

The mechanical properties of green mortar contained aluminum wastes as substitution of sand

Ayad S. Aadi ^a, Taghreed Khaleefa Mohammed Ali ^{b,†}, Rafal Ahmed Abbas Ali ^c, Mohammed Mosleh Salman ^d

Abstract

In this investigation, the natural sand replaced up to 30% by aluminum wastes (AW) to produce green cement mortar for different construction applications. The dry density and the compressive strength of all specimens at ages (7, 14, and 28) days were measured. To examine the microstructure of the specimens at 28 days, the scanning electron microscopy (SEM) was done. The compressive strength decreased sharply by incorporating AW in cement mortar and the reduction ratio ranged between 63% and 95% for mixes contained 5% and 30% of AW respectively. The decrease in dry density was less and varied between 8% and 46% for 5% and 30% of AW in mixes respectively. The AW had the effect of retarding develop the strength. The SEM images showed that there an increase in the number and size of voids and a decrease in hydration products when AW was utilized in mortar. The mortar contained up to 5% of AW can be used for structural application. The AW ratio in the range of (15–30) % can be suitable for lightweight mortar for nonstructural applications.