# Safety Data Sheet (SDS)

*Prepared in accordance with OSHA HazCom, GHS, EU REACH Annex II / (EU) 2020/878, UK REACH, WHMIS, AU WHS compatible*

# Rodin Titan Resin

## Section 1. Identification

**Product Identifier:** Rodin Titan 3D Resin
**Trade Name:** Rodin Titan
**Synonyms:** Dental Ceramic Nanohybrid 3D Printing Resin
**Recommended Use**
Light-curable ceramic nanohybrid resin intended for fabrication of permanent single-unit restorations (crowns, inlays, onlays, veneers) and temporary multi-unit dental prosthetics including bridges, full-arch provisionals, hybrid dentures, and denture teeth using validated CAD/CAM additive manufacturing systems.
**Restrictions on Use**
For professional dental/laboratory use only.
Not for direct intraoral placement in uncured state.
**Manufacturer/Supplier**
Pac-Dent, Inc.
670 Endeavor Circle
Brea, CA 92821
Phone: +1-909-839-0888
Email: info@pac-dent.com
**Emergency telephone number**
CHEMTREC (US): +1-800-424-9300
International: +1-703-527-3887

## Section 2. Hazard Identification

**GHS / CLP Classification of the Mixture**
Skin Sensitization – Category 1
Eye Irritation – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Hazardous to the Aquatic Environment, Chronic – Category 3

GHS07 GHS09

**Signal Word:** Warning
**Hazard Statements**
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H412 Harmful to aquatic life with long lasting effects
**Precautionary Statements**
**Prevention**
P261 Avoid breathing vapors / mist.
P264 Wash thoroughly after handling.
P272 Contaminated work clothing should not be allowed out of the workplace.
P273 Avoid release to the environment.
P280 Wear protective gloves and eye protection.
**Response**
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P333 + P313 If skin irritation or rash occurs: Get medical advice/attention.
P362 + P364 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 person to fresh air and keep comfortable for breathing.
**Storage**
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
**Disposal**
P501 Dispose of contents/container in accordance with local, regional, national, and international regulations.
**Other Hazards**
Uncured resin may cause irritation to skin, eyes, and respiratory tract.
Avoid direct contact with uncured material.
Does not meet criteria for PBT or vPvB based on available data.
Does not contain substances classified as endocrine disruptors above reportable thresholds based on available data.

## Section 3. Composition/Information on Ingredients

Product is a mixture

| Chemical Name | CAS Number | EC Number | Concentration (% w/w) | Classification |
|---|---|---|---|---|
| Methacrylate oligomers / multifunctional methacrylate esters | Proprietary | Proprietary | 10-20% | Skin Sens. 1 (H317), Eye Irrit. 2 (H319) |
| Urethane dimethacrylate derivatives / reactive monomers | Proprietary | Proprietary | 20-30% | Skin Sens. 1 (H317), STOT SE 3 (H335) |
| Photoinitiator system | Proprietary | Proprietary | 0.5–2% | Eye Irrit. 2 (H319), Aquatic Chronic 3 (H412) |
| Ceramic fillers (e.g., barium glass, ytterbium fluoride) | Proprietary | Proprietary | 30-50% | Not classified |
| Additives (pigments, stabilizers, inhibitors) | Proprietary | Proprietary | <5% | Not classified |

## Section 4. First-Aid Measures

**Description of First Aid Measures**

**General Advice**

If medical advice is needed, have product container, label, or Safety Data Sheet available. Ensure medical personnel are aware of the material involved and take precautions to protect themselves

**After Inhalation**

Remove person to fresh air and keep comfortable for breathing. If irritation, coughing, or other symptoms develop or persist, seek medical attention.

**After Skin Contact**

Immediately wash affected skin thoroughly with soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing before reuse. If irritation, redness, or allergic skin reaction develops, seek medical advice/attention.

**After Eye Contact**

Immediately rinse cautiously with clean running water for at least 15 minutes, holding eyelids open. Remove contact lenses if present and easy to do. Continue rinsing. Seek medical attention if irritation persists.

**After Swallowing**

Rinse mouth thoroughly with water. Do **not** induce vomiting unless directed by medical personnel. Never give anything by mouth to an unconscious person. Seek medical attention if discomfort occurs or if significant quantity has been swallowed.

**Most Important Symptoms and Effects, Both Acute and Delayed**

- **Inhalation:** May cause respiratory irritation, coughing, or discomfort from vapors or mist.
- **Skin Contact:** May cause irritation, redness, or allergic skin sensitization after repeated exposure.
- **Eye Contact:** Causes irritation, redness, tearing, and discomfort.
- **Ingestion:** May cause gastrointestinal discomfort, nausea, or irritation.

