

بيانات عن بحث (2) مقدم للترقية

Utilizing Local Natural Pozzolan as Partial Replacement for Cement and Sand in Cement Mortar Cubes with Silica Fume

The concrete is considered as one of the most important building materials. Ordinary Portland cement is used as binding material in concrete production. The manufacturing process of cement is accompanied with carbon dioxide emission. The use of green concrete as environmentally friendly material is very important. The local natural pozzolan (LNP) found in volcanic areas in Almadinah Almunawara in Saudi Arabia may be used as partial replacement of cement and sand to produce lightweight, environmental friendly concrete with special properties and improved mechanical properties. The main objective of this study is to investigate the effect of partial replacement of cement by weight with local natural pozzolan powder in cement mortar cubes to reduce carbon gas emissions and energy in the manufacturing process of cement. The study also includes the effect of partial substitution for sand used in cement mortars with (LNP) and with partial substitution for cement with silica fume on its mechanical properties. The use of pozzolan with special type of cement is recommended by the Saudi Building Code in case of concrete exposed to sulfate and / or chloride with severe exposure. The experimental work was carried out on 84 cement mortar cubes (50 mm in size). The specimens comprised two groups: cement replacement by weight with (LNP) powder at levels ranged from 10% to 40% and sand replacement by volume with (LNP) at levels ranged from 10% to 40% in addition to cement replacement by weight with silica fume at levels ranged from 0% to 10%. The specimens were tested at 28 and 180 days. The utilization of (LNP) and silica fume showed a marked influence on the mechanical properties of cement mortar especially in the case of sand replacement with (LNP).