

Resistance to Sulfuric Acid Attacks of Self-Consolidating Concrete: Effect Metakaolin and Various Cements Types

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Abstract : Due to their fluidity and simplicity of use, self-compacting concretes (SCCs) have undeniable advantages. In recent years, the role of metakaolin as a one of pozzolanic materials in concrete has been considered by researchers. It can modify various properties of concrete, due to high pozzolanic reactions and also makes a denser microstructure. The objective of this paper is to examine the influence of three type of Portland cement and metakaolin on fresh state, compressive strength and sulfuric acid attacks in self- consolidating concrete at early age up to 90 days of curing in lime water. Six concrete mixtures were prepared with three types of different cement as Portland cement type II, Portland Slag Cement (PSC), Pozzolanic Portland Cement (PPC) and 15% substitution of metakaolin by every cement. The results show that the metakaolin admixture increases the viscosity and the demand amount of superplasticizer. According to the compressive strength results, the highest value of compressive strength was achieved for PSC and without any metakaolin at age of 90 days. Conversely, the lowest level of compressive strength at all ages of conservation was obtained for PPC and containing 15% metakaolin. According to this study, the total substitution of PSC and PPC by Portland cement type II is beneficial to the increasing in the chemical resistance of the SCC with respect to the sulfuric acid attack. On the other hand, this increase is more noticeable by the use of 15% of metakaolin. Therefore, it can be concluded that metakaolin has a positive effect on the chemical resistance of SCC containing of Portland cement type II, PSC, and PPC.

Keywords : SCC, metakaolin, cement type, durability, compressive strength, sulfuric acid attacks

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