

MATERIAL SAFETY DATA SHEET

Complies with Approved Code of Practice: Chemical (Hazard Information and Packaging for Supply) Regulations 2002 (UK), European 67/548/EEC, 1999/45/EC format, Australian NOHSC: 1008, 10005(1999), 2011(2003), 1003(1995), Australian Dangerous Goods Code 7th Edition, and 2001/58/E, ANSI Standard Z400.1 and U.S. Federal OSHA Hazard Communication, REACH EC 1907/2006

HAZARDOUS SUBSTANCE.

NON-DANGEROUS GOODS

Hazard classification according to the criteria of NOHSC.

Dangerous goods classification according to the Australia Dangerous Goods Code.

Section 1. Identification of Chemical Substance and Company

- 1.1. **Product Identification: Nanocure RC 31**
Product Class: Mixture acrylic acid esters, photoinitiator and amorphous silicon dioxide
- 1.2. **USE OF SUBSTANCE:** For use in EnvisionTEC's family of Computer Aided Modeling Devices (CAMOD)
- 1.3. **COMPANY:** EnvisionTEC Inc.
15162 S. Commerce Drive
Dearborn, MI 48120
USA
Tel.: 1-313-436-4300
Fax: 1-313-436-4303

Date of Preparation: 16/11/2012

- 1.4. **FOR CHEMICAL EMERGENCY:** Spill Leak Fire Exposure or Accident
Call 1-313-436-4304

Section 2. Hazard Identification

Potential Human Health Effects:

This product is peach color opaque liquid with an acrylate odor, which may cause skin and eyes irritation. Inhalation of high vapor concentration may cause headaches and nausea.

Target Organs or Systems:

Skin, eyes, respiratory system, mucous membranes, and liver.

Route of Exposure:

Skin Contact: May cause skin irritation. Reddening and swelling may not occur immediately. It may also cause sensitization and allergic skin reaction in some individuals.

Eye Contact: May cause serious eye irritation. After eye contact may cause redness of eye tissue.

Inhalation: This product has very low vapor pressure and volatility, which reduce potential for workers' inhalation at room temperature and pressure. However, aerosols or vapors, which may be generated at elevated temperatures, may cause respiratory tract irritation, headache and nausea.

Ingestion: May be harmful if swallowed. Keep all food in area separate from storage and use locations. Prohibit eating, drinking and smoking in areas where there is a potential for significant exposure to this material. Thoroughly wash hands and face before eating.

Signs and Symptoms of Exposure:

Acute:

Skin Contact: May cause irritation.

Eye Contact: May cause irritation.

Inhalation: Vapors may cause mucous membrane irritation, headache and nausea.

Ingestion: May be harmful if swallowed.

Chronic:

Inhalation: Prolonged or repeated overexposure may cause irritation, headache, and nausea.

Skin Contact: May cause sensitization and allergic reaction.

Eye Contact: May cause redness of eye tissue.

Ingestion: May be harmful if swallowed.

Carcinogens:

Titanium dioxide is classified by IARC as Group 2B, possible carcinogen to humans. This product contains very low concentrations of titanium dioxide that is not in respirable form. There are no other carcinogens in concentrations of 0.1 percent or greater in this product.

Potential Environmental Effects:

Not readily biodegradable.

Section 3. Composition/Information on Ingredients

Components	Approximate % by weight	C.A.S. No. & EINECS No.	UK/EU Classification according to Directive 67/548/EEC
1. Acrylated oligomer	20-60%	Proprietary	Xi; R36/38, R43
2. Acrylated monomer	5-20%	Proprietary	Xi: Irritant
3. Acrylated monomer	5-20%	5888-33-5	Xn; R20/22-R36/37/38
4. 1,6-Hexanediol acrylate	1-10%	13048-33-4	Xi; R36/38, R43
5. Amorphous siliconedioxide	10-30%	N/A	None
6. Titanium Dioxide	0.1-0.2%	13463-67-7	None
7. Photoinitiator	0.1-5%	Proprietary	F: Highly flammable Xn: Harmful N: Dangerous for the environment

Section 4. First-Aid Measures

Emergency Overview:

This product is yellow opaque liquid with an acrylate odor, which may cause mild skin and eye irritation. The inhalation of high vapor concentration may cause a headache and nausea.

Inhalation:

In case of exposure to a high concentration of vapor or mist, remove person to fresh air. If breathing has stopped, administer artificial respiration and seek medical attention.

