

DETERMINATION OF THE OPTIMAL COMPOSITION OF THE NEW HYDRAULIC BINDER PREPARED FROM METAKAOLIN, ANHYDRITE AND LIME

Pulcová K.¹, Šídlová M.¹, Šulc R.², Formáček P.², Škvára F.¹

¹*University of Chemistry and Technology Prague, Department of Glass and Ceramics, Technická 5, 166 28, Prague 6, Czech Republic*

²*Czech Technical University in Prague, Faculty of Civil Engineering, Thákurova 7, 166 29, Prague 6, Czech Republic*

This work investigates the preparation of a new hydraulic binder on the basis of metakaolin, anhydrite and free lime, which may in the future become an alternative to Portland cement. A series of 26 mixtures with varying amounts of metakaolin (50 – 80 wt%), anhydrite (10 – 30 wt%) and lime (5 – 35 wt%) were prepared. The mixtures had the same water to binder ratio of 0.35 and contained a superplasticizer. The compressive strength of the mixtures was assessed after 7 and 28 days. Furthermore, on selected 28-day samples of hardened binders the phase composition and porosity were determined and also scanning electron microscope images were taken. Compressive strengths exceeding 60 MPa after 7 and 28 days in damp were measured for the selected optimal compositions. These results are comparable to the characteristics of Portland cement. In addition, these optimal mixtures did not display any potentially dangerous expansive behaviour. Expansion behaviour was observed only for samples with high lime content, especially in the mixture containing 35 wt% of lime. Furthermore, it was found that ettringite is the main crystalline phase in hardened binder mixtures.