

Uses & Applications of Phosphates in Paints and Coatings

Condensed phosphates are extensively used as dispersing agents in pigmented water-based systems, primarily paper coating “colors” and water-based paints. Phosphates, such as tetrasodium pyrophosphate (TSPP) and tetrapotassium pyrophosphate (TKPP), aid in the wetting and even dispersion of pigments in formulating the final product. In latex paints, TKPP and potassium tripolyphosphate (KTPP) are the preferred dispersing agents, yielding systems of low and stable viscosities, but also acting as sequestrants.

Dispersing agents are used to assist the mechanical process of dispersing solid, insoluble pigments in water. Sodium polyphosphate and potassium phosphate are used as dispersing agents for emulsion paints, plasters and adhesives. Sodium polyphosphate also improves the storage stability of these materials when applied in combination with polyacrylates and due to its high dispersing effectivity; optimal particle size is rapidly achieved. Sodium polyphosphate is suitable as a dispersing agent for waterborne paints, slows down sedimentation, reduces water hardness and offers a good binding capacity with regard to calcium and heavy metal ions. It also deflocculates pigments and fillers in aqueous suspensions, thereby, high solid contents of emulsion paints with low viscosity can be achieved. Potassium phosphate helps with low and rapid end viscosity of dispersing process and is best suitable as dispersing agent for all aqueous building paints and plasters, caused by the excellent storage stability. It also prevents white shadings and carbonisation of external wall paints.

Ammonium polyphosphates are also efficient flame retardants for application in intumescent paints, coatings, polyolefin, polyurethanes, thermosets and more. These are non-halogenated flame retardants that provide efficient fire protection by generating intumescent systems, lower toxicity of fumes, reduced corrosivity of fumes thus improved preservation of structures and good compatibility with dispersion or polymer.

Phosphates are also used in a wide variety of applications in the coatings industry. Phosphate coatings are a crystalline conversion coating for steel and other metals that is formed on a ferrous metal substrate. The process of phosphate coating is employed for the purpose of pretreatment prior to coating or painting, increasing corrosion protection and improving friction properties of sliding components. In other instances, phosphate coatings are applied to threaded parts and top coated with oil to add anti-galling and rust inhibiting characteristics. The main phosphate coatings include manganese, iron and zinc. Of the numerous phosphate coatings available, manganese phosphate coatings are the hardest, while providing unbeatable corrosion and abrasion protection. In comparison to zinc phosphate coatings, manganese phosphate coatings offer continued wear protection after the breaking in of components that are subject to wearing. Uses for manganese phosphate applications include the production of bearings, bushings, fasteners and other common industrial products. Zinc phosphate coatings are mainly used for rust proofing on ferrous metals. They are applied by immersion or spraying. Zinc phosphate is a lighter alternative to manganese phosphate, while providing resistance to harsh elements that tend to wear products quickly. Iron phosphates are used as a base for further coatings or painting and are applied by immersion or by spraying.