MSDS No : AA12545-0000000003

Material Safety Data Sheet)

Version No.: 1 (Rev date : 2023-2-16)

AccuTIM™ Thermally Conductive Silicone Adhesive,

(TK-1010-1)

1. Product and company identification

a. Product name : Thermally Conductive Silicone Adhesive

b. Recommended use of the chemical and restrictions of use

Identified uses : Electrical industry and electronics

c. COMPANY IDENTIFICATION:

○ Company : BIONEER Corporation

○ Address : 8-11, Munpyeongseo-ro, Daedeok-gu, Daejeon 306-220, Republic of Korea

○ Emergency telephone Number : : +82-42-930-8591

2. Hazards Identification

a. Hazard classification

Hazard Class	Category
Hazardous to the aquatic environment(long-term)	Category 3

b. Label elements

○ Hazard pictograms : Not applicable

○ Signal word : Not applicable

○ Hazard statements :

H412 : Harmful to aquatic life with long lasting effects

○ Precautionary statements:

Prevention P273 : Avoid release to the environment.

Storage	Store in a well-ventilated place.
Disposal	P501 : Dispose of contents/ container according to waste-related laws.

c. Other hazards : None

3. Composition / information on ingredients

Chemical Name	CAS No./KE No.	Concentration(%)
Copper	7440-50-8/KE-08896	4.5
Silver	7440-22-4/KE-31261	3
Methoxy, VinylSiloxane and alkoxysilane treated Alumina	N/A	>= 39.6 - < = 44.1%
MethoxySiloxane and alkoxysilane treated Alumina	N/A	>= 39.6 - <= 44.1%
Dimethyl Siloxane, Dimethylvinylsiloxy-terminated	68083-19-2/KE-31212	>= 2.25 - <= 7.65%
Siloxanes and Silicones, di-Me, hydrogen-terminated	70900-21-9/KE-31099	>= 1.35 - <= 1.8%
Hydrophobic Silicon Dioxide	67762-90-7	0.3%

4. First aid measures

a. In case of eye contact :

After eye contact : rinse out with plenty of water for a few minutes

Remove contact lenses.

Call in ophthalmologist.

b. In case of skin contact :

In case of skin contact : Take off immediately all contaminated clothing

Rinse skin with water/shower

c. If inhaled :

After inhalation : fresh air.

If symptoms appear, consult a doctor.

d. If swallowed :

Wash a mouth with water.

Consult a physician.

See a doctor immediately.

e. General advice :

Show this material safety data sheet to the doctor in attendance.

5. Firefighting measures

a. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: Water spray, dry powder, foam, carbon dioxide.

Unsuitable extinguishing media: No data available

b. Special hazards arising from the substance or mixture

Hazardous combustion gases or vapors may occur in the event of a fire

Carbon oxides, Metal Oxide

c. Advice for firefighters

In the event of fire, wear self-contained breathing apparatus.

d. Futher information

Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

6. Accidental release measures

a. Personal precautions, protective equipment and emergency procedures:

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.

Evacuate the danger area, observe emergency procedures, consult an expert.

For personal protection see section 8.

b. Environmental precautions:

Do not let product enter drains. Risk of explosion.

c. Methods and materials for containment and cleaning up:

When a small amount of leakage occurs, absorb it using an inert absorbent such as dry sand or soil.

Disposal of any leakage in a suitable container.

d. Reference to other sections

For disposal see section 13.

7. Handling and storage

a. Precautions for safe handling:

Wear personal protective equipment.

Be careful not to come into contact with water or moisture when handling.

Do not inhale dust, steam, mist or gas.

Ensure good ventilation of the work station.

Remove contaminated clothing and clean it before reusing.

Always wash hands after handling the product.

b. Conditions for safe storage, including any incompatibilities:

Store in the original container.

Store containers in a sealed container.

Store in a sealed container as it may harden when exposed to air.

