

Recycling municipal solid waste incineration bottom ash as cement replacement in concrete

Abstract

Cement was a binder material that used in concrete industry. The cost production was very expensive due to the high global demand. Therefore, as a new alternative to replace the used of cement in concrete, which was bottom ash. The objectives of this study were to investigate properties of cement matrix of concrete containing bottom ash, and to observe the ability of bottom ash as a binder. Based on the result on XRF, Ordinary Portland Cement and bottom ash had nearly similar compounds of Calcium and Silica. Results of slump test indicate that concrete contains of 10 %- 30% bottom ash cause the true slump. Determination of the capability and strength of concrete obtained from water absorption test. Percentage of water absorbed increases with increasingly of proportion bottom ash. The strength of concrete for compression test was 27.5 MPa for 10 % of bottom ash that achieved the targeted. Higher percentage of bottom ash replacement affected matrix C-S-H (calcium silicate-hydrate) bond. Interfacial transition zone surface and scanning electron microscope observations confirm these findings. Therefore, municipal solid waste incinerator bottom ash can act partly replace cement in concrete but would not exceed 30% of usage.