SAFETY DATA SHEET

Graphy

1. IDENTIFICATION

A. Product name

- TC-85DAW

B. Recommended use and restriction on use

- General Use : UV-curable 3D printing material
- Restriction on use : Not available

C. Supplier information

- Company name : Graphy Inc.
- Address : 1607 Gasan SK V1 Center, 171, Gasan digital 1-ro, Geumcheon-gu, Seoul 08503 Korea
- Emergency telephone number : 82-2-864-3056

2. HAZARD IDENTIFICATION

A. GHS Classification

- Skin corrosion/irritation : Category 2
- Skin sensitization : Category 1
- Acute aquatic toxicity : Category 3
- Chronic aquatic toxicity : Category 3

B. GHS label elements

○ **Hazard symbols**

○ **Signal word**

- Warning

○ **Hazard statements**

- H315 Causes skin irritation
- H317 May cause an allergic skin reaction
- H402 Harmful to aquatic organisms.
- H412 Harmful to aquatic life with long lasting effects

○ **Precautionary statements**

1) Prevention

- P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
- P264 Wash hands 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/protective clothing/eye protection/face protection

2) Response

- P302+P352 IF ON SKIN: Wash with plenty of soap and water.
- P321 Specific treatment
- P332+P313 If skin irritation occurs: Get medical advice/attention
- P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
- P362 Take off contaminated clothing and wash before reuse.
- P363 Wash contaminated clothing before reuse.

3) Storage

- Not applicable

4) Disposal

- P501 Dispose of contents/container in accordance with local/regional/national/international regulation.

C. Other hazards which do not result in classification : (NFPA Classification)

○ **NFPA grade (0~4 level)**

- Health : 2, Flammability : 0, Reactivity : 0

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	Trade Names and Synonyms	CAS No.	Content(%)
Aliphatic Urethane Acrylate Oligomer	-	Proprietary	20 ~ 60
Proprietary Ingredient #1	-	-	0 ~ 20
Proprietary Ingredient #2	-	-	30 ~ 80
Proprietary Ingredient #3	-	-	0 ~ 1
Photoinitiator	-	-	0 ~ 10
Pigment	-	-	0 ~ 1

4. FIRST AID MEASURE

A. Eye contact

- Do not rub your eyes.
- Immediately flush eyes with plenty of water for at least 15 minutes and call a doctor/physician.

B. Skin contact

- Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
- Wash contaminated clothing thoroughly before re-using.
- Go to the hospital immediately if symptoms (flare, irritate) occur
- Wash thoroughly after handling.

C. Inhalation contact

- When exposed to large amounts of steam and mist, move to fresh air.
- Take specific treatment if needed.

D. Ingestion contact

- Please be advised by doctor whether induction of vomit is demanded or not.
- Rinse your mouth with water immediately.

E. Delayed and immediate effects and also chronic effects from short and long term exposure

- Not available

F. Note to physician

- Notify medical personnel of contaminated situations and have them take appropriate protective measures.

5. FIREFIGHT MEASURES

A. Suitable (Unsuitable) extinguishing media

- Dry chemical, carbon dioxide, regular foam extinguishing agent, spray
- Avoid use of water jet for extinguishing

B. Specific hazards arising from the chemical

- Not available

C. Special protective actions for firefighters

- Move containers from fire area, if you can do without the risk
- Avoid inhalation of materials or combustion by-products.
- Do not access if the tank on fire.
- Wear appropriate protective equipment.
- Keep containers cool with water spray.
- Vapor or gas is burned at distant ignition sources can be spread quickly.

6. ACCIDENTAL RELEASE MEASURES

A. Personal precautions, protective equipment and emergency procedures

- Ventilate closed spaces before entering.
- Move container to safe area from the leak area.
- Handle the damaged containers or spilled material after wearing appropriate protective equipment
- Do not direct water at spill or source of leak.

B. Environmental precautions

- Prevent runoff and contact with waterways, drains or sewers.

- If large amounts have been spilled, inform the relevant authorities.

C. Methods and materials for containment and cleaning up

- Large spill: Stay upwind and keep out of low areas. Dike for later disposal.
- Notification to central government, local government. When emissions at least of the standard amount
- Dispose of waste in accordance with local regulation.
- Appropriate container for disposal of spilled material collected.
- Small leak: sand or other non-combustible material, please let use absorption
- Wipe off the solvent.
- Dike for later disposal.
- Prevent the influx to waterways, sewers, basements or confined spaces

7. HANDLING AND STORAGE

A. Precautions for safe handling

- Large spill : Stay upwind and keep out of low areas. Dike for later disposal.
- Notification to central government, local government. When emissions at least of the standard amount
- Dispose of waste in accordance with local regulation.
- Appropriate container for disposal of spilled material collected.
- Small leak : sand or other non-combustible material, please let use absorption
- Wipe off the solvent.
- Dike for later disposal.
- Prevent the influx to waterways, sewers, basements or confined spaces

B. Conditions for safe storage, including any incompatibilities

- Check regularly for leaks.
- Avoid direct sunlight.
- Keep in the original container.
- Keep sealed when not in use
- No open fire
- Collect them in sealed containers
- Store away from water and sewer

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

A. Exposure limits

○ **ACGIH TLV**

- [Titanium dioxide] : TWA 10 mg/m3

○ **OSHA PEL**

- [Titanium dioxide]: 15 mg/m3 (Total dust)

B. Engineering controls

- Business owner is recommended to maintain below recommended exposure limits for the working place with general exhaust of gas/vapour/mist/fume.

