Lead(II) Acetate

Lead(II) acetate, \([\text{Pb}(\text{CH}_3\text{COO})_2]\), is a white crystalline substance with a sweetish taste and is also known by one of the following trivial names: sugar of lead, lead sugar, salt of Saturn, and Goulard's powder. Lead acetate is soluble in water and glycerin and is toxic (like most other lead compounds). Its sweet taste has led to its use as a sugar substitute throughout history (despite its toxicity).

Lead acetate paper is used to detect the poisonous gas \([\text{H}_2\text{S}]\) (hydrogen sulfide), which reacts with lead(II) acetate on the moistened test paper to form a grey/black precipitate of \([\text{HgS}]\) (lead sulfide).

Lead(II) acetate can be produced by dissolving lead(II) oxide in acetic acid:

\[\text{PbO} + 2 \text{CH}_3\text{COOH} \rightarrow \text{Pb(CH}_3\text{COO})_2 + \text{H}_2\text{O}\]

If more \([\text{PbO}]\) than the stoichiometric amount is dissolved in acetic acid, the reaction yields basic acetates (lead subacetate) such as

\[\text{Pb(CH}_3\text{COO})_2\cdot\text{Pb(OH})_2\]

or

\[\text{Pb(CH}_3\text{COO})_2\cdot 2\text{Pb(OH})_2\]

Pure lead(II) acetate is usually available in form of the trihydrate, \([\text{Pb}(\text{CH}_3\text{COO})_2\cdot 3\text{H}_2\text{O}]\), a colorless or white efflorescent monoclinic crystalline substance.

Lead(IV) Acetate

Lead(IV) acetate or lead tetraacetate, \([\text{Pb}(\text{CH}_3\text{COO})_4]\), can be prepared by electrolytic oxidation of lead(II) acetate, or by dissolving lead plumbate in hot acetic acid:

\[\text{Pb}_3\text{O}_4 + 8 \text{CH}_3\text{COOH} \rightarrow \text{Pb(CH}_3\text{COO})_4 + 4 \text{H}_2\text{O}\]

Lead(IV) acetate is a strong oxidizing agent, a source of acetyloxy groups and a general reagent for the introduction of lead into organo-lead compounds.

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