Material Safety Data Sheet

1. Product and Company Identification

Manufacturer: Ange Ltd.
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Recommended use and limited use: Display materials, optical materials, electronic materials, construction materials for recording materials, products, adhesive agent, sealant etc. as ultra violet curing material and these components/ Materials for ink and paint/ reactive diluent/ copolymerization/ additive agent etc. Industrial/ professional use only. Please do not use for implant or injection into the body.

Product name: Ultra violet curing resin UV-7616

2. Hazard Identification

Toxicity and potential health effect

Toxicity: Meets GHS category standard.

Specific toxicity

Physical and chemical toxicity: 1) It may cause polymerization by light, heat and radical etc.
2) Oxygen is necessary in the system to prevent polymerization. (Prohibit nitrogen gas seal)

Potential health effect: It may cause skin problems such as itching, rash, eruption etc.

Environmental pollution: N/A

[GHS category]

Physical hazards

Explosives:	Out of category
Combustible and flammable gas:	Out of category
Combustible and flammable aerosols:	Out of category
Burnable and oxidized gas:	Out of category
High pressure gas	Out of category
Flammable liquid:	Out of segment
Combustible solid:	Out of category
Self reactive substance	Cannot categorize
Pyrophoric liquid:	Not classified
Pyrophoric solid:	Out of category
Self heating chemicals:	Out of category
Substances which on contact with water emit flammable gas	Cannot categorize
Oxidizing liquid	Out of category
Oxidizing solid	Out of category
Organic peroxide	Out of category
Substance corrosive to metal	Cannot categorize

Health hazards

Acute toxicity (oral)	Category 5
Acute toxicity (dermal)	Cannot categorize
Acute toxicity (inhale gas)	Out of category
Acute toxicity (inhale steam)	Category 5
Acute toxicity (inhale dust)	Out of category
Acute toxicity (inhale mist)	Cannot categorize
Skin corrosion and irritation	Category 3
Serious eye damage and eye irritation	Cannot categorize
Respiratory sensitizer	Cannot categorize
Skin sensitizer	Cannot categorize
Germ cell mutagenicity	Cannot categorize
Carcinogenicity	Cannot categorize
Reproductive toxicity	Category 1A
Specific target organ toxicity (single exposure)	Cannot categorize
Specific target organ toxicity (repeated exposure)	Cannot categorize
Aspiration hazard	Cannot categorize

Environmental hazards

Acute aquatic toxicity	Cannot categorize
Chronic aquatic toxicity	Cannot categorize

[GHS label elements]

Signal words: Danger

Hazard statements
Hazard by taking orally.
Hazard by inhaling gas, steam, dust and mist
Light skin irritation
Hazard to genital organ or fetus.

Caution
[Safety measure]
- Read instructions and Material Safety Data Sheet for this product before use. Please use after you understand all safety cautions.
- Use after you understand this product's reactivity, usage, and usage environment (light resistant etc.).
- Keep away from heat, spark, open flame, ignition source by high temperature.
- Do not drink or smoke while you work this product, and inhale the gas, mist and steam. Please make sure the room is well ventilated when you use.
- Wash your hands well before use and wear protective gloves, protective goggles, and protective mask.
- Avoid emissions to environment.
- Warm up the container slowly.

[First aid measures]
- Use appropriate fire extinguisher (powder, carbon dioxide protein fluoride etc.) in fire.
- Skin contact: Take off affected clothes and wash off with plenty of water and soap. Seek medical advice and treatment.
- Eye contact: Wash out your eyes with water carefully for a few minutes. Remove contact lenses if wearing them and rinse etc.
- Inhalation: Move to fresh air environment and take a rest in easy breathing position.
- Exposure or exposure concerned: Seek medical advice/ treatment.
- Leakage: recover. Wear appropriate protective equipment and remove any sources of flame or heat etc.

