abbreviations and acronyms : ATE = Acute Toxicity Estimate
CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No. 1272/2008]
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
EUH statement = CLP-specific Hazard statement
PBT = Persistent, Bioaccumulative and Toxic
PNEC = Predicted No Effect Concentration
RRN = REACH Registration Number
vPvB = Very Persistent and Very Bioaccumulative

Procedure used to derive the classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

<table>
<thead>
<tr>
<th>Classification</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye Irrit. 2, H319</td>
<td>Calculation method</td>
</tr>
<tr>
<td>Skin Sens. 1, H317</td>
<td>Calculation method</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Full text of abbreviated H statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>H317</td>
</tr>
<tr>
<td>H319</td>
</tr>
<tr>
<td>H361f</td>
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</table>

<table>
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<tr>
<th>Full text of classifications [CLP/GHS]</th>
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<table>
<thead>
<tr>
<th>History</th>
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<tbody>
<tr>
<td>Date of issue (dd/mm/yyyy) : 15/10/2016</td>
</tr>
<tr>
<td>Version : 1</td>
</tr>
<tr>
<td>Prepared by : KMK Regulatory Services Inc.</td>
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</tbody>
</table>

Notice to reader
To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.