8. Exposure controls/personal protection

a. Control parameters :

Ingredients with workplace control parameters

○ Occupational Safety And Health Act in Korea

Copper : 1㎎/㎥(dust, mist), 0.1㎎/㎥(fume)
Silver : 0.01㎎/㎥(soluble compound), 0.1㎎/㎥(metal, dust, fume, Ag)
Methoxy, VinylSiloxane and alkoxysilane treated Alumina : 10㎎/㎥ (Aluminum)
MethoxySiloxane and alkoxysilane treated Alumina : 10㎎/㎥ (Aluminum)

○ ACGIH

Copper : 1㎎/㎥(dust, mist), 0.2㎎/㎥(fume, Cu)
Silver : 0.01㎎/㎥(soluble compound), 0.1㎎/㎥(metal, dust, fume)
Methoxy, VinylSiloxane and alkoxysilane treated Alumina : 1㎎/㎥, respirable (Aluminum)
MethoxySiloxane and alkoxysilane treated Alumina : 1㎎/㎥, respirable (Aluminum)

b. Appropriate engineering controls:

Appropriate engineering controls Ensure good ventilation of the work station.

c. Personal protective equipment

○ Respiratory protection:

If there is a possibility of exposure to chemicals wear respiratory protection

○ Eye protection:

If there is a possibility of exposure to chemicals wear eye protection glasses or face protection

○ Hand protection:

If there is a possibility of exposure to chemicals wear hand protection

○ Body protection:

If there is a possibility of exposure to chemicals wear chemical protective clothing, industrial phones.

9. Physical and chemical properties

a. Appearance

Form: liquid

Color: colorless

b. Odor: odorless

c. Odor Threshold: No data available

d. pH: No data available

e. Melting: No data available

f. Initial boiling point and boiling range: >35 ℃(760mmHg)

g. Flash point: > 100 ℃(closed cup), > 250 ℃(opened cup)

h. Evaporation rate: No data available

i. Flammability (solid, gas): No data available

j. Upper/lower flammability or explosive limits: No data available

k. Vapor pressure: No data available

l. Solubility: insoluble

m.Vapor density: No data available

n. Density: 2.926

o. Partition coefficient(n-octanol/water): No data available

p. Autoignition temperature: No data available

q. Decomposition temperature: No data available

r. Viscosity: 10,640 cP

s. Molecular Weight: No data available

10. Stability and reactivity

a. Chemical stability & Possibility of hazardous reactions:

Stable under normal conditions. The product is non-reactive under normal conditions of use, storage and transport.

b. Conditions to avoid:

Avoid exposure to air. May be cured by room temperature (25°C) or heat.

c. Incompat ible materials

Oxidizer

d. Hazardous decomposition products:

Combustion may produce silicon oxide, metal oxide, carbon oxide

11. Toxicological information

a. Information on exposure routes

○ Respiratory: No exposure through the respiratory tract is expected.

○ Oral Not classified

○ Eye/skin: Eye contact may cause irritation.

Long-term repetitive skin contact may cause irritation or hypersensitivity.

b. Health hazards

○ Acute Toxicity:

1) Oral:

Copper : No data available

Silver : No data available

Methoxy, VinylSiloxane and alkoxysilane treated Alumina :

For similar material(s): LD50 > 5,000 mg/kg

MethoxySiloxane and alkoxysilane treated Alumina :

For similar material(s): LD50(Rat) > 5,000 mg/kg

Dimethyl Siloxane, Dimethylvinylsiloxy-terminated :

For similar material(s): LD50(Rat) > 5,000 mg/kg

Siloxanes and Silicones, di-Me, hydrogen-terminated :

For similar material(s): LD50(Rat) > 5,000 mg/kg

2) Dermal :

Copper : No data available

Silver : No data available

Methoxy, VinylSiloxane and alkoxysilane treated Alumina :

For similar material(s): LD50 > 2,000 mg/kg

MethoxySiloxane and alkoxysilane treated Alumina : No data available

Dimethyl Siloxane, Dimethylvinylsiloxy-terminated :

For similar material(s): LD50(Rabbit) > 2,000 mg/kg

Siloxanes and Silicones, di-Me, hydrogen-terminated :

For similar material(s): LD50(Rat) > 2,000 mg/kg

3) Inhalation:

Copper : No data available

Silver : No data available

Methoxy, VinylSiloxane and alkoxysilane treated Alumina : No data available

MethoxySiloxane and alkoxysilane treated Alumina :

For similar material(s): LC50(Rat) > 2.3 mg/l (dust or mist)

Dimethyl Siloxane, Dimethylvinylsiloxy-terminated : No data available

Siloxanes and Silicones, di-Me, hydrogen-terminated : No data available

○ Skin corrosion/irritation

Copper : No data available

Silver : No data available

Methoxy, VinylSiloxane and alkoxysilane treated Alumina :

For similar material(s): Brief contact is essentially nonirritating to skin.

