LEACHABILITY OF BROWN COAL FLY ASH GEOPOLYMER

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Abstract

The used geopolymeric materials were prepared by mixing brown coal fly ash (CZ), sodium silicate solution, NaOH and water. Alkali activation of brown coal fly ash (CZ) by K silicate and KOH was very ineffective, compressive strength only 1-5 MPa.
This thesis deals with the synthesis of geopolymeric material containing heavy metals (such as Zn, Cu, Cr, Cd, Pb). In some cases were used another components such as $CaSO_4 \cdot 2H_2O$, lime-stone and ground blast granulated furnace slag

Was studied the influence of heavy metals concentration for mechanical properties and an-other part of studies was focused on leaching of heavy metals Zn, Cu, Cr, Cd, Pb, V and As from alkali activated fly ashes. The Portland cement was used as a reference material.

The leaching of each sample was performed in accordance with the EU regulation. The con-centration of heavy metals in the obtained extract was determined using atomic absorption spectros-copy. All values of geopolymer leachability were corresponding to Ist - IIIrd class of leachability (CZ and EU regulations).

Mechanical properties (compressive strength) were examined for different time periode (2- 180 days after preparation). Compressive strength measurements showed the maximum strength of almost 46 MPa after 180 days (geopolymer without heavy metals). Mixtures of alkali activated fly ash including Zn as ZnO are presented with lower strength's. However, to any shift of setting time (4 days) didn't occur when these cement pastes with Zn as ZnO were used. Consequently these cement pastes couldn't be accepted for extremely long setting time. And cement mixtures including Cu as $CuSO_4 \cdot 5H_2O$ are presented with very low compressive strength values.

Czech brown coal fly ash have higher content of As than European fly ash. Leachability of As from Czech fly ash depend on water-to-fly ash ratio; Na_2O content and on another admixtures.

Leachability of Na from geopolymer generates possibility to efflorescence. Efflorescence layer on the surface of geopolymer materials content mostly Na_2CO_3 and Na_2SO_4 hydrates, $CaCO_3$.

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