## TRIPHENYL PHOSPHATE

### PRODUCT IDENTIFICATION

<table>
<thead>
<tr>
<th>CAS NO.</th>
<th>115-86-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS NO.</td>
<td>204-112-2</td>
</tr>
<tr>
<td>FORMULA</td>
<td>((C_6H_5O)_3PO)</td>
</tr>
<tr>
<td>MOL WT.</td>
<td>3296.29</td>
</tr>
<tr>
<td>H.S. CODE</td>
<td>2919.00</td>
</tr>
<tr>
<td>TOXICITY</td>
<td>Oral rat LD50: 3500 mg/kg</td>
</tr>
</tbody>
</table>

### SYNTHYMS

Phosphoric Acid Triphenyl Ester; Fosfato de trifenido (Spanish); Phosphate de Triphenyle; TPP; Trifenylfosfat; Triphenyloxyphosphine Oxide; Phosphate de triphényle (French);

### DERIVATION

from phosphorus oxychloride and phenol

### PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL STATE</td>
<td>white to off-white flake or crystal</td>
</tr>
<tr>
<td>MELTING POINT</td>
<td>49 - 51 C</td>
</tr>
<tr>
<td>BOILING POINT</td>
<td>245 C</td>
</tr>
<tr>
<td>SPECIFIC GRAVITY</td>
<td>1.185-1.202</td>
</tr>
<tr>
<td>SOLUBILITY IN WATER</td>
<td>Insoluble</td>
</tr>
<tr>
<td>SOLVENT SOLUBILITY</td>
<td>Soluble: Chloroform, Carbon Tetrachloride, Ether, Benzene; moderately soluble in ethanol</td>
</tr>
<tr>
<td>AUTOIGNITION</td>
<td>500 C</td>
</tr>
<tr>
<td>pH</td>
<td>Health: 2 Flammability: 1 Reactivity: 0</td>
</tr>
<tr>
<td>VAPOR DENSITY</td>
<td>1.552-1.563</td>
</tr>
<tr>
<td>NFPA RATINGS</td>
<td>220 C</td>
</tr>
<tr>
<td>STABILITY</td>
<td>Stable under ordinary conditions</td>
</tr>
</tbody>
</table>

### APPLICATIONS

TPP is a non-flammable crystalline compound; melts at 49-50 C; soluble in benzene, chloroform, ether, and acetone. It hydrolyses rapidly in alkaline solutions at normal ambient temperature to give phosphoric acid, diphenyl phosphate and phenol, readily hydrolyses in strong acidic conditions at high temperature but slowly in acidic and neutral solutions. TPP is used as:

- Flame-retardant in many plastics and reins especially in phenolic resin for the manufacture of electrical and automobile parts.
- Component of hydraulic fluids and lubricant oils.
- Non-flammable plasticizer or additive in cellulose for photographic films, polyester and polyurethane.
- Non-combustible substitute for camphor in celluloid for fireproof.
- Plasticizer in lacquers and varnishes, vinyl automotive upholstery and in cellulose acetate articles.
- Impregnating agent for roofing paper

### SALES SPECIFICATION

| APPEARANCE | white to off-white flake or crystal |
| COLOR, APHA | 45 max |
GENERAL DESCRIPTION OF FLAME RETARDANT AGENT

Flame Retardant are substances that can be chemically inserted into the polymer molecule or be physically blended in polymers after polymerization to suppress, reduce, delay or modify the propagation of a flame through a plastic materials. There are several classes of flame retardants; Halogenated Hydrocarbons (Chlorine and Bromine containing compounds and reactive flame retardants), Inorganic flame retardants (Boron compounds, Antimony oxides, Aluminium Hydroxide, molybdenum compounds, zinc and magnesium oxides), Phosphorous containing compounds (Organic phosphate esters, phosphates, halogenated phosphorus compounds and inorganic phosphorus containing salts).

Class of Flame Retardants

- Inorganic
  - Metal hydroxides
    - Aluminium hydroxide
    - Magnesium hydroxide
    - Others
  - Antimony compounds
    - Antimony trioxide
    - antimony pentoxide
    - Sodium antimonate
    - Others
  - Boron compounds
    - Boric acid
    - Borax
    - Zinc borate
    - Others
  - Other metal compounds
    - Molybdenum compounds
    - Titanium compounds
    - Zirconium compounds
    - Zinc compounds
      - Zinc stannate
      - Zinc hydroxy-stannate
      - Others
    - Others
  - Phosphorus compounds
    - Red phosphorus
    - Ammonium polyphosphate
    - Others
  - Other inorganic flame retardants
    - ammonium sulfamate
    - ammonium bromide
- Others

- Halogenated organic
  - Brominated
    - Tetrabromobisphenol A
    - Decabromodiphenyl ether
    - Octabromobiphenyl ether
    - Tetrabromobiphenyl ether
    - Hexabromocyclododecane
    - Tribromophenol
    - Bis(tribromophenoxy) ethane
    - Tetrabromobisphenol A polycarbonate oligomers
    - Tetrabromobisphenol A epoxy oligomers
    - Others
  - Chlorinated
    - Chlorinated paraffins
    - Bis(hexachlorocyclopentadieno)cyclo-octane
    - Others

- Organophosphoros
  - Non-halogenated compounds
    - phosphate esters
      - Trialkyl phosphates
      - Triaryl phosphates
      - Aryl-alkyl phosphates
      - Others
    - polyols
    - phosphonium derivatives
    - phosphonates
    - Others
  - Halogenated phosphates
    - Tris(1-chloro-2-propyl) phosphate
    - Tris(2-chloroethyl) phosphate
    - Tris(2,3-dibromopropyl)phosphate
    - Others

- Nitrogen-based
  - Polyurethanes
  - Polyamides
  - Melamine and its salts
  - Guanidine compounds
  - Others