[Storage]
- Store in appropriate container. Store according to Fire Service Act (Japanese Law) and other regulations.
- Keep out of reach of children.
- Seal content with air and seal up the container. Keep in a cool and dark place with good ventilation avoiding direct sunlight under lock and key.

[Disposal]
Remains and a container should be disposed of according to a special local waste procedures permitted by local regulations.

Country/ regional information
- Fire service act (Japanese law) Hazard material Class 4 Class 3 petroleum (non-aqueous solvents)
- Poisonous and deleterious substances control act (Japanese law) N/A

3. *Composition, Information on Ingredients*

Single production and composition: Composition

Ingredient	Urethane acrylate resin	Acrylic ester	Benzophenone	2 Hydroxi 2 methyl 1 phenyl-propane 1 on
Content	63.7%	34.2%	0.1%	2.0%
Official gazette indication number Chemical substance control law	Listed	Listed	Listed	Listed
Official gazette indication number Industrial safety and health	Listed	Listed	Listed	Listed
CAS No.	Confidential	Confidential	Confidential	Confidential

Impure substance and stabilizing additive related to classification Ethyl acetate below 0.1%
Toluene below 0.2%

4. *First Aid Measures*

Inhalation: If you inhale, move to fresh air environment, take a rest, keep warm and contact a physician immediately. If you get sick or do not notice any symptoms, contact a physician and get immediate medical advice.
Skin Contact: Wash well with soap and plenty of water. If skin becomes irritated, contact a physician.
Eye Contact: Immediately flush eye(s) with plenty of water without rubbing. Get immediate medical advice promptly.

Ingestion: Wash your mouth well with water. Get medical advice even if you feel sick or do not notice any symptoms, get medical advice.

Estimated acute symptom and delayed symptom:

Inhalation: cough, sore throat, dizziness, idiopathic hypersomnia, headache, and nausea
Skin contact: dry skin, rash, itching, irritation and rash
Eye contact: rash and pain
Ingestion: burning sensation, stomachache, cough, sore throat, dizziness, idiopathic hypersomnia, headache, nausea

The most important symptoms: rash

5. Fire-Fighting Measures

Extinguishing media: Small fire: dry sand, powder, protein fluoride form, carbon dioxide
Big fire: Block air with extinguisher form etc.

Extinguisher that you should not use: stick type water pouring

Specific hazard: Imperfect combustion and high temperature etc. may make hazardous substance.

Fire fighting procedures: Stop leakage of combustible and move the container to a safe place immediately or transfer the content to other safe tank.
Imperfect combustion and high temperature etc. may make hazardous substance. Contact and require an evacuation to workers and residents in the vicinity under the wind.
Extinguish from upwind.
Flush the area with water avoid rising temperature and/or radiant heat.

Protection of extinguishing workers: Wear appropriate air respirators, protective equipment, protective garment for chemicals in extinguishing.

6. Accidental Release Measure

Personal precaution, protective equipment and emergency measures:

- Move away from spill area.
- Isolate as leakage area immediately. Only authorized personnel can enter.
- Worker wear appropriate protective equipment (Please see 8 Exposure or exposure concerned) to avoid contacting eyes and skin etc. and inhaling gas.
- Do not touch a broken container or leakage when you do not wear appropriate protective garment.
- Wear high sealing and impermeable protective garment when fire does not occur even if it leaks.
- Move to a well ventilated area.

Environmental precautions:

- Do not pour into rivers etc and pollute the environment.
- Do not dispose of in the environment.

Collection and neutralization:

- If it is a small amount, wear protective equipment and garments, collect any ignition sources immediately, and absorb with dry sand and non combustible materials, or collect to empty sealing container, and, dispose. Use clean antistatic tools in collecting absorbed materials. After collecting, wash off with plenty of water. If it is big amount, wear protective equipment and garment, remove any ignition sources immediately, avoid leakage by covering with earth fill and collect in safe place.

