SAFETY DATA SHEET

Irresistible Materials

IM-HM-140

Version 2.0
Rev: 24-02-2015

Section 1 Product and Manufacturer Information

1.1 Product Identifiers

<table>
<thead>
<tr>
<th>Product Name</th>
<th>IM-HM-140</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand</td>
<td>Irresistible Materials</td>
</tr>
<tr>
<td>EC No</td>
<td>N/A – research material</td>
</tr>
<tr>
<td>REACH No</td>
<td>N/A – A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.</td>
</tr>
<tr>
<td>CAS No</td>
<td>N/A – no CAS registration for this mixture, only the components. Individual component CAS numbers in Section 3.</td>
</tr>
</tbody>
</table>

1.2 Relevant identified uses of the substance or mixture and uses advised against

| Identified Uses | Semiconductor and Microsystems manufacturing |

1.3 Details of the supplier of the safety data sheet

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Irresistible Materials, Langdon House, Swansea Waterfront, Swansea, SA1 8QY, Wales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone</td>
<td>+44 121 414 4641</td>
</tr>
<tr>
<td>Email</td>
<td><a href="mailto:info@irresistiblaterials.com">info@irresistiblaterials.com</a></td>
</tr>
</tbody>
</table>

1.4 Emergency Telephone Number

<table>
<thead>
<tr>
<th>Emergency Phone</th>
<th>+1 781 407 9417 x233 or x224</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only available during the following hours:</td>
<td>06:00 – 22:00, EST</td>
</tr>
</tbody>
</table>

Section 2 Hazards Identification

2.1 Classification of the substance or mixture

2.1.1 OSHA Hazards

Combustible Liquid, Target Organ Effect, Harmful by ingestion, Irritant

Target Organs: Liver, Kidney, Central nervous system, Lungs
2.1.2 Classification according to Regulation (EC) No 1272/2008 and 29 CFR 1910 (OSH HCS)

Flammable liquids (Category 3), H226
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 4), H332
Acute toxicity, Dermal (Category 4), H312
Skin irritation (Category 2), H315
Serious eye damage (Category 1), H318

For the full text of the H-statements mentioned in this section, see Section 16

2.1.3 Classification according to EU Directives 67/548/EEC or 1999/45/EC

R10
Xn Harmful R20/21/22
X1 Irritant R38, R41

For the full text of the R-phrases mentioned in this Section, see Section 16

2.2 GHS Label elements

Labelling according to Regulation (EC) No 1272/2008

Pictogram:

Signal word: Danger

Hazard statement(s)
H226 Flammable liquid and vapour.
H302 + H312 + H332 Harmful if swallowed, in contact with skin or if inhaled
H315 Causes skin irritation.
H318 Causes serious eye damage.

Precautionary statement(s)
P261 Avoid breathing vapours/spray/mist/fumes.
P280 Wear protective gloves/ eye protection/ face protection.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
2.3 Other Hazards
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Section 3 Composition and Information on Ingredients

3.2 Mixtures
Description of the mixture: Poly[(o-cresyl glycidyl ether)-co-formaldehyde] and Multiple-adduct-phenyl-[Mixed fullerene]-butyric acid methyl ester dissolved in cyclohexanone.

Hazardous Ingredients

<table>
<thead>
<tr>
<th>Name and Registration Numbers</th>
<th>% by weight</th>
<th>Classification according to 67/548/EEC</th>
<th>Classification according to Regulation (EC) No 1278/2008 (CLP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclohexanone</td>
<td>&gt; 90%</td>
<td>Xn, R10, R20/21/22, R38, R41</td>
<td>Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; Eye Dam. 1; H226, H302+H312+H322, H315, H318</td>
</tr>
<tr>
<td>CAS No: 108-94-1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC-No. 203-631-1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Index-No. 606-010-00-7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poly[(o-cresyl glycidyl ether)-co-formaldehyde]</td>
<td>≤ 5%</td>
<td>None</td>
<td>Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; H315, H319, H335</td>
</tr>
<tr>
<td>CAS No: 29690-82-2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the full text of the H-statements and R-phrases mentioned in this section, see section 16.

Section 4 First Aid Measures

4.1 Description of first aid measures

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance.

**Ingestion**
If swallowed, wash out mouth with water provided person is conscious. Do not induce vomiting. Get medical attention.

