SAFETY DATA SHEET


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1. Identification of the substance & the company

Chemical name: Hexabromocyclododecane, HBCD
Chemical formula: C_{12}H_{18}Br_{6}
Chemical family: Halogenated cycloalkane
Molecular weight: 641.5
Type of product and use: An additive flame retardant used in a wide range of plastics as well as textiles, adhesives and coatings. It is particularly recommended for styrene based systems such as EPS.
Supplier: ICL-IP America Inc.
622 Emerson Road - Suite 500St Louis, Missouri 63141, USA
Tel:(314)983-7884  Fax:(314)983-7607
e-mail:msdsinfo@icl-ip.com
Emergency Telephone: Chemtrec (800)424-9300
Medical: PROSAR 1-888-875-1685 (24HRS)

2. Hazards identification

GHS: GHS classification

Signal Word: WARNING

Hazard statements:
- H361 - Suspected of damaging fertility or the unborn child
- H362 - May cause harm to breast-fed children
- H410 - Very toxic to aquatic life with long lasting effects
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Precautionary statements

P202 - Do not handle until all safety precautions have been read and understood
P260 - Do not breathe dust/fume/gas/mist/vapors/spray
P263 - Avoid contact during pregnancy/while nursing
P273 - Avoid release to the environment
P391 - Collect spillage
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P308 + P313 - IF exposed or concerned: Get medical advice/attention
P501 - Dispose of contents/container to licensed hazardous waste disposal agent/site in accordance with local, regional, national and international legislation

4. First-aid measures

Eye contact
Holding the eyelids apart, flush eyes promptly with copious flowing water for at least 20 minutes. Get medical attention immediately.

Skin contact
Remove contaminated clothing. Wash skin thoroughly with mild soap and plenty of water for at least 15 minutes. Wash clothing before reuse. Get medical attention immediately.

Inhalation
In case of dust inhalation or breathing fumes released from heated material, remove person to fresh air. Keep him quiet and warm. Apply artificial respiration if necessary and get medical attention immediately.

Ingestion
If swallowed, wash mouth thoroughly with plenty of water. Get medical attention immediately.

NOTE: Never give an unconscious person anything to drink

Most important symptoms and effects, acute or delayed
Suspected of damaging fertility or the unborn child. May cause harm to breast-fed children.

Notes to the physician
No specific antidote.
Treat symptomatically and supportively.
In case of ingestion induce vomiting in alert patient.

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS No.</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hexabromocyclododecane</td>
<td>3194-55-6</td>
<td>99.5</td>
</tr>
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5. Fire - fighting measures

Suitable extinguishing media
Material is not combustible. Use extinguishing media appropriate to surrounding fire conditions.

Unusual fire and explosion hazards
Dust may form a weak explosive mixture with air (class St1)
Dust is not sensitive to ignition from static discharge.
When heated to decomposition, may release poisonous fumes of HBr.

Fire fighting procedure
Cool containers with water spray. In closed stores, provide fire-fighters with self-contained breathing apparatus in positive pressure mode.

6. Accidental release measures

Personal precautions
Wear respirator, chemical safety goggles, rubber gloves and boots.

Methods for cleaning up
Shovel into intact packaging and hold for waste disposal or possible re-use. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

Environmental precautions
Prevent product from entering drains, ditches and rivers.

7. Handling and storage

Handling
Keep containers tightly closed. Avoid bodily contact.

Storage
Store in a dry, cool, well-ventilated area. Away from incompatible materials (see "materials to avoid").

