STUDIES ON PREPARATION AND PROPERTIES OF α-HEMIHYDRATED PLASTER FROM USED PLASTER MOULDS

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Two hemihrdrated forms of thermally decomposed gypsum are called as α and β hemihydrated calcium sulphate. (Commercial name - Plaster of Paris). α hemihydrate is formed by dehydration of gypsum under high steam pressure and β hemihydrate is produced under normal heating conditions . Both hemihydrates exhibit similar chemical composition but different physical characteristics. α-hemihydrated plaster shows low water demand and it makes hard and dense material when added to water, hence it is used in very special application such as, dental plaster, surgical plaster, and in case mould plaster in the ceramic industry.

The present investigation is to study the preparation of α-hemihydrated plaster from the gypsum in used plaster mould. The crushed used moulds were dehydrated to form anhydrite ($CaSO_4$) and soaked in water for 3 days, to form recrystallised mould gypsum. The recrystallized mould gypsum was dehydrated in a Autoclave under different steam pressures between 1 to 4 kg/cm^2 . The dehydrated products were investigated using x-ray Diffraction (XRD), Simultaneous Thermal Analysis (STA) and Scanning Electron Microscopy (SEM) and the results confirmed the formation of α-hemihydrate in the above process. STA is the most suitable method to distinguish α-hemihydrate from β- hemihydrate. The most suitable dehydration parameters were, 3 kg/cm^2 steam pressure for 3 hrs.

The physical properties of the product obtained showed low water demand, high surface hardness and very good mechanical strength. Most of the physical properties approached the standard requirement for commercial α-hemihydrated Plaster of Paris.

References:

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