**Indication of Any Immediate Medical Attention and Special Treatment Needed**

Treat symptomatically. No specific antidote is known. For sensitized individuals, manage allergic reactions according to clinical judgment.

## Section 5. Fire-Fighting Measures

**Extinguishing Media**

**Suitable Extinguishing Media**

Use extinguishing media appropriate for the surrounding fire, including:

- Alcohol-resistant foam
- Carbon dioxide ($CO_2$)
- Dry chemical powder
- Water spray or fog (for cooling exposed containers)

**Unsuitable Extinguishing Media**

Do not use a direct water jet, as it may spread burning material.

**Special Hazards Arising from the Substance or Mixture**

The product is not classified as highly flammable; however, combustible organic components may burn under fire conditions.

Exposure to heat may cause:

- Thermal decomposition of resin components
- Formation of irritating, toxic, or hazardous fumes
- Pressure build-up in closed containers
- Possible polymerization with release of heat

Hazardous combustion/decomposition products may include:

- Carbon monoxide (CO)
- Carbon dioxide ($CO_2$)
- Nitrogen oxides (NOx)
- Acrid organic fumes

**Advice for Firefighters**

- Wear self-contained breathing apparatus (SCBA) and full protective firefighting gear.
- Cool fire-exposed containers with water spray.
- Fight fire from a safe distance or protected location.
- Prevent contaminated firefighting runoff from entering drains, waterways, or soil.

## Section 6. Accidental Release Measures

**Personal Precautions, Protective Equipment and Emergency Procedures**

Avoid contact with skin, eyes, and clothing. Ensure adequate ventilation.

Wear appropriate personal protective equipment, including:

- Safety glasses or chemical splash goggles
- Protective gloves (e.g., nitrile)
- Protective clothing / laboratory coat as needed

Avoid breathing vapors, mist, or aerosols generated during cleanup.

For non-emergency personnel, isolate the area and avoid unnecessary exposure.

**Environmental Precautions**

Avoid release to the environment. Prevent material from entering drains, sewers, surface water, or soil.

Contain spill if safe to do so. Notify relevant authorities if required by applicable local, regional, or national regulations.

**Methods and Material for Containment and Cleaning Up**

Small Spills:

- Absorb with inert material such as sand, vermiculite, or absorbent pads.
- Transfer collected material into a suitable waste container.

Uncured Resin Residue:

- Exposure to sunlight or artificial light may initiate polymerization.
- Resin may be cured under controlled light exposure prior to disposal where appropriate.

Large Spills:

- Dike or contain spill area.
- Collect mechanically using non-sparking tools where appropriate.
- Place waste into labeled disposal containers.

After cleanup, wash contaminated surfaces with suitable cleaning agents while preventing environmental release.

**Reference to Other Sections**

- Section 8 for exposure controls and personal protective equipment
- Section 13 for disposal considerations
- Section 7 for safe handling and storage information

## Section 7. Handling and Storage

**Precautions for Safe Handling**

Use only in accordance with professional instructions and validated processing procedures.

Avoid contact with skin, eyes, and clothing. Avoid breathing vapors, mist, or aerosols that may be generated during handling, printing, cleaning, or finishing operations.

Wear appropriate personal protective equipment as described in **Section 8**.

Use only in well-ventilated areas. Wash hands thoroughly after handling and before eating, drinking, or smoking.

Keep containers tightly closed when not in use. Avoid contamination of the product with foreign materials.

Do not reuse empty containers. Residual uncured resin may remain hazardous.

Protect material from unintended exposure to sunlight, UV light, or other curing light sources.

**Conditions for Safe Storage, Including Any Incompatibilities**

Store in the original tightly closed container in a cool, dry, and well-ventilated place.

**Recommended storage temperature: 2°C to 25°C (36°F to 77°F)**

Protect from:

- Direct sunlight
- UV light / curing light sources
- Excessive heat
- Moisture
- Sources of ignition

Do not freeze.

Keep away from incompatible materials such as:

- Strong oxidizing agents
- Strong reducing agents
- Peroxides
- Amines
- Polymerization initiators

Store upright to prevent leakage.

**Specific End Use(s)**

Light-curable dental resin intended for fabrication of permanent single-unit restorations (crowns, veneers, inlays, onlays) and temporary multi-unit prosthetics including bridges, full-arch provisionals, hybrid dentures, and denture teeth using validated CAD/CAM additive manufacturing systems. For professional dental laboratory or clinical use only.

