

CdSe/ZnS UV Curable Resin EviComposite

MSDS

Section 1 - Chemical Product

Product Family #:	EC-CSx-RS2-xxx [UV curable composite resins w/ Evidots]
Substance:	Curable polyurethane oligomer/acrylic acid with dispersed Cadmium (Selenide/Telluride/Sulfide) nanocrystal with Zinc Sulfide coatings
Trade Names/Synonyms:	Evidot Composite UV Curable Resin
Chemical Family:	Polyurethane Oligomer; Nanocrystal: IV-VI semiconductor compound

Section 2 - Composition, Information on Ingredients

Component	CAS#	EC#	% By Weight
Polyurethane Oligomer	proprietary	proprietary	20 - 25
High Boiling Acrylate	proprietary	proprietary	30 - 35
High Boiling Methacrylate	proprietary	proprietary	5 - 10
Aliphatic Amide	2680-03-7	220-237-5	7 - 12
Aliphatic Amide	proprietary	proprietary	2 - 6
High Boiling (Meth)Acrylate	proprietary	proprietary	1 - 5
Photoinitiator	947-19-3	213-426-9	2 - 5
Acrylic Acid	79-10-7	201-177-9	3 - 7
Zinc Sulfide (as nanocrystal coating)	1314-98-3	215-251-3	< 3
And one of the following:			
Cadmium Sulfide (as nanocrystal compound)	1314-87-0	215-147-8	< 3
Cadmium Selenide (as nanocrystal compound)	1306-24-7	215-148-3	< 3
Cadmium Telluride (as nanocrystal compound)	1306-25-8	215-149-9	< 3

Section 3 - Hazards Identification

Hazard Description:	Moderately Toxic
NFPA Rating:	Health = 2 Fire = 1 Reactivity = 1

Emergency Overview	
Color:	Yellow, Red, Red-Brown
Physical Form:	Liquid
Odor:	Mild
Major Health Hazards:	Kidney damage and cancer
Physical Hazards:	Material may auto-polymerize. Large quantities of material undergoing polymerization may result in a strong exothermic reaction with the evolution of toxic materials.

Potential Health Effects	
Inhalation:	Inhalation of vapors may cause respiratory tract irritation, skin irritation, eye irritation, nausea, vomiting, stomach pain, headache, dizziness
Skin Contact:	No data available
Eye Contact:	No data available
Ingestion:	Nausea, vomiting, stomach pain, headache, muscle cramps, dizziness, Chronic ingestion may lead to kidney damage, liver damage, and cancer

Carcinogen Status:	Cadmium Containing Compounds
OSHA:	Yes
NTP:	Yes
IARC:	Yes

Section 4 - First Aid Measures

Inhalation:	If inhaled, remove to fresh air. If not breathing give artificial respiration and seek medical attention.
Skin Contact:	Wash skin with soap and water for at least 15 minutes while removing contaminated personal protective equipment, clothing and shoes. Seek medical attention if needed.
Eye Contact:	Irrigate eyes for at least 15 minutes. Seek medical attention.
Ingestion:	If ingested, do not induce vomiting, seek medical attention immediately.

Section 5 - Fire Fighting Measures

Extinguishing Media:	Dry chemical or carbon dioxide extinguisher
Fire Fighting:	Avoid Inhalation of material or combustion by-products
Flash Point:	>200 F (closed cup)

Flammable Limits:	No data available
Autoignition Point:	No data available
Flammability Class:	OSHA Class IIIb

Section 6 - Accidental Release Measures

Small Spills:	Utilize personal protective equipment as described in section 8 and absorb with spill pillow or other non-combustible material. Collect spilled material in appropriate container for disposal.
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Section 7 - Handling and Storage

Utilize good hygienic work practices. Wash hands after use. Store in a tightly closed container. Store in a cool dry place away from light.

Section 8 - Engineering Controls & Personal Protective Equipment

Exposure Limits	
Acrylic acid	10 ppm (30 mg/m ³) OSHA TWA (skin) (vacated) 2 ppm ACGIH TWA (skin) 2 ppm (6 mg/m ³) NIOSH recommended TWA 10 hour(s) (skin) 10 ppm (30 mg/m ³) UK OES TWA 20 ppm (60 mg/m ³) UK OES STEL2 ppm ACGIH TLV
Cadmium compounds (as Cd)	5 ug/m ³ OSHA TWA (metal and compounds) 2.5 ug/m ³ OSHA action level (metal and compounds) 0.2 mg/m ³ OSHA TWA (dust) (where cadmium standard 1910.1027 is not in effect) 0.6 mg/m ³ OSHA ceiling (dust) (where cadmium standard 1910.1027 is not in effect) 0.01 mg/m ³ ACGIH TWA (compounds and metal) 0.002 mg/m ³ ACGIH TWA (respirable particulate, compounds and metal) 0.015 mg/m ³ AGS TRK (inhalable dust fraction) (others) 0.025 mg/m ³ UK MEL TWA (metal and compounds)
Tellurium Compounds (as Te):	0.1 mg/m ³ OSHA TWA 0.1 mg/m ³ ACGIH TWA 0.1 mg/m ³ NIOSH TWA 10 hour(s) 0.1 mg/m ³ DFG MAK (peak limitation category - II) (inhalable fraction) 0.1 mg/m ³ UK OES TWA
Selenium compounds (as Se):	0.2 mg/m ³ OSHA TWA 0.2 mg/m ³ ACGIH TWA 0.2 mg/m ³ NIOSH recommended TWA 10 hour(s) 0.05 mg/m ³ DFG MAK (peak limitation category - II, with excursion factor of 4) (inhalable dust fraction) (metal and inorganic compounds) 0.1 mg(Se)/m ³ UK OES TWA
Zinc Sulfide	15mg/m ³ OSHA TWA (particulates not otherwise regulated)
Ventilation:	Provide local exhaust ventilation system or work in a chemical fume hood. Ensure compliance with applicable exposure limits.

