

THE MORPHOLOGY OF CRYSTALLINE PHOSPHOGYPSUM FROM ROMANIA

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Phosphogypsum is a secondary technogenic product of the acid phosphate fertilizer industry, derived from phosphate rock during the production of phosphoric acid. Phosphate rock mainly composed of apatite, originating from Morocco, Russia, Syria, Jordan and India, is treated with concentrated sulfuric acid (96%), after fine crushing to supra colloidal size and passing into an aqueous solution of phosphoric acid. The solution is recirculated to produce gypsum, phosphoric and hydrofluoric acid.

Scanning electron microscopy was performed on samples taken from the deposits of Turnu Măgurele, Valea Călugarească, Năvodari and Bacău. The analysis resulted in the definition of four morphological types of phosphogypsum. All of the analyzed samples of the first morphological type have compositions close to stoichiometry. The gypsum crystals are prismatic to acicular, showing perfect cleavage after [001]. Individ-

ual crystals have lengths ranging from 10 to 120 μm (Fig. 1). The phosphogypsum crystals of the second morphological group are grouped in polycrystalline, weakly cohesive aggregates. A morphological feature of this type consists of the homogeneous crystal size. Crystal morphology of this group is relatively large and tends to form aggregates of accretion, with randomly oriented and interlocking crystals. The crystal size varies from 100 μm to 1 mm (Fig. 2). The third morphological group of phosphogypsum is dominated by the presence of crystalline aggregates that are similar to the "sand roses". The largest dimension of the aggregates reaches 1 mm (Fig. 3). The fourth morphological group of phosphogypsum is common at the lower levels of all stockpiles and consists of a series of crystalline, cauliflower-like aggregates. These are practically similar to those of the third group, but the crystalline forms of gypsum are difficult to distinguish (Fig. 4).

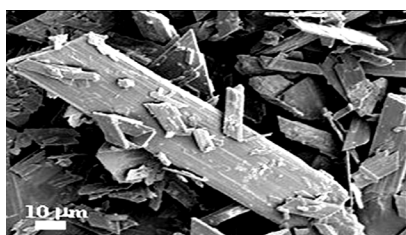


Fig. 1. Type I

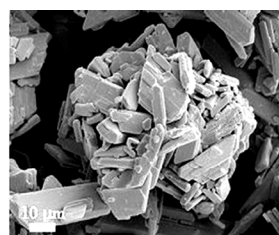


Fig. 2. Type II



Fig. 3. Type III

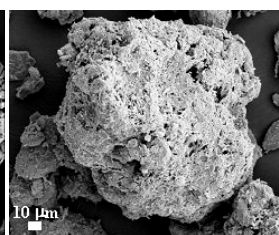


Fig. 4. Type IV