8. Exposure controls / personal protection

Exposure Limits:

<table>
<thead>
<tr>
<th>Components</th>
<th>ACGIH-TLV Data</th>
<th>OSHA (PEL) Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hexabromocyclododecane</td>
<td>Not determined</td>
<td>Not determined</td>
</tr>
<tr>
<td>3194-55-6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Manufacturer's recommendation
TWA - 1 mg/m³

Ventilation requirements
Ventilation must be sufficient to maintain atmospheric concentration below recommended exposure limit.
SAFETY DATA SHEET

Product name: FR-1206
Product id: 8303
Revision date: 17/03/2014
Supersedes: 30/10/2012

Revision: 13

Personal protective equipment:
- Respiratory protection: Approved respirator (90% effectiveness)
- Hand protection: Chemical safety gloves
- Eye protection: Chemical safety goggles
- Skin and body protection: Body covering clothes and boots.

Hygiene measures:
Do not eat, smoke or drink where material is handled, processed or stored. Wash hands thoroughly after handling and before eating or smoking. Safety shower and eye bath should be provided.

9. Physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>White to off-white crystalline free flowing powder</td>
</tr>
<tr>
<td>Melting point/range</td>
<td>175-185°C</td>
</tr>
<tr>
<td>Boiling point/range</td>
<td>Not applicable (decomposes)</td>
</tr>
<tr>
<td>Flash point</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Evaporation rate (ether=1)</td>
<td>Not applicable under standard conditions</td>
</tr>
<tr>
<td>Flammable/Explosion limits</td>
<td>Not flammable</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>6.45 x 10(^{-5}) Pa (21°C)</td>
</tr>
<tr>
<td>Vapor density</td>
<td>Not applicable under standard conditions</td>
</tr>
<tr>
<td>Solubility in water</td>
<td>66 µg/l (20°C)</td>
</tr>
<tr>
<td>Solubility in other solvents</td>
<td>Styrene: 10 g/100g at 25°C, Acetone: 7g/100g at 25°C, Toluene: 6.5 g/100g at 25°C</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>Log Kow - 5.625 (25°C)</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>&gt; 230°C</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>2.18</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not explosive</td>
</tr>
<tr>
<td>Oxidising properties</td>
<td>Not oxidising</td>
</tr>
</tbody>
</table>

10. Stability and reactivity

Stability: Stable under normal conditions
Conditions to avoid: Heating above decomposition temperature
Materials to avoid: Strong oxidants. HBr
SAFETY DATA SHEET


Product name          FR-1206
Product id             8303
Revision date          17/03/2014
Supersedes             30/10/2012

Revision: 13

11. Toxicological information

Acute toxicity:
- Rat oral LD50  >5,000 mg/kg
- Rabbit dermal LD50 >8,000 mg/kg
- Rat inhalation LC50 >200 mg/l/1 hour
- Eye irritation (rabbit) Not irritant
- Dermal irritation (rabbit) Not irritant

Dermal sensitization Produces 0% sensitization rate (Magnusson & Kligman maximisation study)

Sub-acute toxicity:
- NOAEL 1000 mg/kg/day (4 weeks oral rat)

Sub-chronic toxicity:
- NOAEL 1000 mg/kg/day (13 weeks oral, rat)

Chronic toxicity No information available

Mutagenicity Not mutagenic by the Ames Test.
              Not clastogenic in chromosome aberration test with Human lymphocytes.

Carcinogenicity Not included in NTP 12th Report on Carcinogens
             Not classified by IARC

Teratogenicity Not teratogenic, NOAEL=1000 mg/kg body weight (rat, gavage).

12. Ecological information

Aquatic toxicity:
- 96 Hour-LC50, Fish >6.8 ug/L, nominal, (Rainbow trout)
- 72 hour - EC50, Marine algae 52 ug/l (Skeletonema costatum)
- EC50, Freshwater algae >6.8 ug/L, 96 Hours, nominal (Selenastrum capricornutum)

Persistence and degradability Inherently biodegradable In sediments, HBCD is not persistent under either aerobic or anaerobic conditions with half life values of 11-32 days and 1.1-1.5 days, respectively. In soil, HBCD is not persistent under anaerobic conditions but is persistent under aerobic conditions with half life values of 6.9 days and 64-441 days, respectively.
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**Bioaccumulative potential**
HBCD is considered as bioaccumulative. A flow-through bioconcentration test with the rainbow trout measured a steady-state BCF for the whole fish of 8,974

