

**B. Precursors:**

(5) Phosphorus oxychloride  $\text{POCl}_3$   
CAS No. 10025-87-3  
HS No. 28.12.10.10  
TDG No. 1810  
NIOSH/RTECS No. TH 4897000  
Merck 7324

**Synonyms:** Phosphoryl chloride, phosphorous oxytrichloride

**Physical Properties:** MW: 153.3, mp: 1.2°C, bp: 105.1°, d.1.685.  
It is a colourless to pale yellow fuming liquid.

**Synthesis:** Simple methods of preparation include the partial hydrolysis of a mixture of  $\text{PCl}_5$  and  $\text{P}_2\text{O}_5$ , oxidation of  $\text{PCl}_3$  by oxygen or ozone or heating calcium phosphate with a mixture of carbon monoxide and chlorine. It is manufactured by bubbling oxygen through liquid phosphorous trichloride.

**Reactivity:** Similar to  $\text{PCl}_3$ , the halogens can be replaced by R in  $\text{RMgX}$ , all three halogens can be replaced by RO from alcohols, hydrolysis yields phosphoric acid. It forms donor complexes with metal ions e.g.,  $\text{POCl}_3 \cdot \text{AlCl}_3$ .

**Toxicology:** It volatilizes readily to give very irritating vapours. It is poisonous by inhalation and ingestion. It reacts explosively with water and many other liquids. Its  $\text{LD}_{50}$  is 380 mg/kg (rat). It is a corrosive liquid and is reported on the EPA TSCA inventory.

**Uses:** It is used to produce alkyl and aryl orthophosphate triesters that are used in the production of hydraulic fluids, plastic and elastomer additives, oil stabilizers, surfactants, sequestrants, pesticide and pharmaceutical intermediates. Trialkyl phosphates are used in uranium processing.

**Suppliers:** Twenty-five suppliers listed worldwide: These are Brazil (1), USA (6), PRC (2), India (3), Japan (4), France (2), Germany (3), UK (1), Italy (2) and Spain (1).