## Section 8. Exposure Controls / Personal Protection

**Control Parameters**

No specific occupational exposure limits have been established for this mixture as a whole.

Where applicable, occupational exposure limits for individual components should be observed in accordance with local regulations.
Use adequate ventilation during handling, printing, cleaning, finishing, or other operations that may generate vapors, aerosols, or dust.
Local exhaust ventilation is recommended where airborne exposure may occur.

**Exposure Controls**

**Appropriate Engineering Controls**

- Use in a well-ventilated area.
- Provide local exhaust ventilation where vapors, mist, or airborne particulates may be generated.
- Use enclosed or automated processing systems where practical.
- Maintain eyewash stations and hand-washing facilities in work areas.

**Individual Protection Measures (Personal Protective Equipment)**

**Eye / Face Protection**

Wear safety glasses with side shields or chemical splash goggles where splashing or contact is possible.
Face protection may be used for high-exposure operations.

**Skin Protection**

**Hand Protection**

Wear chemical-resistant protective gloves (e.g., nitrile gloves). Replace gloves if contaminated or damaged.

**Body Protection**

Wear suitable protective clothing, laboratory coat, or apron to prevent repeated or prolonged skin contact.

**Respiratory Protection**

Respiratory protection is not normally required under normal conditions of use with adequate ventilation.
If ventilation is insufficient, or if vapors, aerosols, dust, or mist are generated, use approved respiratory protection in accordance with applicable regulations.

**General Hygiene Measures**

- Wash hands thoroughly after handling and before breaks, eating, drinking, or smoking.
- Remove contaminated clothing and wash before reuse.
- Avoid contact with skin, eyes, and clothing.
- Do not eat, drink, or smoke while handling the product.

**Environmental Exposure Controls**

Avoid release to drains, soil, and waterways. Handle waste and residues in accordance with Section 13.

## Section 9. Physical and Chemical Properties

**Information on Basic Physical and Chemical Properties**

| Property | Value |
|---|---|
| Appearance | Pigmented liquid resin |
| Color | Various shades / intentionally pigmented |
| Odor | Mild fruity / ester-like odor |
| Odor Threshold | Not determined |
| Physical State | Liquid |
| pH | Not applicable (non-aqueous mixture) |
| Melting Point / Freezing Point | Not determined |
| Initial Boiling Point / Boiling Range | Not determined |
| Flash Point | > 93°C (> 200°F) |
| Evaporation Rate | Not determined |
| Flammability | Not classified as flammable |
| Upper / Lower Explosive Limits | Not determined |
| Vapor Pressure | Not determined |
| Vapor Density | Not determined |
| Relative Density | Approximately 1.10 – 1.13 |
| Density | Approximately 1.10 – 1.18 g/cm³ at 25°C |
| Solubility in Water | Practically insoluble / nearly insoluble |
| Partition Coefficient (n-octanol/water) | Not determined |
| Auto-Ignition Temperature | Not determined |
| Decomposition Temperature | Not determined |
| Viscosity | 220 – 250 cP at 25°C (Brookfield) |
| Explosive Properties | Not explosive |
| Oxidizing Properties | Not oxidizing |

**Other Information**

| Property | Value |
|---|---|
| Specific Gravity | 1.10 – 1.13 at 25°C |
| VOC Content | Not determined |
| Polymerization Behavior | Polymerizes upon exposure to curing light |

## Section 10. Stability and Reactivity

**Reactivity**
The product is stable under recommended conditions of storage and use.
Uncured resin may undergo polymerization when exposed to heat, UV light, visible curing light, or contamination with reactive substances.
**Chemical Stability**
Stable when stored in the original sealed container under recommended storage conditions.
Product contains polymerizable components that may gradually react if improperly stored or exposed to light, heat, or contamination.
**Possibility of Hazardous Reactions**
Hazardous polymerization may occur under certain conditions.
Conditions that may initiate uncontrolled polymerization include:

- Exposure to sunlight, UV light, or curing light sources
- Elevated temperatures
- Contamination with peroxides, amines, reducing agents, or other reactive materials
- Inhibitor depletion over time
- Bulk heating in closed containers

Runaway polymerization may generate heat and pressure and may rupture sealed containers.
**Conditions to Avoid**

- Heat
- Direct sunlight
- UV / curing light exposure
- Sources of ignition
- Contamination
- Extended storage outside recommended temperature range

**Incompatible Materials**
Keep away from:

- Strong oxidizing agents
- Strong reducing agents
- Organic peroxides
- Amines
- Polymerization initiators
- Strong acids or bases where reactive incompatibility may occur

