

Title: Strength properties and molecular composition of epoxy-modified mortars

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Abstract: Even without hardener, epoxy resin is able to harden in the presence of hydroxyl ions produced during cement hydration process. In this study commercially available Bisphenol A-type epoxy resin without hardener was used as a polymeric admixture to prepare epoxy-modified mortars, whose properties and chemical composition were then investigated. The mortars were prepared with a mass ratio of 1:3 (cement:fine aggregate), water-to-cement ratio (W/C) of 0.48, and epoxy content of 5%, 10%, 15% and 20% of cement. The specimens were subjected to dry and wet-dry curing. Workability, setting time, compressive strength, flexural strength, and tensile splitting strength tests were conducted. A Fourier transformation infrared spectroscopy test was also administered to determine the molecular composition and structure of mortars. Results showed an inverse relationship between workability and setting time of mortars versus epoxy content. The compressive, flexural, and tensile splitting strengths of epoxy-modified mortars were noted to be the highest for mortars containing 10% epoxy in wet-dry curing. A significant improvement in strength development of mortars without hardener had been achieved through dry curing due to gradual hardening of epoxy resin with hydrated cement.