C. Individual protection measures, such as personal protective equipment

○ **Respiratory protection**

- Under conditions of frequent use or heavy exposure, Respiratory protection may be needed.
- Respiratory protection is ranked in order from minimum to maximum
- Consider warning properties before use
- Any chemical cartridge respirator with organic vapor cartridge(s).
- Any chemical cartridge respirator with a full facepiece and organic vaporcartridge(s).
- Any air-purifying respirator with a full facepiece and an organic vapor canister.
- For Unknown Concentration or lmmediately Dangerous to Life or Health : Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. Any self-contained breathing apparatus with a full facepiece.

○ **Eye protection**

- Wear primary eye protection such as splash resistant safety goggles with a secondary protection face shield.

- Provide an emergency eye wash station and quick drench shower in the immediate work area.

○ **Hand protection**

- Wear appropriate glove

○ **Skin protection**

- Wear appropriate clothing.

○ **Others**

- Not available

9. PHYSICAL AND CHEMICAL PROPERTIES

A. Appearance	
- Appearance	Liquid (viscous liquid)
- Color	Ivory
B. Odor	Not available
C. Odor threshold	Not available
D. pH	Not available
E. Melting point/Freezing point	Not available
F. Initial Boiling Point/Boiling Ranges	Not available
G. Flash point	Not available
H. Evaporation rate	Not available
I. Flammability (solid, gas)	Not available
J. Upper/Lower Flammability or explosive limits	Not available
K. Vapour pressure	Not available
L. Solubility	Not available
M. Vapour density	Not available
N. Specific gravity(Relative density)	Not available
O. Partition coefficient of n-octanol/water	Not available
P. Autoignition temperature	Not available
Q. Decomposition temperature	Not available
R. Viscosity	200 ~ 800 cps (25℃)
S. Molecular weight	Not available

10. STABILITY AND REACTIVITY

A. Chemical Stability

- This material is stable under recommended storage and handling conditions.

B. Possibility of hazardous reactions

- Hazardous Polymerization will not occur.

C. Conditions to avoid

- Avoid: contact with incompatible materials and condition.

- Avoid: Accumulation of electrostatic charges, Heating, Flames and hot surfaces

D. Incompatible materials

- Not available.

E. Hazardous decomposition products

- May emit flammable vapour if involved in fire.

11. TOXICOLOGICAL INFORMATION

A. Information on the likely routes of exposure

○ **(Respiratory tracts)**

- Not available

○ **(Oral)**

- Not available

○ **(Eye · Skin)**

- Cause skin irritation

- May cause an allergic skin reaction

B. Delayed and immediate effects and also chronic effects form short and long exposure

○ **Acute toxicity**

* Oral

- Product (ATEmix) : >5000mg/kg

- [α,α`-[(1-Methylethylidene)di-4,1-phenylene]bis[ω-[(2-methyl- 1-oxo-2-propenyl)oxy]poly(oxy-1,2- ethanediyl)] : LD50 > 2000mg/kg Rat ((OECD TG 423, GLP). ECHA)
- [Titanium dioxide]: LD50 >10000 mg/kg Rat (HSDB)

* Dental
- Product (ATFmix) : >5000mg/kg
- [Titanium dioxide] : LD50 >10000 mg/kg Rabbit (IUCLID)

* Inhalation
- Product (ATFmix) : Not available
- [Titanium dioxide] : LC50 >3.43mg/l Rat (OECD TG 403

○ **Skin corrosion/irritation**

- Cause skin irritation

○ **Serious eye damage/irritation**

- Not available

○ **Respiratory sensitization**

- Not available

○ **Skin sensitization**

- Not available

○ **Carcinogenicity**

* IARC
- [Titanium dioxide] : Group 2b * IARC (International Cancer Research Institute) classified TiO2 as potentially carcinogenic, but IAR's TIO2 carcinogenicity research paper does not suggest that serious exposure will occur if it is included in a paint-like substance. The National Institute of Occupational Safety and Health (NIOSH) reported that cancer increased only in animal chronic inhalation studies using ultra-fine TiO2 of less than 100 nm. Therefore, the particle size of TiO2 used in this product is 280-360nm, it is difficult to determine that cancer may occur.

