and stibine are not produced In experimental subacute or chronic phosphine poisoning, the effects are similar to those of poisoning by white or yellow phosphorus

Phosphoric acid is a corrosive mineral acid, usually encountered as the tribasic (orthophosphoric) acid Although its irritation of the skin and mucous membranes is not as pronounced as that of nitric or sulfuric acid, 75 percent phosphoric acid will destroy body tissues and cause severe burns

Phosphoric anhydride is a local irritant and a very strong dehydrating agent With moisture it forms phosphoric acid (corrosive to the skin, mucous membranes, and the eyes, but is not considered as hazardous as nitric or sulfuric acid) Very high concentrations of the anhydride will cause violent coughing, although those exposed regularly to the industrial fume apparently become acclimated to some degree No evidence of systemic poisoning has been reported in the literature for either acute or chronic exposures Suitable process enclosures or local exhaust ventilation or both should be used to control industrial exposures Avoid skin and/or eye contact For very dusty conditions, the use of full face industrial canister masks, coveralls, rubber gloves, aprons, and foot protection are indicated

Phosphorus is supplied commercially as a dark red powder and as a light yellow translucent waxy solid Red phosphorus is harmless since it does not react with the air and is extremely insoluble Yellow phosphorus, however, melts at just about body temperature and is extremely flammable The liquid ignites spontaneously in the presence of air, and many painful burns have been produced by picking up pieces of phosphorus with the bare fingers It is normally stored as a solid kept under water and transferred as a liquid

Since the water used to shield yellow phosphorus invariably contains small particles of the material, it should not be permitted to escape from the plant premises until the phosphorus has been completely removed and burned The water should be cooled below the melting point of phosphorus, filtered to remove the larger particles, and then aerated thoroughly to oxidize remaining phosphorus before being disposed

Burns from liquid phosphorus are ordinarily extremely severe because of the high temperature of the flaming material in immediate contact with the skin and because particles of the phosphorus will likely be left in the burned tissue when the area is cleaned up The burning can be stopped for the moment by saturating the area with cool water or immersing the part in water The phosphorus will start to burn again as soon as the water runs off or evaporates The burning can be stopped permanently by washing the burned area thoroughly and repeatedly with a solution of soluble copper salt, such as 3 percent copper sulfate This will precipitate metallic copper or perhaps copper phosphide on the surface of the phosphorus and prevent its further oxidation After the skin surface has been cooled to solidify the particles, they can be easily found by their bright coppery appearance and removed

If a copper salt solution is not available, the burning part can be covered with cloth saturated in cold water, and kept saturated until the copper salt solution can be obtained, or until the particles can be otherwise removed

If possible, spilled phosphorus should be immediately covered with water Large spills can be confined to a small area with sand or earth dikes and then flooded with water or covered with sand or earth and kept wet until the phosphorus can be burned or recovered

Yellow phosphorus is toxic It may produce poisoning if taken by mouth, but in modern industry the only important method of absorption is by inhalation

Although a few cases of chronic phosphorus poisoning have been reported, it is not a serious industrial hazard since most operations can be carried out under water and the exposure can be minimized Chronic poisoning may take the form of general weakness, with anemia, loss of appetite, indigestion, and chronic cough resulting from irritation of the gastrointestinal system and fatty degeneration of the liver

Bone necrosis ("phossy jaw"), first seen in the preparation of phosphorus matches, may affect any bone but is most commonly seen in the jawbone It usually appears as a toothache followed by the loosening of one or more