

Uses & Applications of Phosphates in Gypsum Production

Gypsum is one of the oldest known materials and is used in a variety of applications including construction, medicine and agriculture. Small quantities of high-purity gypsum are used in confectionary, food, brewing and pharmaceutical industries. Gypsum is also used in sugar beet refining, as cat litter and as an oil absorbent.

Nowadays, gypsum used in construction is used primarily in the form of building blocks, spray-on coating, or as a main component of construction boards. Production of gypsum boards involves preparation of a calcium sulfate slurry which is fed between continuous layers of paper on a board machine. As the board moves down a conveyer line, the calcium sulfate recrystallizes or rehydrates, reverting to its original rock state. The paper becomes chemically and mechanically bonded to the core, and the board is then cut to length and conveyed through dryers to remove any free moisture.

Condensed phosphates can be used in various stages of the manufacturing process of gypsum boards and other gypsum-derived products. Phosphates like sodium tripolyphosphate (STPP), tetrasodium pyrophosphate (TSPP), sodium acid pyrophosphate (SAPP) and sodium hexametaphosphate (SHMP) act as dispersants for the calcium sulfate slurries and enhance the structural integrity of gypsum boards.

Another important parameter which significantly affects manufacturing process, future performance and integrity of the board is gypsum setting time, which needs to be carefully controlled. Polyphosphates such as sodium trimetaphosphate (STMP) are typically used to extend the setting time. At very low dosage, polyphosphates strongly retard the hydration of calcium sulfate by interactions between polyphosphate and calcium ions.