Containment, purifying method and machinery:

- Stop leakage if it is dangerous. Connect all equipment to the ground when you handle leakage.

Prevention of second disaster:

- Remove any ignition source immediately. (Do not smoke, ignition and flame in the neighborhood)
- Prevent inflow to drainage channel, drain sewer, basement, closed spaces.

7. Cautionary notes for handling and storage

Handling

Technical steps: Take the steps for equipment and facilities set forth at “8. Protective measures and leak prevention.” Put on protective gear. If spilled on the floor, etc., wipe it up or clean it. After handling, thoroughly gargle water and wash your face.

Partial venting off and overall ventilation: Vent off the local area, and ventilate the entire facility, as set forth at “8. Protective measures and leak prevention.”

Cautionary provisions for safe handling

- Before use, get a copy of the handling manual.
- Do not handle before reading and understanding all of the safety warnings.
- Carefully confirm in advance this product’s reactivity and dangerousness in relation to the work details, as well as the work environment (blocking out light, etc.), through conducting small volume tests, etc.
- Prohibit the use of hot items, sparks and flames nearby.
- No knocking over, dropping or impacting the container, etc. No dragging the container along the ground.

- Do not touch, inhale or drink. Avoid contact with eyes..
- If crystallized (or solidified), avoid melting in a machine from which uneven heat is emitted, such as a steam or ribbon heater. Melt slowly in a warm bath (60 to 70 degrees C). (Antipolymerization agents are omnipresent due to crystallization, but there is a danger of polymerization from heating.)
- After handling, wash your hands, gargle and wash your face with plenty of water.
- Use only in areas with good ventilation.
- When using this product, do not eat, drink or smoke.
- Avoid dispose into the environment.

To avoid touching: Please refer to "10. Stability and reactivity."

Storage
Technical steps:

- Conform to legal storage technical standards.
- Add antipolymerization agents, and manage concentration.
- Do not store for periods in excess of the product's quality warranty period.
- Use only electrical equipment with anti-explosive construction, and ground all equipment.

Storage conditions:

- Store away from heat, fireworks, open flames and other ignition sources. Prohibit smoking in storage environemnt.
- Keep containers out of direct sunlight and away from fires
- Hermetically seal containers and air seal the contents. (Oxygen helps prevent polymerization)
- Store in a dark, cool place with good ventilation.
- Store under lock and key.

Substances that are dangerous to mix with it: Please refer to "10. Stability and Reactivity."
Container packaging materials: Use containers as specified by the fire protection law and the United Nations transport law.
Container material: Polyolefin (light blocking); Glass (light blocking); Stainless steel.
Fixture material: Stainless steel.

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8. Protective measures and leak prevention

Facilities steps:

- Use the anti-explosive electrical, ventilation and illumination devices designated by the manufacturer.
- Use devices and machinery with hermetically sealed construction, and attempt to seal off all possible sources of leaks.
- Install localized and overall exhaust devices, and conduct ventilation.
- Take measures to prevent static electrical discharge.
- Install and clearly indicate the location of equipment (safety showers, etc.) for washing hands, washing eyes, and overall body cleanings for the workers who handle or store this material.

Leakage limitation values:
Regulated concentration: 50 ppm (toluene) 4)
Allowable concentration (leakage limitation value, biological leakage indicator) (toluene)
Japan Society for Occupational Health (2006 edition): 50 ppm, 188 mg / m3 (there is transdermal absorption). 3)
ACGIH (2007 edition): TLV-TWA 50 ppm A4 2)

Protective gear: Select appropriate protective gear based on the details of the work. It's necessary to consider electrostatic properties.
Respiratory protective gear: Masks that prevent poisoning for direct use with organic gas, or masks that transmit air, should be used as needed.
Hand protective gear: Oil resistant gloves (natural rubber, etc.)
Eye protective gear: Protective glasses (goggles)
Skin and body protective gear: Apron-type simple protective clothes, protective mask (face shield), oil resistant shoes
Health steps: Wash your hands well after handling. When using this product, do not eat, drink or smoke.

