ALKALI ACTIVATION OF MSWI BOTTOM ASH: EFFECTS OF THE SIO2/NA2O RATIO

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Due to its high mineral content, the valorization of bottom ash from municipal solid waste incineration (MSWI) as potential precursor in the application of alkali activated materials is attracting attention. In literature there is a large variation on using of the activator solutions to activate MSWI bottom ash. In most studies, the bulk composition rather than reactive fraction of MSWI bottom ash is considered in the alkali activation design. However a large part of the Si present in MSWI bottom ash is in the form of non-reactive quartz. In this study, mainly slag fraction was considered, the glass, ceramic and natural stony materials were removed before MSWI bottom ash was used as precursor. An efficient activator solution was developed by considering the reactive silica content of MSWI bottom ash determined by a dissolution test. Alkali activator was made of NaOH solution with concentration varying from 4M to 8M and Na_2SiO_3 solution with moduli of 0.75 to 1.5. The effects of SiO_2/Na_2O ratio, where the oxide ratio for SiO_2 consisting of the reactive Si contributed by MSWI bottom ash slag and by the Na_2SiO_3 in the activator solution, on the compressive strength of alkali activated MSWI bottom ash were studied. XRD was used to determine the reaction products. SEM was used to observe the morphology of synthesized binder phase and EDX will be used to determine the binder chemistry.