MethoxySiloxane and alkoxysilane treated Alumina :

For similar material(s): Brief contact is essentially nonirritating to skin.

Dimethyl Siloxane, Dimethylvinylsiloxy-terminated :

For similar material(s): Brief contact is essentially nonirritating to skin.

Siloxanes and Silicones, di-Me, hydrogen-terminated :

Repeated contact is not expected to cause serious effects.

○ Serious eye damage/eye irritation:

Copper : No data available

Silver : No data available

Methoxy, VinylSiloxane and alkoxysilane treated Alumina :

Solid or dust may cause irritation or corneal injury due to mechanical action.

MethoxySiloxane and alkoxysilane treated Alumina :

Solid or dust may cause irritation or corneal injury due to mechanical action.

Dimethyl Siloxane, Dimethylvinylsiloxy-terminated :

Solid or dust may cause irritation or corneal injury due to mechanical action.

Siloxanes and Silicones, di-Me, hydrogen-terminated :

For similar material(s): May cause slight temporary eye irritation but does not cause corneal damage.

○ For respiratory sensitization: Not classified based on available information.

○ For skin sensitization

Copper : No data available

Silver : No data available

Methoxy, VinylSiloxane and alkoxysilane treated Alumina : No data available

MethoxySiloxane and alkoxysilane treated Alumina :

For similar material(s): Test – Rat, Pig – negative

Dimethyl Siloxane, Dimethylvinylsiloxy-terminated :

For similar material(s): Test – Rat, Pig – negative

Siloxanes and Silicones, di-Me, hydrogen-terminated :

For similar material(s): Test – Rat, Pig – negative

○ Carcinogenicity:

Methoxy, VinylSiloxane and alkoxysilane treated Alumina :

ACGIH A4 (Aluminum insoluble compounds) : Not classified based on available information.

MethoxySiloxane and alkoxysilane treated Alumina :

ACGIH A4 (Aluminum insoluble compounds) : Not classified based on available information.

○ Teratogenicity

Copper : No data available

Silver : No data available

Methoxy, VinylSiloxane and alkoxysilane treated Alumina : No data available

MethoxySiloxane and alkoxysilane treated Alumina :

For similar material(s): Test – Genotoxicity in vitro – negative

Dimethyl Siloxane, Dimethylvinylsiloxy-terminated :

For similar material(s): Test – Genotoxicity in vitro – negative

Siloxanes and Silicones, di-Me, hydrogen-terminated :

Test – Genotoxicity in vitro – negative

○ Reproductive toxicity :

Copper : No data available

Silver : No data available

Methoxy, VinylSiloxane and alkoxysilane treated Alumina : No data available

MethoxySiloxane and alkoxysilane treated Alumina :

In experimental animals : Excessive use of aluminum or aluminum salts administered during pregnancy is weakly toxic to the mother and causes developmental toxicity to the fetus at that dose.

Dimethyl Siloxane, Dimethylvinylsiloxy-terminated : No data available

Siloxanes and Silicones, di-Me, hydrogen-terminated : No data available

○ Specific target organ toxicity – single exposure :

Copper : No data available

Silver : No data available

Methoxy, VinylSiloxane and alkoxysilane treated Alumina :

Not classified based on available information.

MethoxySiloxane and alkoxysilane treated Alumina :

Not classified based on available information.

Dimethyl Siloxane, Dimethylvinylsiloxy-terminated : 자료없음

Siloxanes and Silicones, di-Me, hydrogen-terminated :

Not classified based on available information.

○ Specific target organ toxicity - repeated exposure

Copper : No data available

Silver : No data available

Methoxy, VinylSiloxane and alkoxysilane treated Alumina : No data available

MethoxySiloxane and alkoxysilane treated Alumina :

Repeated or excessive exposure to dust or vapor can cause respiratory problems.