**Note:**
HBCD fulfils the criteria for P, B, and T (PBT)

### 13. Disposal considerations

**Waste disposal**
Treat the solid waste and packaging waste via an incinerator equipped with an adequate gas cleaning system or send to a controlled landfill. Observe all federal, state and local environmental regulations when disposing of this material

### 14. Transportation information

**UN No.**
3077

**DOT**
Proper shipping name: Environmentally hazardous substance, solid, n.o.s (Hexabromocyclododecane)
Class: 9 - Miscellaneous Hazardous Material
Label: 9
Marking: Marine Pollutant
Packing Group: III

**IMDG**
Proper shipping name: Environmentally hazardous substance, solid, n.o.s (Hexabromocyclododecane)
Class: 9 - Miscellaneous Dangerous Substances and Articles
Label: 9
Packing Group: III
Mark: MARINE POLLUTANT

**ICAO/IATA**
Proper shipping name: Environmentally hazardous substance, solid, n.o.s (Hexabromocyclododecane)
Class: 9
Hazard label(s): Miscellaneous
Packing group: III
Marking: Environmentally hazardous substance
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Revision: 13

15. Regulatory information

USA
Reported in the EPA TSCA Inventory.

- SARA 313
Not listed

Canada
Listed in DSL

EU
HBCDD was added to ANNEX XIV, Substances Subject to Authorization, as amended through Regulation No. 143/2011/EU of 17 Feb 2011

Japan
ENCS no. 3-2254
ISHL no. 3-2254
Type III Monitoring Chemical Substances.

Australia
Listed in AICS

New Zealand Inventory
Listed in NZIoC

- China inventory
Listed in IECSC

Korea
Listed in ECL (KE-18398)

Philippines
Listed in PICCS

16. Other information

This data sheet contains changes from the previous version in section(s) 8

Health, Safety & Environment Policy
We will strive to ensure that our operations and products meet the needs of the present global community without compromising the ability of future generations to meet their needs. We accept that the success of our business is dependent on the supply of products and services that will benefit society whilst ensuring human safety and protection of the environment and natural resources. Within the framework of our commitment to the Responsible Care program, we will provide a healthy and safe work environment for employees and will responsibly manage our products at all stages of their life cycle in order to protect human health and the environment whilst maintaining high production standards of operation.

TO MEET THIS COMMITMENT WE WILL: Comply with or exceed applicable national and international regulatory requirements and other requirements to which we subscribe. Communicate openly and actively encourage dialogue with employees, customers, and community concerning our products and operations. Implement documented management systems consistent with and for promotion of the Responsible Care ethics.
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Develop and supply products that can be manufactured, transported, used and disposed of safely whilst best meeting the needs of our customers. Regularly assess, continually improve and responsibly manage health, safety and environmental risks associated with products and processes throughout their life-cycles. Share knowledge and expertise with others and seek to learn from and incorporate improved practices into our own operations.

Educate and train employees, contractors and customers to improve their HSE performance. Communicate up-to-date information to enable our workers, customers and other interested parties to handle our products in a safe and environmentally responsible manner. Endeavor to work with customers, suppliers, distributors and contractors to foster the safe use, transport and disposal of our chemicals. Support Product Stewardship programs in cooperation with customers, distributors and transporters.

Although the information and recommendations set forth herein (hereinafter “information”) are presented in good faith and believed to be correct as of the date hereof, ICL-IP America Inc. makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its safety and suitability for their purposes prior to use. In no event will ICL-IP America Inc. be responsible for damages of any nature whatsoever resulting from the use of or reliance upon information. NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE, ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH THE INFORMATION REFERS.

In an event of discrepancy between the contents of this SDS and the English version of it, the English version shall prevail.

**Prepared by**

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End of safety data sheet