1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: TMSI-H
NAME OF MANUFACTURER: GL Sciences Inc.
ADDRESS: 22-1 Nishishinjuku 6-chome Shinjuku-ku Tokyo 163-1130, Japan
CHARGE SECTION: International Sales Section
TELEPHONE No.: +81-3-5323-6620
FACSIMILE No.: +81-3-5323-6621
PRODUCT No.: 1022-11150, 1022-11151
SDS No.: 1022-0004

Research use only.

2. HAZARDS IDENTIFICATION

GHS CLASSIFICATION:
- Flammable liquids: Category 2
- Acute toxicity - oral -: Category 4
- Acute toxicity - dermal -: Category 3
- Acute toxicity - inhalation -: Category 4
- Skin corrosion/irritation: Category 1
- Eye damage/irritation: Category 1
- Carcinogenicity: Category 2
- Reproductive toxicity: Category 2
- Specific target organ toxicity (Single exposure): Category 1 (respiratory system, nervous system)
- Specific target organ toxicity (Single exposure): Category 3 (anesthesia)
- Specific target organ toxicity (Repeated exposure): Category 1 (liver, kidneys, nervous system)
- Specific target organ toxicity (Repeated exposure): Category 2 (blood system)
- Hazardous to the aquatic environment - Acute hazard: Category 1
- Hazardous to the aquatic environment - Chronic hazard: Category 1

HAZARD SYMBOL:

SIGNAL WORD: Danger

HAZARD STATEMENTS:
- H225: Highly flammable liquid and vapour
- H302: Harmful if swallowed
- H311: Toxic in contact with skin
- H332: Harmful if inhaled
- H314: Cause severe skin burns and eye damage
- H318: Cause serious eye damage
- H351: Suspected of causing cancer
- H361: Suspected of damaging fertility or the unborn child
- H370: Cause damage to organs (respiratory system, nervous system)
- H336: May cause drowsiness or dizziness
- H372: Cause damage to organs through prolonged or repeated exposure (liver, kidneys, nervous system)
- H373: May cause damage to organs through prolonged or repeated exposure (blood system)
- H400: Very toxic to aquatic life
PRODUCT NAME : TMSI-H

SDS No.1022-0004 Revised date October 11, 2016 2/5 page

H410 Very toxic to aquatic life with long lasting effects

PRECAUTIONARY STATEMENTS :
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat/sparks/open flames/hot surfaces. -No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ventilating/lighting/equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P260 Do not breathe fume/gas/mist/vapours.
P264 Wash hands thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P273 Avoid release to the environment.
P303+P361+ P353 IF ON SKIN: Take off immediately all contaminated clothing. Rinse skin with water/shower.
P361+P364 Take off immediately all contaminated clothing and wash it before reuse.
P363 Wash contaminated clothing before reuse.
P370+P378 In case of fire: Use appropriate media such as chemical powder or carbon dioxide to extinguish.
P301+P312 IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell.
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P305+ P351+ P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308+P313 IF exposed or concerned: Get medical advice/attention.
P391 Collect spillage.
P405 Store locked up.
P501 Dispose of contents/container in accordance with all applicable regulations.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CHEMICAL IDENTITY</th>
<th>CONTENT</th>
<th>CHEMICAL FORMULA</th>
<th>CAS No.</th>
<th>TSCA INVENTORY</th>
<th>EINECS No.</th>
<th>EC INDEX No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyridine</td>
<td>approx. 77 %</td>
<td>CsH5N</td>
<td>110-86-1</td>
<td>Listed</td>
<td>203-809-9</td>
<td>613-002-00-7</td>
</tr>
<tr>
<td>Hexamethyldisilazane (HMDS)</td>
<td>15 - 16 %</td>
<td>(CH3)3SiNHSi(CH3)3</td>
<td>999-97-3</td>
<td>Listed</td>
<td>213-668-5</td>
<td>Not established</td>
</tr>
<tr>
<td>Trimethylchlorosilane (TMCS)</td>
<td>7 - 8 %</td>
<td>(CH3)3SiCl</td>
<td>75-77-4</td>
<td>Listed</td>
<td>200-900-5</td>
<td>Not established</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

GENERAL ADVICE : Consult a physician immediately. Show this safety data sheet to the doctor in attendance.

INHALATION : Move victim to fresh air. If breathing is difficult, give oxygen. If irritation persists, consult a physician.

SKIN CONTACT : Remove contaminated clothes and shoes, rinse skin with plenty of water or shower. Use soap to help assure removal. Consult a physician immediately.

EYE CONTACT : Flush eyes well with flooding large amounts of running water for at least 15 minutes. Assure adequate flushing by separating the eyelids with sterile fingers. If possible, remove any contact lenses. Consult a physician immediately.

