

An investigation of the effect of walnut shell as sand replacement on the performance of cement mortar subjected to elevated temperatures

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Abstract

This study examined the effect of ground shells of walnut (GW) as fine aggregate on the fresh and hardened properties of cement mortar before and after being subjected to elevated temperatures. The experimental work consists of two series with different water to cement ratio (w/c) and various percentages of GW. In each series, the ratios of GW were varied in range (0- 30% at an increment of 10%). The fresh density and slump test were used as fresh properties and the dry density with compressive strength were measured at the curing ages of 7, 14 and 28 days as hardened characteristics. Also, the dry density and compressive strength at 28 days curing age were examined after exposure to an elevated temperature of 400 °C and 600 °C for two hours. The results indicated that the all tested properties were reduced by using GW. The optimum utilized ratio of GW is 20% for the first series with w/c of 0.5 which led to producing lightweight cement mortar and is suitable for structural purposes before and after exposure to 400 °C. However, the rest of the mixtures are suitable for non-structural purposes.