Eye Protection:	Wear safety glasses with side shields as a minimum level of protection. If splash or splatter is possible, wear chemical/splash resistant safety goggles and or face shield. Emergency eye wash station and quick drench shower should be provided in the immediate work area as per the ANSI Z358.1 guidelines.
Clothing:	Wear appropriate chemical resistant clothing.
Gloves:	Wear appropriate chemical resistant gloves for type of exposure. Butyl gloves are good for limited duration contact with product.
Respirator:	Refer to 29CFR1910.134 for selection of appropriate respiratory protection. Organic vapor cartridge with a $\frac{1}{2}$ or full face mask, where vapors do not exceed the assigned protection factor for the respirator. For unknown concentrations or IDLH atmospheres wear self-contained breathing apparatus or supplied air with escape bottle.

Section 9 - Physical & Chemical Properties

Cadmium Selenide / Cadmium Telluride Core EviDots in Toluene and UV Resin	
Physical State:	Liquid
Color:	Yellow, red, red-brown
Odor:	Mild odor
Boiling Point:	No data available
Freezing Point:	No data available
Vapor Pressure:	6mmHg @30C
Vapor Density (air = 1):	Heavier than air
Specific Gravity (water = 1):	1.07
pH:	No data available

Section 10 - Reactivity

Stability:	Stable at standard temperatures and pressure.
Conditions to avoid:	Avoid heat and exposure to light.
Incompatible:	Incompatible with oxidizing materials, amines, mineral acids, and thiosulfates.
Hazards Decomposition:	Combustion produces toxic by-products.
Polymerization:	Hazardous polymerization may occur.

Section 11 - Toxicological Information

Zinc Sulfide	
Toxicity Data:	Oral Rat > 2,000 mg/kg LD50; Inhalation Rat > 5,040 mg/m ³ LC50; Skin Rat > 2,000 mg/kg LD50

Zinc Sulfide	
Acute inhalation, skin and eye toxicity:	Zinc Sulfide is an irritant to the eyes, respiratory system and skin.
Cadmium Compounds	
Acute Inhalation:	Exposure to sufficiently high concentrations of cadmium dusts may result in upper respiratory tract irritation with delayed symptoms of cough, sore throat, wheezing, headache, chest pain, dizziness, abdominal pain, nausea, diarrhea and vomiting. Exposure may also cause sweating, chills, and difficulty in breathing. Severe exposures may result in lung, kidney or liver damage or death from massive pulmonary edema.
Chronic Inhalation:	Cadmium is highly cumulative and respiratory effects from repeated or prolonged exposure to dusts or fumes may include rhinitis, bronchitis, emphysema, cough, dyspnea, abnormal lung function, obstructive disease, and possibly fibrosis. Ulceration of the nasal septum and yellow discoloration of the teeth may occur. Cadmium induced kidney damage is irreversible and may progress after exposure ceases; some cases of progression to kidney failure have been described. Osteomalacia, osteoporosis, and spontaneous and pseudofractures may occur and may be manifested as back pain, pain in the extremities, difficulty in walking, and pain on bone pressure. Other effects may include irritability, weight loss, fatigue, mild to moderate anemia, eosinophilia, damage to the olfactory nerve with anosmia, and liver damage. An epidemiological study suggests a relationship between cadmium levels in air and cardiovascular disease, but a causal association has not been proved. Occupational exposure to cadmium is implicated in a significant increase in the incidence of prostatic and respiratory cancers.
Acute Ingestion of Cadmium Compounds:	The persistent vomiting induced by cadmium compounds may limit the amount retained, but if sufficient amounts are absorbed, symptoms of systemic toxicity may begin within 15 minutes to 2 hours. Salivation, choking, severe nausea, abdominal pain, diarrhea, tenesmus, blurred vision, dizziness, headache, muscular cramps, exhaustion, collapse, shock, unconsciousness and rarely, convulsions may occur. Recovery may begin within 5-10 hours; sequelae may include delayed liver and kidney damage. Single doses of 10-20 mg of soluble cadmium salts have induced severe toxic effects and doses above 300 mg may be fatal. Death due to shock and dehydration may occur within 24 hours or may be delayed 7-14 days and be due to renal failure or cardiopulmonary depression.
Chronic Ingestion of Cadmium Compounds:	Cadmium accumulates in the body and prolonged low level exposure may cause irreversible renal tubular dysfunction and bone effects as described in the chronic inhalation section.
Moderately Toxic:	Ingestion
Target Organs:	Nervous system
Tellurium Compounds	
Inhalation:	Symptoms of exposure may include garlic breath, metallic taste, dry mouth headache, sweating, chills, shortness of breath, sleepiness, loss of appetite, and weakness.
Ingestion:	No data available
Skin Contact:	No data available
Eye Contact:	No data available
Additional toxicological information:	To the best of our knowledge the acute and chronic toxicity of this substance is not fully known. Cadmium Telluride or Cadmium Sulfide in the form of a nanocrystal may or may not present the same health hazards as a larger Cadmium or Tellurium containing molecules. It is therefore encouraged to use caution when handling this product as its toxicity and modes of exposure are not well characterized or understood.
Selenium Compounds	
Acute Inhalation:	May cause irritation and inflammation of the upper respiratory tract, redness of mucous membranes, sneezing, coughing, sore throat, metallic taste in the mouth, and gastrointestinal distress. Exposure to high concentrations of fumes may cause dyspnea and possibly slight tracheobronchitis. Central nervous effects may include frontal headaches, nervousness, convulsions, and death from respiratory depression.

