COOLTTM Material Safety Data Sheet

Date : 2007.10.23
Rev Date : 2008. 08.21
MSDS No. : TTM-NANOTIM-QC-004 Rev No. : 1

1. Chemical Product and Company Identification

1. Product Name : TGS-A300 2. Feature: Silicon compound
3. Toxicity alert: N/A 4. Purpose: Interface of the electronic part and heat
5. Manufacturer
   (1) Manufacturer Name : T T M Co., LTD. www.coolttm.com
   (2) Manufacturer Address : Venture Tower 43-5 Sameun-ri Jiksan-eup Cheonan-si Chungcheongnam-do Korea
   (3) Emergency Phone : 82-41-585-3755
6. Supplier/Distributed by: Same as manufacturer
7. Endorsed by: Produce/Management : QC Team

2. Composition Information on Ingredients

Chemicals or name of the materials	CAS Number	Wt. %
Polydimethysiloxane	63148-62-9	10-20
Aluminum	7429-90-5	Business secret
Zinc oxide	1314-13-4	Business secret

3. Hazards Identification

1. Warnings
   Level of NFPA (0-4): Hygiene=1, Conflagration=1, Reactivity=1
2. Effect on eyes
   (1) Short -term exposure : irritation
   (2) Long-term exposure: N/A
3. effect on external skin
   (1) Short -term exposure : irritation
   (2) Long-term exposure: N/A
4. effect on inhalation
   (1) Short -term exposure : irritation
   (2) Long-term exposure: N/A

5. effect on ingestion
(1) Short -term exposure : gastrological, nausea, diarrhea
(2) Long-term exposure : N/A
6. cause of carcinogenesis
(1) Industrial Safety and Health Act : not decided yet
(2) OSHA : NO
(3) NTP : NO
(4) IARC : NO

4. First Aid Measures

1. Contacting eyes : Rinse gently in running water at least 15 minutes. Seek immediate Medical attention.
2. Contacting skin: Wash thoroughly good 15 minutes using soap and water while discard polluted clothes and shoes. Get a medical help right away.
3. Inhaling: Promptly move to unpolluted area when side effect is occurred to a body. Do artificial respiration if necessary. Contact a physician immediately.
4. Overdoes: in case of over does, contact a physician
5. Note from physician: Antidote unknown. Treated based on condition of each case.

5. Fire-fighting Measures

1. Fire & explosion risk: Merely but yes
2. Restrictions by the Fire Service Act: None
3. Fire extinguisher: powdery extinguishing formula, carbon dioxide, water (H2O), foam
4. Direction & tool: Move the object from fire area, if possible. In the case of huge access, aim and strew with high coercion of watercourse to exposed area. Use fire extinguisher that is applied for this case. Avoid breathing the air.
5. Toxic materials in combustion: carbon oxidized substances, electropositive gas, and formaldehyde.

6. Accidental Release Measures

1. To protect body: Wear a helmet or proper tool to protect your body all the time.
2. To protect environment: remove polluted area and prevent further contamination to the soil and water.
3. Purgation or discard: Wipe it off using absorptive paper, put into disusing bag and discard.

7. Handling and Storage

1. Safety tip: Wear a proper protection
2. Other tips: separate from inflammable materials. Avoid direct contact to the water. Tightly closed. Keep it cool and dry place.

8. Exposure Controls and Personal Protection

1. Technical managing tip: joint steaming Installation is necessary for the criterion of governmental grant.
2. To protect respiratory organs: Wear a protection in the case of frequency of exposure.
3. To protect eyes: Wear a protective goggle blocking from arsenic acid
4. To protect hands: Wear a proper pair of gloves.
5. To protect body: Wear protective clothes and tools.
6. the standard of exposure
   (1) ZINC OXIDE:
   Industrial Safety and Health Act:
   - TWA: 5㎎/㎥ - STEL: 10㎎/㎥
   - 5 ㎎/㎥ OSHA TWA (Proportion of Respirable Particle)
   - 15 ㎎/㎥ OSHA TWA (total particle)
   - 10 ㎎/㎥ OSHA TWA (total particle) (Mulled by 58 FR 35338 on June 30th of 1993)
   - 5 ㎎/㎥ OSHA TWA (emitting smoke)
   - 10 ㎎/㎥ OSHA STEL (emitting smoke) (Nulled by 58 FR 35338 on June 30th of 1993)
   - 2 ㎎/㎥ ACGIH TWA (Respirable Particle) - 10 ㎎/㎥ ACGIH STEL (Respirable Particle)
   - 5 ㎎/㎥ NIOSH recommended TWA 10 Hrs (emitting smoke) (Particle)
   - 15 ㎎/㎥ NIOSH recommended ceiling (Particle) - 10 ㎎/㎥ NIOSH STEL (emitting smoke)
   - 1 ㎎/㎥ DFG MAK (the criterion of peak limit - I, excursion factor 1)
   (Respirable Particle) (Emitting smoke)
   (2) Aluminum :
   Industrial safety and health act: not decided yet
   5 ㎎/㎥ OSHA TWA (respiratorable particle)
   15 ㎎/㎥ OSHA TWA

9. Physical and Chemical Properties

1. Exterior color : grey
2. Scent : Very weak
3. pH : N/A
4. Solubility (water) : N/A
5. Boiling point/ degree of boiling point : N/A
6. Steam pressure : None
7. Specific gravity : 1.7-2.2
8. Division coefficient's : N/A
9. Density of steam : N/A
10. Viscosity : N/A
11. Molecular weigh t: N/A

10. Stability and Reactivity

1. The condition of chemical safety: room temp., high temp(less than 250) safe within higher pressure.
2. Substances to avoid: direct contact to water.
3. In combustion: carbon oxidized substances, electropositive gas, and formaldehyde.