Dimethyl Siloxane, Dimethylvinylsiloxy-terminated : No data available

Siloxanes and Silicones, di-Me, hydrogen-terminated :

No data available

○ Aspiration hazard

Copper : No data available

Silver : No data available

Methoxy, VinylSiloxane and alkoxysilane treated Alumina : No data available

MethoxySiloxane and alkoxysilane treated Alumina : No data available

Dimethyl Siloxane, Dimethylvinylsiloxy-terminated : No data available

Siloxanes and Silicones, di-Me, hydrogen-terminated : No data available

12. Ecological information

a. Ecotoxicity effects

○ Ecotoxicity effect (Acute)

1) Fish :

Copper : No data available

Silver : No data available

Methoxy, VinylSiloxane and alkoxysilane treated Alumina : No data available

MethoxySiloxane and alkoxysilane treated Alumina :

For similar material(s): EC50(96hr) > 100mg/l, fish (OECD TG 203(Similarity))

Dimethyl Siloxane, Dimethylvinylsiloxy-terminated :

For similar material(s): LC50(96hr) > 100mg/l, fish

NOEC(33d) = 91mg/l, Cyprinodon variegatus

Siloxanes and Silicones, di-Me, hydrogen-terminated : No data available

2) Daphnia :

Copper : No data available

Silver : No data available

Methoxy, VinylSiloxane and alkoxysilane treated Alumina : No data available

MethoxySiloxane and alkoxysilane treated Alumina :

For similar material(s): EC50(48hr) > 100mg/l, Daphnia magna (OECD TG 203(Similarity))

Dimethyl Siloxane, Dimethylvinylsiloxy-terminated :

For similar material(s): LC50(48hr) > 100mg/l, Daphnia magna

Siloxanes and Silicones, di-Me, hydrogen-terminated : No data available

3) Algae :

Copper : No data available

Silver : No data available

Methoxy, VinylSiloxane and alkoxysilane treated Alumina : No data available

MethoxySiloxane and alkoxysilane treated Alumina :

For similar material(s): ErC50(72hr) > 100mg/l, Pseudokirchneriella subcapitata (OECD TG 201(Similarity))

Dimethyl Siloxane, Dimethylvinylsiloxy-terminated :

For similar material(s): EC50(14d) > 2,000mg/l

Siloxanes and Silicones, di-Me, hydrogen-terminated : No data available

○ Ecotoxicity effect (Chronic)

Copper : Chronic aquatic toxicity category 2 (EU CLP)

Silver : No data available

Methoxy, VinylSiloxane and alkoxysilane treated Alumina : No data available

MethoxySiloxane and alkoxysilane treated Alumina : No data available

Dimethyl Siloxane, Dimethylvinylsiloxy-terminated : No data available

Siloxanes and Silicones, di-Me, hydrogen-terminated : No data available

b. Elimination information (persistence and degradability)

Copper : No data available

Silver : No data available

Methoxy, VinylSiloxane and alkoxysilane treated Alumina : No data available

MethoxySiloxane and alkoxysilane treated Alumina : No data available

Dimethyl Siloxane, Dimethylvinylsiloxy-terminated : No data available

Siloxanes and Silicones, di-Me, hydrogen-terminated : No data available

c. Bioaccumulative potential

Copper : No data available

Silver : No data available

Methoxy, VinylSiloxane and alkoxysilane treated Alumina : Molecular weight above 1,000 not expected to be Bioaccumulative

MethoxySiloxane and alkoxysilane treated Alumina : No data available

Dimethyl Siloxane, Dimethylvinylsiloxy-terminated :

Molecular weight above 1,000 not expected to be Bioaccumulative

iloxanes and Silicones, di-Me, hydrogen-terminated : Expected to be highly bioaccumulative.

d. Mobility in soil

Copper : No data available

Silver : No data available

Methoxy, VinylSiloxane and alkoxysilane treated Alumina : No data available

MethoxySiloxane and alkoxysilane treated Alumina : No data available

Dimethyl Siloxane, Dimethylvinylsiloxy-terminated : KOC > 5,000, Expected low soil mobility

Siloxanes and Silicones, di-Me, hydrogen-terminated : KOC > 10,210(estimate), Expected low soil mobility

e. Other adverse effects:

This product does not contain ozone-depleting substances under the Montreal Protocol.