Selenium Compounds	
Chronic Inhalation:	Repeated or prolonged exposure may result in a metallic taste in the mouth followed by a garlic odor of the breath and sweat. Other symptoms may include pallor, coated tongue, gastrointestinal disturbances including nausea, vomiting, abdominal pain, diarrhea, weight loss, lumbar pain, depression, lassitude, fatigue, giddiness, and emotional instability. Liver and spleen effects and albuminuria, porphyrinuria, and urobilinuria have also been reported.
Acute Skin Exposure:	Contact with selenium compounds may cause irritation, rashes and skin eruptions. Some compounds are strong vesicants and can cause destruction of skin and possibly burns.
Chronic Skin Exposure:	Repeated or prolonged exposure to light dust concentrations of selenium compounds may cause dermatitis, paronychia, and skin eruptions. Some selenium compounds are absorbed through the skin and may result in effects as detailed in the inhalation section.
Acute Ingestion:	Ingestion may cause severe irritation and disturbances of the gastrointestinal tract, metallic taste in the mouth, tachycardia, chills, and central nervous system effects as detailed in acute inhalation.
Chronic Ingestion:	Repeated or prolonged ingestion may result in a metallic taste in the mouth, garlic odor of breath and sweat, and other symptoms as described in chronic inhalation. Additional effects reported from ingestion of food and water containing excessive amounts of selenium include skin hyperpigmentation, nail changes, gingivitis, excess dental caries, malocclusion, weight loss, vestibulotoxicity, amyotrophic lateral sclerosis, arthritis, problems walking, diminished reflexes, substernal pain, disturbances of respiratory and endocrine function, jaundice, hepatic disease, and socio-psychologic effects. In extreme cases, loss of nails and hair, numbness and incoordination of arms and legs, paralysis, lack of mental alertness and death from respiratory paralysis may occur.
Additional toxicological information:	To the best of our knowledge the acute and chronic toxicity of this substance is not fully known. Cadmium Selenide, in the form of a nanocrystal may or may not present the same health hazards as a larger cadmium or selenium containing molecules. It is therefore encouraged to use caution when handling this product as its toxicity and modes of exposure are not well characterized or understood.
Curable Resin Mixture	
	No data available

Additional toxicological information:

To the best of our knowledge the acute and chronic toxicity of this EviComposite Resin is not fully known. Cadmium compounds, in the form of a nanocrystal may or may not present the same health hazards as a larger cadmium containing molecules. It is therefore encouraged to use caution when handling this product as its toxicity and modes of exposure are not well characterized or understood.

Section 12 - Ecological Information

Do not allow material to be released to the environment (ground, air or water bodies) without proper permits.

Section 13 - Transportation Information

U.S. DOT:	Environmentally hazardous substance, liquid, mixture, n.o.s., (contains cadmium) class 9, packing group III, UN 3077
Canadian Transportation of Dangerous Goods:	UN 3077 Class 9, packing group III

Section 14 - Disposal

Dispose in accordance with all applicable local, state and federal regulations. Considered dangerous to the environment. U.S. EPA 40 CFR 262: Hazardous Waste Number: D006 (cadmium), D010 (selenium)

Section 15 - Regulatory Information

US Regulations

CERCLA: 5000lbs(acrylic acid)
SARA Title III, sec. 302, 304: Acrylic acid
SARA Title III, Section 311/312
Acute: Yes
Chronic: Yes
Fire: No
Reactive: Yes
Sudden Release: No
US Inventory (TSCA) listed: Yes

Canadian Regulations

WHMIS Classification: Not available

European Regulations

T, Xn, N

EC Risk Phrases

R20/21/22, R36/37/38, R48/23/25, R45, R50/53, S36/37, S60, S61

Section 16 - Other Information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. Evident Technologies shall not be held liable for any damage resulting from handling or from contact with the above product. See packing slip for additional terms and conditions of sale.

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