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Study on Setting & Strength Characteristic of GGBS based Geopolymer Concrete by Blending of Fly Ash and Metakaoline

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Abstract : Carbon dioxide is liberated in huge amounts by the manufacturing of Portland Pozzolana Cement. Normally, conventional concrete is manufactured with Portland cement, which acts as a binder. The production of cement emits CO₂ into the atmosphere, which is a green house gas and causes the environmental pollution. Considering this as a serious environmental problem, there is a need to develop sustainable alternatives to Portland cement utilizing the industrial byproducts such as fly ash, ground granulated blast furnace slag and Metakaoline which are pozzolonic in nature. It has been established that fly ash can replace cement partially. In this context, a new material was developed known as "Geopolymer".

In this study, the various parameters on the short term engineering properties of fresh and hardened properties of Geopolymer Mortar were studied. In the present investigation, cement is replaced by geopolymer source material and water is replaced by alkaline activator consisting of Sodium Silicate and Sodium Hydroxide of molarity (12M). The ratio of sodium silicate to sodium hydroxide adopted was 2.5. The test results showed that final setting time decreases as the GGBS content in the mix increases and also increase in compressive strength. Where as in the case of metakaoline, as the content increases, there is a decrease in compressive strength and setting times of the geopolymer concrete.

Keywords: Geopolymer Mortar, Normal Consistency, Normal Consistency, Setting Times, Fly Ash, GGBS, Metakaoline.

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