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9. Physical and chemical properties

Physical state, form, color etc.: Light yellow liquid 1)
Odor: Weak ester odor 1)
pH: Unrelated
Melting point, freezing point: No data
Boiling point, initial boiling point and boiling range: No data.
Flash point: Polymerizes first (rapidly polymerizes at temperatures of 160 degrees C or above) 1)
Explosive range: No data.
Vapor pressure:No data
Vapor density (air = 1): No data.
Ratio (density): No data
Solubility: Almost entirely insoluble in water. Highly soluble in organic solvents (toluene, acetone, etc.) 1)
Octanol / water partition coefficient: No data.
Autoignition temperature: No data.
Decomposition temperature: No data
Olfactory threshold value: No data

Evaporation rate (butyl acetate = 1): No data.
Flammability (solid, gas): Not applicable.
Viscosity: 4,000 to 8,000 mps, 25 degrees C 1)

10. Stability and Reactivity

Stability: Stable when handled ordinarily.

Possibility of dangerous and harmful reactions: There's a danger of polymerization and explosion when sealed with inert gases, under anaerobic conditions or when mixed with substances that are dangerous to mix with it.

Conditions that should be avoided: Heat, light, strong acids, mixture with substances that are dangerous to mix with it, anaerobic conditions and sealing with inert gas.

Substances dangerous to mix with it: Heat, light, strong acids, peroxides, oxidation agents, metallic powder, primary and secondary amines.

Organisms that have dangerous reactions with it: No information.

11. Hazard information

Acute toxicity (oral): No information as a product

Acute toxicity (transdermal): No information as a product.

Acute toxicity (inhalation): No information as a product.

Skin irritation or corrosion: By irritation of the skin, may cause skin symptoms such as itching, irritation, rashes, etc. (category 3).

Serious eye damage or eye irritation: No information as a product.

Skin sensitization: No information as a product.

Reproductive toxicity: No information as a product, but from statements such as that toluene in "products with less than 0.2%, with a cut-off of 0.1%" in the IRIS Toxicological review (2005), etc., caused it to be evaluated as Category 1A, we put it in Category 1.

Target organ / overall body toxicity: No information as a product.

Inhalation respiratory hazard: No information as a product.

12. *Information on environmental effects:* No information as a product.

Toxicity to living organisms: No information as a product.
Tendency to remain / be degraded: No information as a product.
Bioaccumulability: No information as a product.
Mobility within soil: No information as a product.
Other harmful effects: No information as a product.
Environmental standards: No information as a product.

13. Cautionary notes on disposal

Disposal of excess amounts:

- To be conducted in accordance with the cautionary notes on handling and storage, and also in accordance with the general cautionary notes regarding chemicals (flammable hazardous substances).
- Comply with local regulatory standards and related laws and regulations in disposal.
- Subcontract for disposal with industrial waste disposal businesses with a license from the prefectural governor, etc., or regional public bodies in the event that such businesses or public bodies are conducting such disposal.

When subcontracting disposal of waste, do so after thoroughly notifying the disposal business, etc. of the dangerous and harmful nature of the substance. Comply with regional waste regulations, if there are any.

14. *Cautionary notes on transport*

International regulations	Information on maritime regulations	Comply with the IMO regulations
	Information on aerospace regulations	Comply with the ICAO/IATA regulations
Domestic regulations	Information on overland regulations	Comply with the provisions of the fire protection law. Category 4 hazardous material, type 3 fossil fuel (non-water soluble)

Information on maritime regulations Comply with the provisions of the ship safety act.
Information on aerospace regulations Comply with the provisions of the civil aeronautics act.

