SAFETY DATA SHEET

Product name: PHOSFLEX 4
Product id: 7020
Revision date: 26/11/2013
Revision: 3
Supersedes: 27/10/2010

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
e-mail: msdsinfo@icl-ip.com

Emergency telephone number:
- For Europe: +32 (0) 3 575 5555  SGS
- For UK and Ireland: +44 (0) 1270 502891 (24 Hours)
- For USA: Chemtrec (800) 424-9300
- For Asia - Pacific: ALERT-SGS
  24 hr Toll Free Number : +800 ALERTSGS (+800-2537-8747)
  24 hr Singapore Exchange Number : +65 6542-9595

2. Hazards identification

GHS classification:
- Carc. Cat. 2, H351 Suspected of causing cancer
- Skin Irrit. 2, H315 Causes skin irritation
- Acute Tox. 4, H302 Harmful if swallowed
- Aquatic Chronic 3, H412 Harmful to aquatic life with long lasting effects

Signal Word: WARNING
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Hazard statements
H351 - Suspected of causing cancer
H315 - Causes skin irritation
H302 - Harmful if swallowed
H412 - Harmful to aquatic life with long lasting effects

Precautionary statements
P202 - Do not handle until all safety precautions have been read and understood
P264 - Wash hands thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P273 - Avoid release to the environment
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P301 + P312 - IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
P330 - Rinse mouth
P332 + P313 - If skin irritation occurs: Get medical advice/attention
P362 + P364 - Take off all contaminated clothing and wash it before reuse
P308 + P313 - IF exposed or concerned: Get medical advice/attention
P405 - Store locked up
P501 - Dispose of contents/container to licensed hazardous waste disposal agent/site in accordance with local, regional, national and international legislation

NFPA Ratings (Scale 0-4)
Health = 3, Fire = 1, Reactivity = 0

3. Composition / information on ingredients

<table>
<thead>
<tr>
<th>Components</th>
<th>Weight %</th>
<th>Index No.</th>
<th>EC No.</th>
<th>EU Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tributyl Phosphate 126-73-8</td>
<td>100</td>
<td># 015-014-00-2</td>
<td>204-800-2</td>
<td>Carc.2  H351, Acute Tox. 4 H302, Skin Irrit 2 H315 Aquatic Chronic 3, H412 (In accordance with CLP 1272/2008) Carc. Cat 3; R40 Xn; R22 XI; R38 (In accordance with DSD 67/548/EEC)</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.
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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 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.

NOTE: Never give an unconscious person anything to drink

Most important symptoms and effects, acute or delayed
Suspected of causing cancer
Causes skin irritation
Harmful if swallowed

Notes to the physician
Treat symptomatically and supportively.

5. Fire - fighting measures

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

Unusual fire and explosion hazards
When heated to decomposition, may release poisonous and corrosive fumes of carbon dioxide, carbon monoxide and phosphorus oxides.

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

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.
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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).

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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>5 mg/m³, A3</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.

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.

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9. Physical and chemical properties

- Appearance: Colorless to pale yellow liquid
- Odor: None
- Melting point/range: -80°C (-112°F)
- Boiling point/range: ~ 180°C
- Flash point: 165°C (329°F) (closed cup)
- Flammable/Explosion limits: Not flammable/Not explosive
- Vapor pressure: 0.014 mmHg (20°C)
- Relative density: 0.987 g/mL (20°C)
- Solubility:
  - Solubility in water: 1 g/l @ 20°C
- Auto-ignition temperature: Not self-ignitable
- Viscosity: 4.5 cP (25°C)
10. Stability and reactivity

Stability
Stable under normal conditions.

Conditions to avoid
High temperatures.

Materials to avoid
Strong oxidizers, strong acids and strong alkalis.
It hydrolyzes slowly at normal temperatures in acidic or alkaline aqueous solutions.

Hazardous decomposition products
Phosphorus oxides, Carbon dioxide and carbon monoxide

11. Toxicological information

Acute toxicity:
- Rat oral LD50 1,6 ml/kg bw
- Rabbit dermal LD50 > 3100 mg/kg
- Dermal irritation (rabbit) Slight irritant

- Eye irritation (rabbit) Slightly irritant

Dermal sensitization
Not a sensitizer.

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

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

Neurotoxicity
There was no evidence that this material affected nervous system 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.

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
Bioaccumulative potential: Not bioaccumulative
BCF=21-35

Note: Does not meet the criteria for PBT or vPvB assessment

13. Disposal considerations

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

14. Transportation information

IMDG: Not regulated
ADR/RID: Not regulated
ICAO/IATA: Not regulated
DOT: Not regulated
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15. Regulatory information

EU: Reported in EINECS
USA: Reported in the EPA TSCA Inventory.
Australia: Listed in AICS
Canada: Listed in DSL
China
  - China inventory: Listed in IECSC
Japan: Listed in ENCS
Korea: Listed in ECL
New Zealand Inventory: Listed in NZIoC
Philippines: Listed in PICCS

16. Other information

This data sheet contains changes from the previous version in section(s) 2, 4, 11, 12

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.
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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.

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End of safety data sheet