**Inhalation**
Remove to fresh air. If breathing is difficult, get medical advice.

**Skin Contact**
Flush skin with water. Wash skin with soap and copious amounts of water.

**Eye Exposure**
Immediately flush eyes with sufficient amounts of water for at least 15 min.
4.2 Most important symptoms and effects, both acute and delayed
   The most important known symptoms and effects are described in the labelling and/or
   in section 11.

4.3 Indication of any immediate medical attention and special treatment needed
   No data available.

Section 5 Fire Fighting Measures

5.1 Suitable extinguishing media
   Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
   Carbon oxides

5.3 Advice for firefighters
   Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
   Use water spray to cool unopened containers.

Section 6 Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures
   Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate
   ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours
   accumulating to form explosive concentrations. Vapours can accumulate in low areas. For
   personal protection see section 8.

6.2 Environmental precautions
   Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
   Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-
   brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
   For disposal see section 13.
Section 7 Handling and Storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Keep away from sources of ignition. No smoking. Take measures to prevent the build up of electrostatic charge. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

Section 8 Exposure Controls and Personal Protection

8.1 Components with Workplace Control Parameters

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclonexanone</td>
<td>108-94-1</td>
<td>TWA</td>
<td>20 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEL</td>
<td>50 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>25 ppm</td>
<td>USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000</td>
</tr>
<tr>
<td>Skin notation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>50 ppm</td>
<td>USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The value in mg/m3 is approximate.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>25 ppm</td>
<td>USA. NIOSH Recommended Exposure Limits</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>100 mg/m3</td>
<td></td>
</tr>
</tbody>
</table>

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of the workday.
Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands. Butyl-rubber gloves with a minimum layer thickness of 0.3 mm may offer full-contact resistance. Natural latex/chloroprene gloves with a minimum layer thickness of 0.6 mm may offer splash contact resistance. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by the end users. It should not be construed as offering an approval for any specific use scenario.

Eye / Face protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals. Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Section 9 Physical and Chemical Properties

9.1 Information on basic physical and chemical properties
a) Appearance
   Form: clear, liquid
   Colour: colourless
b) Odor
   No data available
c) Odor Threshold
   No data available
d) pH
   No data available
e) Melting point
   47 °C - lit.
f) Boiling point
   155 °C - lit.
g) Flash point
   44 °C - closed cup
h) Evaporation rate
   No data available
i) Flammability
   No data available

j) Explosive limits
   Upper explosion limit: 9.4 % (V)
   Lower explosion limit: 1.1 % (V)

k) Vapour pressure
   4.5 hPa at 20 °C
   13.3 hPa at 38.7 °C

l) Vapour density
   3.39 - (Air = 1.0)

m) Relative density
   0.947 g/cm³ at 25 °C

n) Water solubility
   86 g/L at 20 °C

o) Partition coefficient
   n-octanol/water
   log Pow: 0.81

p) Auto-ignition temperature
   420 °C at 1.013 hPa

q) Decomposition temperature
   No data available

r) Viscosity
   No data available

s) Explosive properties
   No data available

t) Oxidizing properties
   No data available

9.2 Other safety information

   Surface tension
   35.05 mN/m at 20 °C

   Relative vapour density
   3.39 - (Air = 1.0)

Section 10 Stability and Reactivity

10.1 Reactivity
   No data available

10.2 Stability
   Stable under recommended storage conditions

10.3 Possibility of hazardous reactions
   No data available

10.4 Conditions to avoid
   Heat, flames and sparks

10.5 Materials to avoid
   oxidizing agents, plastics

10.6 Hazardous decomposition products
   combustion may produce carbon monoxide and carbon dioxide.
Section 11 Toxicological Information

11.1 Information on toxicological effects

Acute toxicity
Oral LD50
LD50 Oral - rat - 1,534 mg/kg

Inhalation LC50
LC50 Inhalation - rat - 4 h - > 6.2 mg/l

Dermal LD50
LD50 Dermal - rabbit - 794 - 3,160 mg/kg

Skin corrosion/irritation
Skin - rabbit - Irritating to skin. - OECD Test Guideline 404

Serious eye damage/eye irritation
Eyes - rabbit - Risk of serious damage to eyes. - 24 h

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
Genotoxicity in vitro - Ames test - S. typhimurium - with and without metabolic activation - negative
Genotoxicity in vitro - Human - fibroblast - with and without metabolic activation - Laboratory experiments have shown mutagenic effects.