Special safety procedures

- Stow hazardous materials in such a way as to prevent such hazardous materials from falling, or the container being transported that holds hazardous materials from being damaged, rolling over or falling.
- Transport so as to prevent the hazardous materials or the container in which the hazardous materials are being stored from chafing hard or from shaking.
- When there is a risk that a disaster will occur during transport of hazardous materials such as a serious leak of hazardous materials, notify the nearest firefighting agency or other related agency in addition to taking emergency measures to prevent the disaster.
- Avoid direct sunlight during transport. Pack so as to prevent leakage, corrosion and damage to the container during transport. Soundly conduct prevention of load shifting during transport.
- This product must not be shipped together with food products or animal feed. Do not load heavy items on top. A yellow card (a safety card explaining the substance for firefighters in the event of an accident) must be maintained during transport.

15. Applicable laws and regulations

Occupational health and safety law: Does not constitute a category 1 hazardous material on the chart attached to the implementing regulations. Does not constitute a harmful substance that should have its name, etc. displayed. Does constitute a harmful substance that should have its name, etc. notified (toluene).

Labor standards act: Toluene constitutes a chemical that causes disease.

Fire protection act: Category 4 hazardous material, type 3 fossil fuel.

Act regarding regulation of manufacture and screening of chemicals (chemical screening act): Existing chemical.
Act to Promote Confirmation and Management of Release Amounts of Chemicals(Pollutant Release and Transfer Register Act): Does not constitute either a type 1 designated chemical or a type 2 designated chemical.

Poisonous and Deleterious Substances Control Act: Does not constitute a poisonous, deleterious, or designated poisonous substance.

Act on Port Regulations: Does not constitute a hazardous material.

Ship Safety Act: Does not constitute a hazardous material.

Civil Aeronautics Act:Does not constitute a hazardous material.

Air Pollution Control Act: Toluene constitutes a volatile organic compound.

Foreign Exchange and Foreign Trade Control Law: Attachment 1-16 to the export regulations (catch-all regulation)

Act for the Prevention of Marine Pollution: Has not been the subject of a determination by the international maritime organization's environmental protection committee. Does not constitute a hazardous material.

Water Quality Pollution Control Act: Does not constitute a substance specified in article 2 of the implementing regulations.

Sewerage Service Act: Does not constitute a substance specified in Article 9-4 of the implementing regulations.

Constitutes a substance under the sewage discharge standard (biochemical oxygen demand and chemical oxygen demand).
Waste Disposal and Public Cleansing Act (Waste Cleansing Act): Industrial waste.

Soil Contamination Countermeasures Act: Does not constitute a specified harmful substance under article 1 of the implementing regulations or article 2.1.

Act for Protection of the Ozone Layer through Regulation of Designated Substances, etc.: Does not constitute a substance of the attachment to the implementing regulations.

Offensive Odor Control Act: Toluene constitutes a specified offensive odor substance of article 1 to the implementing regulations.

16. Other information

Reference documents

1) Manufacturer of the substance Documents
2) National Institute of Technology and Evaluation (NITE) homepage (September 19, 2008)
3) Japan Society for Occupational Health's *Magazine of the Society for Occupational Health*, vol. 48, 2006.

4) Chemicals Evaluation and Research Institute, safety of existing chemical substances (hazards) evaluation sheet (1997).

* Preventing partial heating:
When crystallized, there is a particularly high risk of polymerization from extreme heating due to uneven distribution of the concentration of antipolymerization agents. There is a high risk of explosion from heat due to extremely rapid polymerization. Also, depending on the time and temperature, rapid polymerization can result from heating in an attempt to reduce viscosity. For this reason, please conduct heating after confirming its safety on a small scale with regard to the time and temperature of heating in advance.

Treatment of the statements herein.

The statements herein have been produced based on the information, materials, data, etc. that could be obtained at the present time. However, we can provide no guaranty whatsoever as to the amount contained, physical and chemical properties, hazardousness and harmfulness. Also, the cautionary notes are based on ordinary handling. Accordingly, if it will be handled in an unusual way, please use after implementing safety measures appropriate for that use or use method.