11. Toxicological Information

1. Polydimethylsiloxane :
   (1) Toxicity data :
      >535mg/ℓ inhalation - mouse LC50
      >5,000mg/kg buccal cavity - mouse LD50
   (2) Poduction of cancer : Industrial Safety and Health Act :-
   (3) The degree of virulence : insufficient info
2. Zinc Oxide :
   (1) Pungent data :
      500mg/24h skin - rabbit weak stimulus
      500mg/24h eye - rabbit weak stimulus
   (2) Toxicity data :
      >200mg/ℓ inhalation - mouse LC50
      >7950mg/kg buccal cavity - mouse LD50
   (3) Poduction of cancer : Industrial Safety and Health Act :-
   (4) Partial effect's/A:

Stimulus : inhalation

(5) The degree of virulence :

Toxicity : inhalation

Low-toxicity : intaking

(6) Increasing risk by exposure: abnormal respiration

(7) Data of mutation: toxicity data available.

(8) Toxicity of reproduction: available.

12. Ecological Information

1. Polydimethylsiloxane :

(1) Environmental toxicity data :

Toxicity of fish: 3,160μg/ℓ 96hrs LC50(death rate) catfish

Toxicity of invertebrate animal: 44,500μg/ℓ 48hrs LC50(death rate)water flea

Other toxicity: 9,650μg/ℓ 96hrs LC50(death rate) leopard frog

Accumulation into organisms: 12.62(evaluated from solubility in water)

2. Zinc Oxide :

(1) Environmental toxicity data :

Toxicity of fish : 2,246,000μg/ℓ 96hrs LC50(death rate) mire prawn

Toxicity of invertebrate animal : 98μg/ℓ 48hrs LC50(death rate)water flea

Other toxicity : 3,200μg/ℓ 3week LC50(death rate) toad

13. Disposal Considerations

1. Contemporary law for the management of waste : None
2. Disposal process : Follow with the adaptive rules.
3. Special note : No pyrolysis

14. Transport Information

1. Shipboard safety act for hazardous items for shipment : Not subject to IMDG code
2. Note for shipping: Surrender to the government and local authority.
3. other criterion and restriction for shipping to oversea:

Air transport : Not subject to IATA regulation

15. Regulatory Information

1. Polydimethylsiloxane

(1) Korean law :

Industrial Safety and Health Act : unclassified

The Administration law for toxic substances : unclassified

The Administration law for toxic substances : unclassified

(2) The US law:

CERCLA 103 regulation (40CFR302.4): Not applicable

SARA 302 regulation (40CFR355.30): Not applicable

SARA 304 regulation (40CFR355.40): Not applicable

SARA (Superfund Amendments and Reauthorization Act), SARA 311/312 regulation (40CFR370.21):

Acute: No Chronic: No

Fire: No Reactivity: No Sudden discharge: No

SARA 313 regulation (40CFR372.65): not applicable

OSHA regulation (29CFR1910.119): not applicable

(3) State law:

Californian state law suggested article No. 65(Beverage controlling regulation): not applicable

(4) the European Union (EC) law:

Classification: not decided

(5) List of countries hazardous items:

Toxic Substances Control Act (TSCA) : listed

(6) TSCA 12(b) notice of exportation : not listed.

2. Zinc Oxide :

(1) Korean law:

Industrial Safety and Health Act: Measurement of working environment substances, Controlling toxic substances, basic substances of exposure

The Administration law for toxic substances : unclassified

The Administration law for toxic substances : unclassified

(2) The US law:

CERCLA 103 regulation (40CFR302.4): Not applicable

SARA 302 regulation (40CFR355.30): Not applicable

SARA 304 regulation (40CFR355.40): Not applicable

SARA (Superfund Amendments and Reauthorization Act), SARA 311/312 regulation (40CFR370.21):

Acute: Yes Chronic: No

Fire: No Reactivity: No Sudden discharge: No

SARA 313 regulation (40CFR372.65): ZINC COMPOUNDS

OSHA regulation (29CFR1910.119): not applicable

(3) State law:

Californian state law suggested article No. 65(Beverage controlling regulation): not applicable

(4) The European Union (EC) law:

(EC) classification: Xi stimuli

Hazardous sign/label: Xi stimuli

(EC) Safety Tips:

R 37 May cause abdominal pain.

S 2 Keep out of reach of children.

S 24 Avoid skin contact.

S 46 Ask a doctor and show warning label on the container if the case of swallowing.

(5) List of countries hazardous items:

Toxic Substances Control Act (TSCA): listed

(6) TSCA 12(b) notice of exportation: not listed.

16. Other Information

1. Sources

(1) Law regarding MSDS (Material Safety Data Sheet) fill-out, provision (Ministry of labor Item No. 97-27, October 1997)

(2) Korea Occupational Safety and Health Agency MSDS DB data

(3) MSDS distributed by our company suppliers

* This MSDS is based on above information and written on 1st of August 2005, followed by Industrial Safety and Health Act item No. 41-1. The credibility of MSDS is relatively high on account of the truth of above information. However, that does not mean that our company would wholly guarantee it. At the same time, all information can be changeable or added later when new facts or the knowledge is found. This MSDS is allowed to use for the purpose of providing the laborer's safety and health information only.