**Hazardous Decomposition Products**
Thermal decomposition or combustion may generate:

- Carbon monoxide (CO)
- Carbon dioxide ($CO_2$)
- Nitrogen oxides (NOx)
- Irritating organic fumes
- Acrid smoke

## Section 11. Toxicological Information

**Information on Hazard Classes as Defined in Applicable GHS / CLP Regulations**
**Acute Toxicity**
Based on available data, the mixture is not classified for acute toxicity.
Uncured material may be harmful if swallowed in significant quantities and may cause irritation of the mouth, throat, or gastrointestinal tract.
**Skin Corrosion / Irritation**
Not classified as corrosive.
Prolonged or repeated skin contact may cause irritation, redness, or dryness.
**Serious Eye Damage / Eye Irritation**
Classified as Eye Irritation Category 2.
Direct contact with uncured material may cause redness, tearing, pain, and discomfort.
**Respiratory Sensitization**
Not classified based on available data.
**Skin Sensitization**
Classified as Skin Sensitization Category 1.
Repeated or prolonged exposure may cause allergic skin reaction in susceptible individuals.
**Additional Effects Related to Intended Dental Use**
Uncured material may cause irritation to skin, eyes, and mucosal tissues upon contact.
Following proper processing and curing in accordance with validated instructions, the material is intended to be biologically stable and non-reactive for its intended intraoral use, including extended wear of temporary prosthetic restorations.
The material is designed to withstand functional loading conditions typical of full-arch and multi-unit dental applications.
**Germ Cell Mutagenicity**
Not classified based on available data.
**Carcinogenicity**
Not classified based on available data.
The components of this product are not intentionally added at reportable concentrations as carcinogens listed by:

- IARC (International Agency for Research on Cancer)
- NTP (National Toxicology Program)
- OSHA

**Reproductive Toxicity**
Not classified based on available data.
**Specific Target Organ Toxicity – Single Exposure**
May cause respiratory irritation if vapors, mist, or aerosols are generated during handling or processing.
**Specific Target Organ Toxicity – Repeated Exposure**
Not classified based on available data.
**Aspiration Hazard**
Not classified.
**Information on Other Hazards**
**Likely Routes of Exposure**

- Skin contact
- Eye contact
- Inhalation of vapors, mist, or dust generated during processing
- Accidental ingestion

**Symptoms Related to Physical, Chemical and Toxicological Characteristics**

- Eye irritation
- Skin redness or rash
- Allergic skin reaction
- Respiratory discomfort if airborne exposure occurs
- Gastrointestinal discomfort if swallowed

**Delayed and Immediate Effects**
Repeated skin exposure may result in delayed sensitization.

## Section 12. Ecological Information

**Toxicity**
Harmful to aquatic life with long lasting effects.
Uncured resin components may present toxicity to aquatic organisms. Avoid release to the environment.
**Persistence and Degradability**
No specific data are available for the mixture.
Uncured polymerizable resin components are not expected to degrade rapidly under normal environmental conditions.
Cured material is expected to be relatively inert.
**Bioaccumulative Potential**
No specific data are available for the mixture.
Certain organic components may have some potential for bioaccumulation depending on environmental conditions.
**Mobility in Soil**
No specific data are available.
Liquid uncured material may adsorb to soil or sediment surfaces and may exhibit limited mobility in water due to low water solubility.
**Results of PBT and vPvB Assessment**
Based on available information, this mixture does not contain components meeting criteria for PBT (Persistent, Bioaccumulative and Toxic) or vPvB (very Persistent and very Bioaccumulative) at reportable concentrations.
**Endocrine Disrupting Properties**
No components are known to be present at reportable concentrations that are identified as endocrine disruptors based on available data.
**Other Adverse Effects**
No additional adverse environmental effects are known.
Prevent uncontrolled release of uncured product to drains, waterways, and soil.
Refer to Section 13 for disposal considerations.

## Section 13. Disposal Considerations

**Waste Treatment Methods**
**Product Disposal**
Where practical, **cure uncured resin prior to disposal** to reduce hazard.
Dispose of contents in accordance with applicable **local, regional, national, and international regulations**.
Do not discharge uncured material into drains, surface water, or soil.
Waste classification should be determined by the waste holder based on composition, contamination, and applicable regulations.
**Contaminated Packaging**
Containers and packaging may retain hazardous residues of uncured resin.
Do not reuse empty containers.
Dispose of contaminated packaging in accordance with applicable regulations.
Where appropriate, containers may be drained and allowed to cure before disposal.
**Cleaning Materials**
Cleaning agents (e.g., alcohol used for rinsing) and contaminated absorbents should be collected and disposed of in accordance with applicable regulations.
Do not discharge cleaning solutions into drains or the environment.

