

Effects of used engine oil on slump, compressive strength and oxygen permeability of normal and blended cement concrete

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A B S T R A C T

Used engine oil (UEO) is recognized as a hazardous waste produced during engine servicing. Its disposal in an environmentally friendly manner is a big challenge. This paper presents the experimental results of an investigation of the effects of UEO on slump and hardened concrete properties. Three concrete groups; 100% cement (OPC) concrete, concrete with 60% OPC + 40% fly ash and concrete with 80% OPC + 20% rice husk ash were prepared. Each of the groups composed of a control mix and a mix with 0.15% dosage of UEO (this dosage was selected from previous studies). Slump measurement of fresh concrete confirmed that a small dosage of UEO reasonably improves the slump of concrete. Lignosulfonate molecule (a com-mon class of water reducing admixture) consists of aromatic rings containing one of the ionic groups viz., OH^- , COO^- , SO_3^- . The chemical composition of used engine oil showed the presence of 37% SO_3 content that may be the reason for the plasticizing effect. Used engine oil caused variation in the compressive strength in the range of $\pm 20\%$ as compared to the control mix. The compressive strength at 28, 56, and 180 days of 100% OPC concrete with UEO reduced by about 17%. In general, a small dosage of used engine oil caused a substantial reduction in coefficient of oxygen permeability and porosity of all concrete mixes, which is an indicator of enhanced long-term durability.

Keywords: Air content; Oxygen permeability Fly ash; Rice husk ash; Used engine oil