ABSTRACT

Concrete production has evolved from a 3-phase material (aggregates, cement and water) to a more sophisticated 5-phase material (aggregates, cement, water, admixtures and supplementary cementitious materials) that may develop different enhancements. The composition-characteristic features of cementitious systems either fresh or hardened may be altered by the addition of admixtures to modify the rate of interaction mechanisms, hydration process and or the make-up of the process of hydration. The effects of starch as a viscosity modifier on various properties of cement and concrete are not well understood. This is because the effects of starch depends its chemical structure, molecular weight and concentration and the composition of the cement. The use of starch extracted from cassava (CA) and maize (MS) as a viscosity modifier was explored in this research with a view for application to cement and concrete practice. This is because CA and MS are promising sources of concrete admixtures in Africa and South America, and can contribute to the enhanced concrete performances in these regions of the world because they are produced in abundance. Results showed that cassava and maize starch can be used as an admixture in concrete to improve rheological cohesiveness while it retards setting (initial and final) time of cement. Compressive strength of concretes with starch additions were found moderately increase more than the control concretes at the same time durability properties such as water sorptivity and oxygen permeability were enhanced. CA and MS starch were also found to reduce creep and shrinkage of concrete. The microstructural analysis showed the growth of hydration products and inform on the time during the hydration process when starch retard the hydration process and FTIR provide some clues to the cause of this delay. The conclusion from this research shows that CA and MS starch can be used as an admixture in concrete to stabilize concrete mix up to a maximum of 2% by weight of cement without the use of a superplasticizer.