Eye Contact:

Immediately flush with plenty of water (under eye lids) for at least 20-30 minutes. Get medical attention immediately. Do not apply oil or oily ointments unless ordered by a physician.

Skin Contact:

Remove contaminated clothing and wash contact area with soap and water for 15 minutes. Particular attention should be paid to hair, nose, and ears, and other areas not easily cleaned. If irritation develops, consult a physician.

Ingestion:

Ingestion unlikely. However, if ingested dilute with water by giving glasses of water to the victim then induce vomiting. Do not make an unconscious person vomit. Get medical attention immediately.

Section 5. Fire-Fighting Measures

Flash point:	> 100 ⁰ C / 237 ⁰ F
Method:	Setaflash
Ignition temperature:	n.d
Lower explosion limit:	n.d
Upper explosion limit:	n.d
Extinguishing media:	Use carbon dioxide or dry chemical for small fires; aqueous foam or water spray for larges fires.
Special firefighting procedures:	Firefighters should wear full protection clothing and self contained breathing apparatus (SCBA). Thoroughly decontaminate firefighting equipment including all firefighting apparel after the incident.
Unusual Fire & Explosion:	Emits irritating vapors.
Exposure Hazard(s):	Material: Irritant

Section 6. Accidental Release Measures**Procedures of Personal Precautions:**

Wear respirator, chemical safety goggles, and chemical gloves.

Environmental Precautions:

Contain spill to prevent spread into drains, sewers, water supplies, or soil.

Methods of Cleaning Up:

In the event of a spill, immediately remove all sources of ignition. Cover the liquid with inert absorbent. Using appropriate personal protective equipment and non-sparking tools, contain spilled material.

Waste Disposal Method:

Do not dispose to sewers, lakes, rivers or streams. Scoop all contaminated material into drums for proper disposal. Dispose of in accordance with all applicable federal, state and local environmental regulations. National or regional provisions may also be in force.

Section 7. Handling and Storage**Handling Precautions:**

User Exposure: Product may cause irritation. Avoid contact with eyes. Avoid prolonged or repeated contact with skin. Wash hands with soap and water before eating, drinking, smoking, applying cosmetics, or using toilet facilities. Launder contaminated clothing before reuse. Contaminated leather articles, including shoes, cannot be decontaminated and should be destroyed to prevent reuse. Solvents should never be used to clean hands or skin because they increase the penetration of the material into the skin.

Storage Precautions:

Suitable: Store in a cool, dry place out of direct sun light, in opaque or amber containers. Store the containers at 10-35⁰C (50-95⁰F). Keep containers closed. Avoid ignition sources.

Special Requirements:

Do not heat containers with steam or electrical equipment. Heating this product above 300⁰F in the presence of air may cause slow oxidative decomposition; above 500⁰F polymerization may occur. Fumes and vapors from this thermal decomposition may be dangerous (nitrous vapors, carbon monoxide-carbon dioxide). Do not breath fumes.

Section 8. Exposure Controls & Personal Protection

Exposure Limits:

Component	HSIS Australia	IOELVs (UK)	ACGIH TLV	OSHA PEL	WEEL
1. Acrylated oligomer	None	None	None	None	None
2. Acrylated monomer	None	None	None	None	1 mg/m ³
3. Acrylated monomer	None	None	None	None	None
4. 1,6-Hexanediol acrylate	None	None	None	None	1 mg/m ³ Dermal sensitization Notation
5. Amorphus siliconedioxide	None	None	None	None	None
6. Titanium Dioxide <i>Note: this product is not in dust form.</i>	10 mg/m ³	10 mg/m ³ total inhalable 4 mg/m ³ respirable	10 mg/m ³	10 mg/m ³	None
7. Photoinitiator	None	None	None	None	None

Notations:

IOELVs = Indicative Occupational Exposure Limit Values

OEL = Occupational Exposure Limits

TLV = Threshold Limit Value

WEEL = Workplace Environmental Exposure Level by the American Industrial Hygiene Association

TWA = time weighted average

PEL = Permissible Exposure Limit

STEL = short term exposure limit

Exposure Controls:

Ventilation Controls:

Local exhaust is recommended to control exposure, which may result from operations generating aerosols and hot operations generating vapors. Mechanical exhaust is not recommended to control exposure for operations generating aerosols or vapors.

Respiratory Protection:

Respirators are generally not needed under normal conditions of use. If this material is handled at elevated temperature, under mist forming conditions or in case of accidental release of large quantities of product use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Protective Gloves:

Impervious gloves (nitrile or neoprene), clothing which covers any other exposed areas of the arms, legs and torso.