13. Disposal considerations

a. Disposal methods

o DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator.

FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed.

permitted: Incinerator or other thermal destruction device.

For additional information, refer to:

Handling & Storage Information, MSDS Section 7 Stability & Reactivity Information, MSDS Section10

Regulatory Information, MSDS Section 15

b. Treatment and disposal methods of used packaging

o Empty containers should be recycled or otherwise disposed of by an approved waste management facility. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator.

Do not re-use containers for any purpose.

14. TRANSPORT INFORMATION

a. UN number : Not regulated for transport

b. U N proper shipping name : Not applicable

c. Transport hazard class : Not applicable

d. Packaging group : Not applicable

e. Marine pollutant Not dangerous for the environment

f. Special precautions for user : No data available

15. Regulatory information

a. Regulation under the Occupational Safety and Health Act

- Harmful Substances Prohibited from Manufacturing – Not applicable
- Harmful Substances Required Permission for Manufacture – Not applicable
- Controlled Substances Subject to Environment Monitoring :

  Copper: A mixture containing copper and its compounds in a weight ratio of 1% or more

  Silver: A mixture containing silver and its compounds in a weight ratio of 1% or more.

  Methoxy, VinylSiloxane and alkoxysilane treated Alumina :

  Aluminum : A mixture containing aluminum and its compounds in a weight ratio of 1% or more.

  MethoxySiloxane and alkoxysilane treated Alumina :

  Aluminum : A mixture containing aluminum and its compounds in a weight ratio of 1% or more.
- Special Management Materials – Not applicable
- Controlled Substances Subject to Health Examination :

  Copper: A mixture containing copper and its compounds in a weight ratio of 1% or more

  Silver: A mixture containing silver and its compounds in a weight ratio of 1% or more.

  Methoxy, VinylSiloxane and alkoxysilane treated Alumina :

  Aluminum : A mixture containing aluminum and its compounds in a weight ratio of 1% or more.

  MethoxySiloxane and alkoxysilane treated Alumina :

  Aluminum : A mixture containing aluminum and its compounds in a weight ratio of 1% or more.
- Substances of special Health Examination :

  Copper: A mixture containing copper and its compounds in a weight ratio of 1% or more

Methoxy, VinylSiloxane and alkoxysilane treated Alumina :

Aluminum : A mixture containing aluminum and its compounds in a weight ratio of 1% or more.

MethoxySiloxane and alkoxysilane treated Alumina :

Aluminum : A mixture containing aluminum and its compounds in a weight ratio of 1% or more.

- Harmful Agents to be kept below Occupational Exposure Limits :

  Copper : Cu(Copper; 7440-50-8)

  Silver : Ag(Silver; 7440-22-4)

  Methoxy, VinylSiloxane and alkoxysilane treated Alumina :

  Aluminum : A mixture containing aluminum and its compounds in a weight ratio of 1% or more.

  MethoxySiloxane and alkoxysilane treated Alumina :

  Aluminum : A mixture containing aluminum and its compounds in a weight ratio of 1% or more.

- Process Safety Report (PSM) Submission Target Material: Not applicable

b. Act on the Registration and Evaluation, etc. of Chemical Substances, Chemicals Control Act:

- Toxic Chemicals - Not applicable
- Restricted Chemicals - Not applicable
- Prohibited Chemicals - Not applicable
- Accident Precaution Chemicals - Not applicable

c. Dangerous Substances Safety Management Act : Not applicable

d. Waste Control Act

Follow article 13 of the act to dispose the product waste

e. Other Domestic and International Regulatory Information

o Domestic :

Persistent Organic Pollutants(POPs) Control Act Not applicable

o International :

Rotterdam Convention : Not Applicable

Stockholm Convention : Not applicable

Montreal Protocol : Not Applicable

16. Other information

a. List of references :

1) Supplier supplied MSDS

2) Chemicals Information Processing System (https://kreach.me.go.kr)

3) KOSHA (https://www.kosha.or.kr)

4) EU CLP Regulation No.1272/2008, Annex VI

b. Issuing date : 2023-02-16

c. Version: 1 Revision Date:

Number of revisions : 0 ,
Revision date : . . .

d. Further 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. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. BIONEER Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product.
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