MATERIAL SAFETY DATA SHEET

Product Name: PHOSFLEX 4
Product id: 7020
Revision: 2
Revision date: 27/10/2010
Supersedes: 21/12/2008

1. Identification of the substance & the company

Chemical name: Tributyl phosphate
Synonym(s): TBP; Tri-n-butyl phosphate
Chemical formula: C12H27O4P
Chemical family: Trialkyl phosphate
Molecular weight: 266.32
Type of product and use: Flame-retardant plasticizer, Heat exchange medium
Supplier: ICL-IP America Inc.
       622 Emerson Road - Suite 500
       St Louis, Missouri 63141, USA
       Tel:(314)983-7884 Fax:(314)983-7607
Emergency Telephone: Chemtrec (800)424-9300

2. Hazards identification

Emergency overview: May cause eye irritation.
                      May cause skin and respiratory tract irritation.
                      May cause cholinesterase inhibition

NFPA Ratings (Scale 0-4): Health = 3, Fire = 1, Reactivity = 0
HMIS Ratings (Scale 0-4): Health = 2, Fire = 1, Reactivity = 0.

3. Composition / information on ingredients

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS No.</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tributyl Phosphate</td>
<td>126-73-8</td>
<td>100</td>
</tr>
</tbody>
</table>
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 re-use. Get medical attention if irritation persists.

**Inhalation**
In case of inhalation, 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.

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NOTE: Never give an unconscious person anything to drink.
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**Notes to the physician**
Treat symptomatically and supportively.

5. Fire - fighting measures

**Suitable extinguishing media**
Carbon dioxide, dry chemicals, foam, water spray (fog).

**Fire fighting procedure**
Fire fighters should wear full protective clothing and self-contained breathing apparatus (SCBA). Contain fire fighting water to prevent entry into water or drainage systems.

**Unusual fire and explosion hazards**
When heated to decomposition, may release poisonous and corrosive fumes of Carbon Dioxide, Carbon Monoxide and Phosphorus Oxides.
6. Accidental release measures

Personal precautions
Wear appropriate safety clothing and eye/face protection (see Section 8)

Methods for cleaning up
Absorb on sand or vermiculite and place in closed container for disposal.
Collect in suitable and properly labeled containers.
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").
Maximum recommended storage temperature of 65°C (149°F)

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>Tributyl Phosphate 126-73-8</td>
<td>0.2 ppm</td>
<td>5 mg/m³</td>
</tr>
</tbody>
</table>

Ventilation requirements
Ventilation must be sufficient to maintain atmospheric concentration below exposure limit.

Personal protective equipment:
- Respiratory protection
  In case of insufficient ventilation wear suitable respiratory equipment.
- Hand protection
  Neoprene gloves or gloves from Viton A and ethylene propylene elastomers
- Eye protection
  Chemical safety goggles
- Skin and body protection
  Use protective clothing impervious to this material.
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Hygiene measures: Safety shower and eye bath should be provided. Do not eat, smoke or drink where material is handled, processed or stored. Wash hands carefully before eating or smoking.

9. Physical and chemical properties

Appearance: Colorless to pale yellow liquid
Odour: None
Boiling point/range: ~ 180°C
Melting point/range: -80°C (-112°F)
Flash point: 165°C (329°F) (closed cup)
Flammable/Explosion limits: Not explosive/Not flammable
Auto-ignition temperature: Not self-ignitable
Vapour pressure: 0.014 mmHg (20°C)
Viscosity: 4.5 cP (25°C)
Solubility:
- Solubility in water: 1 g/l @ 20°C
Density: 0.987 g/mL (20°C)
Particle size: Substance is a liquid, thus test not relevant

10. Stability and reactivity

Stability: Stable under normal conditions.
Materials to avoid: Strong oxidizers, strong acids and strong alkalis. It hydrolyzes slowly at normal temperatures in acidic or alkaline aqueous solutions.
Conditions to avoid: High temperatures
Hazardous decomposition products: Carbon dioxide and carbon monoxide
Hazardous polymerization: Not expected to occur

11. Toxicological information

Acute toxicity:
- Rat oral LD50: 3160 mg/kg
- Rabbit dermal LD50: > 4640 mg/kg
- Eye irritation (rabbit): Mild irritant
- Dermal irritation (rabbit): Not irritant
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Dermal sensitization
Not a sensitizer

Mutagenicity
Not mutagenic by the Ames Test
In vivo Drosophila melanogaster test: not mutagenic
The product did not demonstrate mutagenic or genotoxic effects in various tests using mammalian cells.