Eye and Face Protection:

Chemical splash goggles. A face shield is recommended during operations where splashing could occur.

Skin Protection:

Avoid all skin contact. Depending on the conditions of use, cover as much of the exposed skin area as possible by wearing gloves, aprons, long pants, and long sleeved shirts.

Other Controls:

For operations where contact can occur a safety shower and eye wash facility should be available. Always use good personal hygiene and housekeeping practices. Wash thoroughly after handling.

Environmental Exposure Controls:

Keep product from waterways and watersheds. This substance is not readily biodegradable.

Section 9. Physical & Chemical Properties

Appearance: Peach color opaque liquid

Odor: Acrylate

	Value	Unit	Method
Specific gravity:	1.15 – 1.20	g/cm ³	
Boiling point:	> 100	°C	
Flash point:	> 100	°C	
Ignition temperature:	n.d.		
Lower explosion limit:	n.d.		
Upper explosion limit:	n.d.		
Vapour pressure:	0.035	mm Hg	@ 25°C (77°F)
Solubility in water:	practically insoluble		
Solubility in organic solvents:	soluble in organic solvents		
Volatile characteristics:	negligible		
Electrostatic discharge:	safe		
Electric conductivity	dielectric		

Section 10. Stability and Reactivity

Stability: Stable when stored in container designed for use with light sensitive materials under 35°C (95°F) in dark, cool place.

Conditions to Avoid: Storage >100°F, exposure to light, loss of dissolved air, loss of polymerization inhibitor, contamination with incompatible materials.

Materials to Avoid: Incompatible: Polymerization initiators, including peroxides, strong oxidizing agents, alcohols, copper, copper alloys, carbon steel, iron, rust, and strong bases.

Hazardous Decomposition Products: Hazardous decomposition products may include oxides of carbon and various hydrocarbon fragments.

Hazardous Polymerization: Hazardous polymerization may occur. Uncontrolled polymerization may cause rapid evolution of heat and increase in pressure that could result in violent rupture of sealed storage vessels or containers.

Section 11. Toxicological Information

1. Acrylated oligomer	No data available
2. Acrylated monomer	LD50 Oral Rat: 5,709 mg/kg LD50 Intraperitoneal Rat: 55 mg/kg
3. Acrylated monomer	LD50 Oral Rat: 4,890 mg/kg Inhalation: No data available LD50 Dermal Rabbit: >5,000 mg/kg
4. 1,6-Hexanediol acrylate	LD50 Oral Rat: 5,000 mg/kg May cause sensitization by inhalation.
5. Amorphous silicon dioxide	No data available
6. Titanium Dioxide	LD50 Oral Rat: >10,000 mg/kg LD 50 Dermal Rat: >10,000 mg/kg Skin Human: Mild skin irritation – 3 h Eyes Rabbit: No eye irritation Genotoxicity in vitro – Hamster Ovary: Micronucleus test Genotoxicity in vitro – Hamster – Lungs: DNA inhibition Genotoxicity in vivo – Mouse – Intraperitoneal: Micronucleus test

Product: Nanocure RC 31

from: 16/11/2012

Page 6 of 9

7. Photoinitiator	Acute Oral Toxicity Rats >2,000 mg/kg Acute Dermal Toxicity >2,000 mg/kg
--------------------------	---

Some substances in the class of acrylated materials have indicated limited evidence of mutagenicity in vitro test. A lifetime painting study of all acrylated materials that contain this product with mice indicated no evidence of carcinogenicity.

Section 12. Ecological Information

Keep product from waterways and watersheds. This substance is not readily biodegradable.

1. Acrylated oligomer	No data available
2. Acrylated monomer	No data available
3. Arcrylated monomer	No data available
4. 1,6-Hexanediol acrylate	No data available
5. Amorphous siliconedioxide	No data available
6. Titanium Dioxide <i>Note: this product is not in dust form.</i>	Ecotoxicity effects: LC50 Other Fish: >1,000 mg/l – 96 h EC50 Daphnia magna (Water flea): >1,000 mg/l – 48 h EC0 Daphnia magna (Water flea): >1,000 mg/l – 48 h
7. Photoinitiator	Ecotoxicity effects: LC50 Zebra Fish: >100 ppm – 96 h EC50 Daphnia magna: >2.5 ppm – 48 h

Section 13. Disposal Considerations

Dispose of in accordance with governmental regulations (community, national or regional). Contact a licensed professional waste disposal service to dispose of this mixture. As with all foreign substances do not allow to enter the storm or sewer drainage systems.

