

Fresh and hardened properties of lightweight self-compacting concrete incorporating with waste plastic and Expanded Polystyrene Beads

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The aim of this study is to develop Lightweight self-compacting concrete (LWSCC) mixtures using locally sourced waste materials such as Expanded Polystyrene Beads (EPS) and Waste Plastic Fibers (WPFs) which are all available abundantly available in Republic of Iraq at little or no cost. The fresh, hardened and mechanical properties of these LWSCC were studied, followed by results analysis. Five different mixes of LWSCC were prepared in term of WPF content (0.25, 0.5, 0.75, 1.0, and 1.25 %), in addition to the control mix (R mix) and lightweight concrete (E mix) made of EPS content as a replacement of coarse aggregate. The study showed that the LWSCC produced with these waste materials were decreased the density (lightweight) of the concrete mixes as EPS tend to form more clumps, absorb water and make the mix dry. Therefore, concrete mixtures were adjusted accordingly to be able to offset the workability caused by the addition of EPS. The increase in WPF content decreased the workability due to clumping that occurred in the mixing phase. The analysis of mechanical properties of the LWSCFRC specimens revealed that there was not much improvement. While LWSCC with 100% of EPS replacement as coarse aggregates and 1.25% WPFs provides the best flexural toughness performance.