* OSHA
- Not available

* ACGIH
- [Titanium dioxide] : A4

* NTP
- Not available

* EU CLP
- Not available

○ **Germ cell mutagenicity**

- Not available

○ **Reproductive toxicity**

- Not available

○ **STOT-single exposure**

- Not available

○ **STOT-repeated exposure**

- Not available

○ **Aspiration hazard**

- Not available

12. ECOLOGICAL INFORMATION

A. Ecotoxicity

○ **Fish**

- [α,α`-[(1-Methylethylidene)-di-4,1-phenylene]bis[ω-[(2-methyl- 1-oxo-2-propenyl)oxy]poly(oxy-1,2- ethanediyl)] : LC50 > 100mg/l 96 hr Cyprinus carpio (ECHA)
- [Titanium dioxide] : LL50 >100 mg/l 96 hr Oryzias latipes(OECD TG 203) Not available

○ **Crustaceans**

- [α,α`-[(1-Methylethylidene)di-4,1-phenylene]bis[ω-[(2-methyl- 1-oxo-2-propenyl)oxy]poly(oxy-1,2- ethanediyl)] : EC50>100mg/l 48 hr
Daphnia magna (ECHA)
- [Titanium dioxide] : EC50 > 100 mg/l 48 hr Daphnia magna(48h-EL50Daphnia magna> 100 mg/L, 48h-EC50>100, 48h-EC10=91.2 mg/L OECD TG 202)

○ **Algae**

- [α,α`-[(1-Methylethylidene)di-4,1-phenylene]bis[ω-[(2-methyl- 1-oxo-2-propenyl)oxy]poly(oxy-1,2- ethanediyl)] : EC50 > 100 mg/l 72 hr Other (ECHA)
- [Titanium dioxide] : ErL5O > 100mg/l 72hr (Pseudokirchneriella subcapitata, 72h-ErL50 Pseudokirchneriella subcapitata >100 mg/L growth rate, static, 72h-EyL50 >100 mg/l static, OECD TG 201)

B. Persistence and degradability

○ **Persistence**

- Not available

○ **Degradability**

- Not available

C. Bioaccumulative potential

○ **Bioaccumulative potential**

- Not available

○ **Biodegration**

- Not available

D. Mobility in soil

- Not available

E. Other adverse effects

- Not available

13. DISPOSURE CONSIDERATION

A. Disposal methods

- Since more than two kinds of designaed waste is mixed, it is difficult to treat seperatly, then can be reduction or stabilization by incineration or similar process.
- If water separation is possible, pre-process with Water separation process.
- Dispose by incineration.

B. Special precautions for disposal

- The user of this product must dispose by oneself or entrust it to a waste disposer, a person who recycles other's waste or establishes and operates waste disposal facilities.
- Dispose of waste in accordance with all applicable laws and regulations.

14. TRANSPORT INFORMATION

A. UN No. (IMDG)

- Not applicable

B. Proper shopping name

- Not applicable

C. Hazard Class

- Not applicable

D. IMDG Packing group

- Not applicable

E. Marine pollutant

- Not applicable

F. Special precautions for user related to transport or transportation measures

- Local transport follows in accordance with Dangerous goods Safety Management Law.
- Package and transport follow in accordance with Department of Transportation (DOT) and other regulatory agency requirements.
- Air transport(IATA): This product is NOT classified as dangerous for IATA Transport.
- EmS FIRE SCHEDULE : Not available
- EmS SPILLAGE SCHEDULE : Not available

15. REGULATORY INFORMATION

A. National and/or international regulatory information

○ **POPs Management Law**

- Not applicable

○ **Information of EU Classification**

*** Classification**

- [Phenylbis(2,4,6-trimethylbenzoyl)phosphine oxide] : H317, H413

○ **U.S. Federal regulations**

*** OSHA PROCESS SAFETY (29CFR1910.119)**

- Not applicable

*** CERCLA Section 103 (40CFR302.4)**

- Not applicable

*** EPCRA Section 302 (40CFR355.30)**

- Not applicable

*** EPCRA Section 304 (40CFR355.40)**

- Not applicable

*** EPCRA Section 313 (40CFR372.65)**

- Not applicable

○ **Rotterdam Convention listed ingredients**

- Not applicable

○ **Stockholm Convention listed ingredients**

- Not applicable

○ **Montreal Protocol listed ingredients**

- Not applicable

16. OTHER INFORMATION

A. Reference

- The information contained herein is believed to be accurate. It is provided independently of any sale of the product for purpose of hazard communication. It is not intended to constitute performance information concerning the product. No express warranty, or implied warranty of merchantability or fitness for a particular purpose is made with respect to the product or the information contained herein.
- This Safety Data Sheet was compiled with data and information from the following sources: KOSHA, NITE, ESIS, NLM, SIDS, IPCS

B. Issue date

- 2019-09-02

C. Revision number and Last date revised

- 5 times, 2020-09-08

D. Others

- This SDS is prepared according to the Globally Harmonized System (GHS)