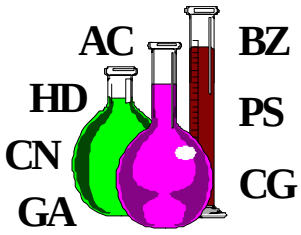
U.S. Army Center for Health Promotion and Preventive Medicine



Detailed Facts About White Phosphorous (WP)

218-24-1096

Physical Properties of White Phosphorous

Chemical Formula	P_4
Description	White phosphorous is a white or pale yellow, translucent, crystalline solid with a waxy consistency. It is also called yellow phosphorus due to impurities and has a match-like odor.
Molecular Weight	124.11
Boiling Point	280°C
Vapor Pressure (mm Hg)	0.026 @ 20°C
Freezing Point	44°C
Density	Solid = 1.83 @ 20°C
Solubility	Insoluble in water 1 gm/400 ml absolute alcohol 1 gm/102 ml absolute ether 1 gm/40 ml chloroform 1 gm/35 ml benzene 1 gm/0.8 ml carbol disulfide
Flash Point	Ignites spontaneously in air or above 30°C.
Volatility	May be ignited by heat, sparks, or flame; may burn rapidly with flare-burning effect; fire may produce irritating or poisonous gases.

Agent WP - The chemical white phosphorus, Chemical Abstract Service Registry No. 7723-14-0.

Toxicity Values Range from approximately 1 to 16 mg/kg.

Exposure Limits

Workplace Time-Weighted Average - 0.1 mg/m^3
General Population Limits - No standard available

Toxic Properties of White Phosphorous

White phosphorous is spontaneously flammable and is an extremely toxic inorganic substance. It is used primarily as a smoke agent and can also function as an antipersonnel flame compound capable of causing serious burns.

Overexposure Effects

The vapors of burning phosphorous (yellow) can be a mild irritant; continued exposure can lead to bronchitis, persistent coughing, severe burns, weakness, anemia, loss of appetite, and possibly pneumonia; if ingested, the fatal dose is 1 mg/kg. WP can cause thirst cyanosis, abdominal pain, jaundice; acute poisoning produces shock, coma and death in a short time (symptoms may subside and then return); liver and kidney damage may occur. It can cause very severe, slow-healing burns on contact and particularly deep burns with hemorrhaging. WP can also cause severe burns and permanent damage to the eyes.

Inhalation or ingestion of small amounts of phosphorus over long periods can lead to necrosis or deformation of the lower jaw, damage to teeth, and susceptibility to bone fracture. Persons with pre-existing skin disorders, eye problems, or impaired liver or kidney function may be more susceptible to the effects of the substance.

Emergency and First Aid Procedures

Inhalation: remove victim to fresh air immediately; perform artificial respiration if breathing has stopped; keep affected victim warm and at rest; seek medical attention immediately.

Eye Contact: wash eyes with copious amounts of water immediately lifting the lower and upper lids occasionally; do not wear contact lenses when working with this chemical; seek medical attention immediately.

Skin Contact: flush the contaminated skin with water immediately; remove the clothing immediately and flush the skin with water; keep skin wet until medical attention is obtained to prevent any remaining WP from burning; seek medical attention immediately.

Ingestion: if victim is conscious, give victim copious amounts of water immediately; induce vomiting after victim has swallowed the water; do not make unconscious person vomit; seek medical attention immediately.

Protective Equipment

Protective Gloves:	Wear flame-retardant clothing and gloves.
Eye Protection:	Wear dust- and splash-proof safety goggles.
Other:	Wear a complete set of protective clothing necessary to prevent any possible skin contact to include gloves and lab coat, apron, boots, plastic coveralls; other protective clothing and equipment should be available to prevent contact with skin or clothing; remove contaminated clothing immediately; do not wear clothing until it has been properly laundered.

Reactivity Data

Stability:	Stable in steel drum not in contact with air or oxygen; reactive with many substances including atmospheric oxygen when dry; information on possible reactivity in use must be investigated prior to use; WP is unstable under water.
Hazardous Decomposition:	Phosphorus pentoxide is formed on exposure to air.
Hazardous Polymerization:	WP does not polymerize.
Incompatibilities:	Reacts vigorously or violently with halogens, oxidizers, alkaline compounds, acids, some metals and sulfur compounds, nitrites, and many additional unlisted compounds.
Persistency	The dissemination efficiency as flame is very low as thickened.

References

1. Department of the Army Technical Manual (DA TM) 3-250, *Storage, Shipment, Handling, and Disposal of Chemical Agents and Hazardous Chemicals,* 1969.

2. Genium's Reference Collection, *Material Safety Data Sheet No. 25,* Genium Publishing Corporation, 1988.

3. U.S. Army Chemical Command Materiel Destruction Agency, *Site Monitoring Concept Study,* 15 September 1993.

4. *Hazardous Substances Data Bank*, 1995.

5. Meditext (TM), 1995.

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