Carcinogenicity
Not included in NTP 11th Report on Carcinogens
IARC Group 3 (animal inadequate evidence, human no data available).
Not classified as a carcinogen by USA OSHA
Data from a lifetime study in rats has shown an increased incidence of urinary bladder tumors at a very high dose level. These tumors developed in response to long-term irritation of the bladder wall by cytotoxic metabolites which caused chronic irritation with subsequent abnormal growth during repair of the bladder wall. A recent risk assessment has shown no risk to human health from occupational exposure to tributyl phosphate.
Tributyl phosphate was administered in the diet of mice for 18 months at concentrations of 100, 1000, and 3500 ppm. The only treatment related change other than an increase in liver weight at 1000 and 3500 ppm was an increase in the incidence of benign liver tumors in the high dose males.

Reproductive toxicity
In a two generation reproductive toxicity study, rats were dosed with tributyl phosphate at concentrations of 200, 700 or 3000 ppm (approximately 15, 53 or 225 mg/kg/day). There were no adverse effect on fertility or reproduction at any dose. The NOEL was greater than 3000 ppm.

Neurotoxicity
There was no evidence that this material affected nervous sytem function and structure of rats following both acute (single dose) and subchronic (repeated dose over a 90 day period) exposure. This material is not considered neurotoxic based on these tests.

Developmental toxicity
In a developmental toxicity test, the product was not teratogenic or embryotoxic when administered orally to pregnant rats at levels up to 750 mg/kg/day. A decrease in fetal body weight was observed at the maternally toxic dose of 750 mg/kg/day. It was not maternally toxic, embryotoxic, fetotoxic or teratogenic when administered to pregnant rabbits at levels up to 150 mg/kg/day.

Other
This product is a weak cholinesterase inhibitor.
**12. Ecological information**

Aquatic toxicity:
- 96 Hour-LC50, Fish: 13 mg/l (Rainbow Trout)
- LC50, Crustacea: 2.4 mg/l (Amphipod, 96-hours)
- 48 Hour-EC50, Daphnia magna: 2.6 mg/l
- 96 Hour- IC50, Algae: 4.4 mg/l

Biodegradation: Readily biodegradable

Germany, water endangering classes (WGK): 2

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**13. Disposal considerations**

Waste disposal: Observe all federal, state and local environmental regulations when disposing of this material

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**14. Transportation information**

DOT: Not regulated

IMO: Not regulated

ICAO/IATA: Not regulated

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**15. Regulatory information**

USA: Reported in the EPA TSCA Inventory.

- **SARA 313**: This product does not contain a chemical listed at or above de minimis concentrations.

- **California-Prop 65**: This product does not contain any ingredient known to the State of California to cause cancer or reproductive toxicity as listed under the State drinking Water and Toxic Enforcement Act of 1986.

- **Waste Classifications**: This material does not meet RCRA’s characteristic definition of ignitability, corrosivity, or reactivity, and is not listed in 40CFR 261.33.
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- Workplace Classification
  This product is considered hazardous under the OSHA Hazard Communication Standard (29CFR 1910.1200).

  Canada
  Listed in DSL

  -WHMIS hazard class
  D2B  toxic materials

  EU
  Reported in EINECS

  Japan
  Listed in ENCS

  Australia
  Listed in AICS

  New Zealand Inventory
  Listed in NZIoC

  China inventory
  Listed

  Korea
  Listed in ECL

  Philippines
  Listed in PICCS

16. Other information

This data sheet contains changes from the previous version in section(s)
2 & 3 (Not ANSI), 9

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
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

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End of safety data sheet