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WASTEWATER TREATMENT FROM THE GYPSUM SUSPENSION AND THE RESULTING WASTE MANAGEMENT

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Abstract

In the following work, the examination of separation of gypsum from wastewater generated during the machining of casts and the method of waste gypsum management have been presented. This waste gypsum is produced in Ortolab Poland facilities. Gypsum casts are cut and ground in water-cooled circular saws. Wastewater, with over-normative content of suspension, 10000 mg L^{-1} and sulphates, 1600 mg L^{-1} is produced in the process. The analysis of water and wastewater management in Ortolab Poland facilities led to propose the technique which included the construction of sedimentation tanks and the manner of gypsum separation by means of a flocculant. Obtained waste gypsum with water content of approximately 43% was solidified in two. In the first method the waste gypsum was solidified with process water by adding Portland cement, building plaster and activators ($MgSO_4$, NaCl, $Al_2(SO_4)_3$). In the second method the waste gypsum was filtered and dehydrated. Setting time, water/gypsum ratio and compressive strength of solidified samples have been determined for both methods. The structure of materials have been determined by SEM while the phase was analyzed using XRD method. Gypsum content in materials have been determined by TG/DTA method. The strength of the solidified gypsum mixture after dehydration is 8.5 MPa. The strength of the solidified gypsum mixture without the dehydration process has uniaxial compressive strength equal to approximately 2.8 MPa and it cannot be a substitute of building plaster. The proposed dissolution of waste gypsum solidification at the site of its formation solves the problem regarding slurry transportation. It is an energy-saving technique due to the lack of gypsum dehydration process and ecological, because it limits the quantity of sulphate ions SO_4^{-2} entered into the sewerage system.

Key words: gypsum suspension, waste gypsum management, wastewater treatment

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