**Additional Disposal Information**
Follow all applicable regulatory requirements for hazardous waste handling and disposal in the region of use.

## Section 14. Transport Information

**UN Number or ID Number**
Not applicable
**UN Proper Shipping Name**
Not applicable
**Transport Hazard Class(es)**
Not applicable
**Packing Group**
Not applicable
**Environmental Hazards**
Not classified as environmentally hazardous for transport.
**Special Precautions for User**
No special precautions required under normal conditions of transport.
Transport in tightly closed containers. Avoid exposure to excessive heat, direct sunlight, and conditions that may initiate polymerization.
**Maritime Transport in Bulk According to IMO Instruments**
Not applicable
**Additional Transport Information**
This product is not regulated as dangerous goods under:
- US DOT (Department of Transportation)
- IATA (International Air Transport Association)
- IMDG (International Maritime Dangerous Goods Code)
- ADR/RID (European road/rail transport)

## Section 15. Regulatory Information

**Safety, Health and Environmental Regulations / Legislation Specific for the Substance or Mixture**
This Safety Data Sheet has been prepared in accordance with applicable international regulations, including:
- OSHA Hazard Communication Standard (29 CFR 1910.1200)
- Globally Harmonized System of Classification and Labelling of Chemicals (GHS)
- Regulation (EC) No 1907/2006 (REACH), as amended
- Commission Regulation (EU) 2020/878 (SDS requirements)
- Regulation (EC) No 1272/2008 (CLP)
- UK REACH Regulations
- Canada WHMIS (Workplace Hazardous Materials Information System)
- Australia Work Health and Safety (WHS) Regulations

**CLP Classification**
The product is classified and labeled in accordance with the CLP Regulation (EC) No 1272/2008.
Refer to Section 2 for full classification, hazard statements, and precautionary statements.
**REACH Status**
The components of this product are:
- Registered under REACH, or
- Exempt from registration, or
- Present below applicable concentration thresholds

**PBT and vPvB Assessment**
This mixture does not contain substances meeting the criteria for:
- Persistent, Bioaccumulative and Toxic (PBT), or
- Very Persistent and Very Bioaccumulative (vPvB)

in accordance with REACH Annex XIII, based on available data.
**Endocrine Disrupting Properties**
No components are known to be present at reportable concentrations that are identified as endocrine disruptors based on available information.
**Other Regulatory Information**
This product is intended for professional dental use and should be handled in accordance with applicable occupational safety regulations.
**Chemical Safety Assessment**
A Chemical Safety Assessment has not been carried out for this mixture.

## Section 16. Other Information

**Abbreviations and Acronyms**
- GHS – Globally Harmonized System of Classification and Labelling of Chemicals

- CLP – Classification, Labelling and Packaging Regulation (EC) No 1272/2008
- REACH – Registration, Evaluation, Authorisation and Restriction of Chemicals
- PBT – Persistent, Bioaccumulative and Toxic
- vPvB – Very Persistent and Very Bioaccumulative
- STOT – Specific Target Organ Toxicity
- SCBA – Self-Contained Breathing Apparatus

**Key Literature References and Sources for Data**

- Supplier Safety Data Sheets for raw materials
- European Chemicals Agency (ECHA) database
- OSHA Hazard Communication Standard (29 CFR 1910.1200)
- Regulation (EC) No 1907/2006 (REACH)
- Regulation (EC) No 1272/2008 (CLP)

**Classification Procedure**

The classification of this mixture is based on:

- Available data on individual components
- Application of CLP/GHS classification criteria
- Bridging principles and expert judgment

**Relevant Hazard Statements (Full Text)**

- H317 May cause an allergic skin reaction
- H319 Causes serious eye irritation
- H335 May cause respiratory irritation
- H412 Harmful to aquatic life with long lasting effects

**Training Advice**

Users should be trained in:

- Safe handling of light-curable resin materials
- Use of appropriate personal protective equipment
- Prevention of skin contact and inhalation exposure
- Proper waste handling and disposal practices

Use only as directed for professional dental or laboratory applications.

**Disclaimer**

The information provided in this Safety Data Sheet is based on current knowledge and is intended to describe the product for the purposes of health, safety, and environmental requirements only.
It should not be construed as guaranteeing any specific property of the product.
The user is responsible for ensuring compliance with all applicable laws and regulations.