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.
IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Cyclohexanone)
NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Teratogenicity
no data available
Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

- **Inhalation**: May be harmful if inhaled. Causes respiratory tract irritation.
- **Ingestion**: Harmful if swallowed.
- **Skin**: Harmful if absorbed through skin. Causes skin irritation.
- **Eyes**: Causes eye irritation.

Signs and Symptoms of Exposure
Prolonged or repeated exposure to skin causes defatting and dermatitis. Cough, Shortness of breath, Headache, Nausea, Vomiting, Central nervous system depression, Incoordination. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects
no data available

Additional Information
RTECS: GW1050000

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**Section 12 Ecological Information**

**12.1 Toxicity**
Toxicity to daphnia and other aquatic invertebrates
EC50 - Daphnia magna (Water flea) - 820 mg/l - 24 h

**12.2 Persistence and degradability**
Biodegradability Result: 90 - 100 % - Readily biodegradable.

**12.3 Bioaccumulative potential**
no data available

**12.4 Mobility in soil**
no data available
12.5 PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
no data available

Section 13 Disposal Considerations

13.1 Waste treatment methods
Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

Section 14 Transport Information

14.1 UN Number
ADR/RID: 1915     IMDG: 1915     IATA: 1915

14.2 UN proper shipping name
ADR/RID: CYCLOHEXANONE
IMDG: CYCLOHEXANONE
IATA: Cyclohexanone

14.3 Transport hazard class
ADR/RID: 3     IMDG: 3     IATA: 3

14.4 Packing Group
ADR/RID: III     IMDG: III     IATA: III

14.5 Environmental hazards
ADR/RID: no     IMDG: Marine Pollutant No     IATA: No

14.6 Special precautions for user
No data available
14.7 DOT (US)
UN number: 1915 Class: 3 Packing group: III
Proper shipping name: Cyclohexanone
Reportable Quantity (RQ): 5000 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

Section 15 Regulatory Information

15.1 Safety, health and environmental regulations specific for the substance or mixture

OSHA (US) Hazards
Combustible Liquid, Target Organ Effect, Harmful by ingestion., Irritant

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components
Cyclohexanone CAS-No.108-94-1 Revision Date: 1993-04-24

Pennsylvania Right To Know Components
Cyclohexanone CAS-No.108-94-1 Revision Date: 1993-04-24

New Jersey Right To Know Components
Cyclohexanone CAS-No.108-94-1 Revision Date: 1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.
US Regulatory Information
This substance is distributed solely for processing and use by recipients under the Toxic Substances Control Act (TSCA) R&D Exemption in accordance with the regulations at 40 CFR 720.36. Commercial use is prohibited. This substance is specifically regulated under a TSCA Section 5(e) Consent Order. Substances regulated under TSCA Section 5(e) are subject to TSCA Section 12(b) export notification in accordance with the regulations at 40 CFR 707.60-.75.

15.2 Chemical Safety Assessment
For this product, a chemical safety assessment was not carried out.

Section 16 Other Information

Full text of H-statements referred to under sections 2 and 3.
Acute Tox. Acute toxicity
Eye Dam. Serious eye damage
Eye Irrit. Eye irritation
Flam. Liq. Flammable liquids
H226 Flammable liquid and vapor.
H302 Harmful if swallowed.
H302 + H312 + H332 Harmful if swallowed, in contact with skin or if inhaled
H312 Harmful in contact with skin.
H315 Causes skin irritation.
H318 Causes serious eye damage.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
Skin Irrit. Skin Irritation.
STOT SE Specific target organ toxicity – single exposure.

Full text of R-phrases referred to under sections 2 and 3
Xi Irritant
Xn Harmful
R10 Flammable
R20/21/22 Harmful by inhalation, in contact with skin, and if swallowed
R38 Irritating to skin
R41 Risk of serious damage to eyes

HMIS Classification
Health hazard: 2
Chronic Health Hazard: *
Flammability: 2
Physical hazards: 0
NFPA Rating

Health hazard: 2
Fire: 2
Reactivity Hazard: 0

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