INGESTION : Rinse mouth, give plenty of water to dilute the substance. Do not induce vomiting. Never give anything by mouth to an unconscious person. Consult a physician immediately.
PRODUCT NAME : TMSI-H

MOST IMPORTANT SYMPTOMS AND EFFECTS :
- May cause headache, dizziness and sleepiness.
- May cause chemical injury or conjunctivitis by contacting with eyes/skin.
- May cause stomachache, diarrhea, dizziness, headache, retching, vomiting, consciousness and weakness by ingestion.

5. FIRE FIGHTING MEASURES
   **EXTINGUISHING MEDIA** : Water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
   **FIRE & EXPLOSION HAZARDS** : Toxic, irritating, dust/fume/smoke may be emitted. Carbon monoxide may be foamed.
   **SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTERS** : Firemen should wear normal protective equipment(full bunker gear) and positive-pressure self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES
   **PERSONAL PRECAUTIONS** : Remove ignition sources and ventilate the area. In case of insufficient ventilation, wear suitable respiratory equipment. Avoid raising dust and avoid contact with skin and eyes.
   **ENVIRONMENTAL PRECAUTIONS** : Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.
   **METHODS FOR CLEAN UP** : Do not touch spilled material without suitable protection. Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE
   **HANDLING** : Keep away from ignition sources and ventilate the area — No smoking. In case of insufficient ventilation, wear suitable respiratory equipment. Avoid contact with eyes, skin, and clothing. Avoid inhalation of vapour or mist. Avoid prolonged or repeated exposure. Handle this product with suitable protection.
   **STORAGE** : Store away from sunlight, heat and all ignition sources in an explosion-proof refrigerator (2-10°C).
   **INCOMPATIBLE PRODUCTS** : Strong oxidizers, acids

8. EXPOSURE CONTROL/PERSONAL PROTECTION
   **ENGINEERING MEASURES** : Use exhaust ventilation to keep airborne concentrations below exposure limits. Use adequate ventilation.
   **VENTILATION** : Local Exhaust ; Necessary, Mechanical(General) ; Necessary
   **PERSONAL PROTECTION** : Respiratory protection — Use respirators approved under appropriate government standards and follow all regulations.
   **HAND PROTECTION** : Chemical resistant gloves
   **EYE PROTECTION** : Safety glasses(goggles)
   **SKIN PROTECTION** : Protective clothing
   **CONTROL PARAMETERS (Pyridine)**

<table>
<thead>
<tr>
<th>Components</th>
<th>ACGIH</th>
<th>OSHA</th>
<th>NIOSH REL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyridine</td>
<td>1 ppm</td>
<td>5 ppm (15 mg/m³)</td>
<td></td>
</tr>
<tr>
<td>HMDS</td>
<td></td>
<td></td>
<td>Not established</td>
</tr>
<tr>
<td>TMCS</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. PHYSICAL AND CHEMICAL PROPERTIES
   **APPEARANCE** : Colorless, clear liquid
   **ODOR** : Characteristic odor
   **pH** : No data available
   **BOILING POINT** : approx.116 °C(Pyridine)
   **MELTING POINT** : -42 °C(Pyridine)
   **FLASH POINT** : 20 °C(TCC)(Pyridine)
   **EXPLOSIVE LIMITS** : 1.8 - 12.4 % (Pyridine)
   **VAPOR PRESSURE** : 26hPa (at 25°C)(Pyridine)
   **VAPOR DENSITY** : 2.72(Pyridine)
PRODUCT NAME : TMSI-H

SPECIFIC GRAVITY : 0.98 g/cm³ (Pyridine)
SOLUBILITY IN (Pyridine) : Miscible
Water : Miscible
Organic solvent : Miscible in Ethanol, Diethylether
PARTITION COEFFICIENT : log Pow: 0.65 (Pyridine)
AUTOIGNITION TEMPERATURE : 482 °C (Pyridine)
DECOMPOSITION TEMPERATURE : No data available (Pyridine)

10. STABILITY AND REACTIVITY

REACTIVITY : Deteriorated by sun-light
CHEMICAL STABILITY : No data available
CONDITION TO AVOID : Sunlight, heat, open flames, high temperature, sparks, static electrical charge, other ignition sources, contact with incompatible materials.
INCOMPATIBLE MATERIALS : Oxidizers and strong acids
HAZARDOUS DECOMPOSITION PRODUCTS : CO, CO₂, NOₓ.