Contaminated Packaging: Dispose of as unused product.

Section 14. Transport Information

Department of transportation classification: Not hazardous by D.O.T. regulations

D.O.T. proper shipping name: Not regulated

Other requirements: N/A

Australian HazChem Code:

1,6-Hexanediol acrylate – 3Z

Titanium dioxide – 1Y

Section 15. Regulatory Information

The following provides a summary of the legal requirements.

Product: **Nanocure RC 31**

from: 16/11/2012

Page 7 of 9

Ingredient	EPA* TSCA	CA Prop 65	European Economic Community (EEC)				Canada Regs	
			EINECS	European Community Standards	Listed as dangerous chemicals per ESIS	EEC Symbol	DSL	NDSL
1.Acrylated oligomer	Yes	No	No	None	No	Xi; Irritant R36/38, R43	Yes	No
2. Acrylated monomer	Yes	No	Yes	None	Yes	Xi; Irritant R36/38 R43 S2, S39	Yes	No
3.Acrylated monomer	Yes	No	No	None	No	Xn; Harmful R20/22 Xi; Irritant R36/37/38 S26-36	Yes	No
4. 1,6-Hexanediol acrylate	Yes	No	Yes	None	Yes	Xi; R36/38 R43 S2,S39	Yes	No
5. Amorphous siliconedioxide	No	No	No	None	No	No	No	No
6. Titanium Dioxide	Yes	No	Yes	None	No	None	Yes	No
7. Photoinitiator	Yes	No	No	None	Yes	F;Xn;N R11 R48/22 R62 R51/53 S2, S7 S22, S33 S36/37 S61	No	Yes

* All the components present in this product at concentrations equal to or greater than 0.1% are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory.

Substance Preparation Classification:



Harmful

Full Text of any R-Phrases and S-Phrases

Risk Phrases:

R11 – Highly flammable
R20/ R22 – Harmful by inhalation and if swallowed
R22 – Harmful if swallowed
R36/37/38 - Irritating to eyes, respiratory system and skin
R36/38 – Irritating to eyes and skin
R43 – May cause sensitization by skin contact
R48/22 – Harmful: danger of serious damage to health by prolonged exposure if swallowed
R62 – Possible risk of impaired fertility
R51/53 – Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

Safety Phrases:

S2 – Keep out of the reach of children
S7 – Keep container out of the reach of children
S22 – Do not breathe dust
S26 – In case contact with eyes, rinse immediately with plenty of water and seek medical advice
S33 – Take precautionary measures against static discharges
S36– Wear suitable protective clothing
S37 – Wear suitable gloves
S39 – Wear eye/face protection
S61 – Avoid release to the environment. Refer to special instructions/Safety data sheets

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

Pursuant to Title III of the Superfund Amendments and Reauthorization Act of 1986, (SARA) and 40 CFR 372 Part 372, this product does not contain chemicals subject to the reporting requirements under Section 313.

California Proposition 65: This product does not contain chemicals which are known to the state of California to cause cancer.

Section 16. Other Information

HMIS (Hazardous Materials Information System) for secondary labeling:

Health 2

Fire Hazard 1

Reactivity 1

Personal Protective Equipment D

References

- 1) 2010 Threshold Limit Values and Biological Exposure Indices. American Conference of Governmental Industrial Hygienists.
- 2) MSDS + Cheminfo CD-ROM, Canadian Centre for Occupational Health and Safety
- 3) SAX'S Dangerous Properties of Industrial Materials, Tenth Edition
- 4) TSCA & SARA Title III, U.S. Environmental Protection Agency and the National Technical Information Services
- 5) Raw Material Manufacturers Material Safety Data Sheets
- 6) US National Institute of Medicines Toxnet current edition
- 7) ESIS:European Chemical Substance Information System, <http://ecb.jrc.it/esis>

Product: **Nanocure RC 31**

from: 16/11/2012

Page 9 of 9

-
- 8) NOHSC Hazardous Information Substances Information System, Department of Employment and Workplace Relations, Australian Government, 2005

To the best of our knowledge the information contained herein is accurate. However, EnvisionTEC, Inc. makes no warranty, expressed or implied regarding the accuracy of these results to be obtained from the use thereof. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist. EnvisionTec, Inc. assumes no responsibility for injury from the use of the product described here in.