11. TOXICOLOGICAL INFORMATION

ACUTE TOXICITY - oral : This product is classified in Category 4.
(Pyridine) : rat; LD₅₀=895mg/kg(calculated)(CERI hazard data 2001-70(2002),ACGIH(7th,2004),IARC77(2004))
ACUTE TOXICITY - dermal : This product is classified in Category 3.
(Pyridine) : marmot; LD₅₀=1000 mg/kg(Risk assessment vol.3,2004)
(HMDS) : rabbit; LD₅₀=547 - 589 mg/kg(SIAP,2009)
ACUTE TOXICITY - inhalation : This product is classified in Category 4.
(HMDS) : rat; LC₅₀=1857 ppm, 4h(SIAP,2009)
(TMCS) : rat; LD₅₀=1498 ppm, 4h(IUCLID,2000)
SKIN CORROSION/IRRITATION : This product is classified in Category 1.
(Pyridine) : rabbit; sever damage and corrosion (CERI hazard data 2001-70(2002),ACGIH(7th, 2004))
(HMDS) : rabbit; Draize test, moderate to severe damage and necrosis (SIAP,2004)
(TMCS) : rabbit; severe corrosion (IUCLID,2000), HSDB(2007))
EYE DAMAGE/EYE IRRITATION : This product is classified in Category 1.
(Pyridine) : rabbit, marmot; severe damage and corneal damage.(CERI hazard data 2001-70(2002), etc.)
(TMCS) : rabbit; moderate to severe conjunctivitis, strong corrosion(HSDB(2007),IUCLID (2000))

RESPIRATORY OR SKIN SENSITIZATION : No data available

GERM CELL MUTAGENICITY : This product is not classified.
CARCINOGENICITY : This product is classified in Category 2 according to Pyridine.
(Pyridine) : Pyridine is classified in Group A3 by ACGIH(2001).
REPRODUCTIVE TOXICITY : This product is classified in Category 2 according to Pyridine.
(Pyridine) : There is a description that an extension of the atrophy and the estrous cycle of the testicle an epididymis are recognized.(Risk assessment report vol.2, 2003)

SPECIFIC TARGET ORGAN TOXICITY - single exposure -
(Pyridine) : This product is classified in Category 1 and 3 according to Pyridine.
Human : There are descriptions that “Pulmonary congestion and bronchitis” and “Effects on the nervous system with a language disorder”.(CERI hazard data 2001-70, 2002).

SPECIFIC TARGET ORGAN TOXICITY - repeated exposure -
(Pyridine) : This product is classified in Category 1 and 3 according to Pyridine.
Human: There are descriptions that “Serious damage of the liver and kidney” and “Headache, dizziness, irritability, insomnia, nausea, vomiting ataxia of liver damage, cirrhosis of the liver, the nervous system with a language disorder”.(CERI hazard data 2001-70,2002)
12. ECOLOGICAL INFORMATION

Hazardous to the aquatic environment - Acute hazard

(Pyridine) : This product is classified in Category 1 according to Pyridine.
           : Pseudokirchneriella subcapitata; ErC50=0.10 mg/L,72h(Ecological impact test in the Ministry of the Environment, 1995)

Hazardous to the aquatic environment - Chronic hazard

(Pyridine) : This product is classified in Category 1 according to Pyridine.
           : Pseudokirchneriella subcapitata; NOEC=0.10 mg/L,72h(Ecological impact test in the Ministry of the Environment, 1995)

                      BOD(HMDS) = 0%

BIOACCUMULATIVE POTENTIAL : No data available

MOBILITY IN SOIL : No data available

OTHER ADVERSE EFFECTS : Not listed in Montreal Protocol list.

13. DISPOSAL INFORMATION

Dispose in a hazardous-waste site in accordance with all applicable regulations. Any disposal practice must be in compliance with country, local, state, and federal laws and regulations (contact country, local or state environment agency for specific rules).

14. TRANSPORT INFORMATION

IATA
UN NUMBER : 2924
UN PROPER SHIPPING NAME : Flammable liquid, corrosive, N.O.S. (Approx. 77%Pyridine solution)
CLASS : 3, flammable liquid
SUB-CLASS : 8, corrosive
PACKING GROUP : II
ADR/RID : 2924, Flammable liquid, corrosive, N.O.S.
DOT : 2924, Flammable liquid, corrosive, N.O.S.
MARINE POLLUTANT : Not classified

15. REGULATORY INFORMATION

US REGULATIONS : Labeling according to EC Directives; See section 2
EU REGURATIONS : Labeling according to EC Directives; See section 2

16. OTHER INFORMATION

NOTICE:

The information contained in the SDS description is applicable exclusively to the chemical substance identified herein and for its intended use as an analytical reference standard or reagent and to the unit quantity intended for that purpose. The information does not relate to, and may not be appropriate for, any application or larger quantity of the substance described. Our products are intended for the use by individuals possessing sufficient technical skill and qualification on use the material potential hazardous chemical. Accordingly, no representation or warranty, express or implied, with respect to merchantability and fitness for a particular purpose is made with respect to the information contained herein.

Attention:

This product in terms of chemical identity and the unit amount provide is intended for use in chemical analysis and not for human consumption, nor any other purpose.