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Effect of mixing ingredient on compressive strength of oil palm shell lightweight aggregate concrete containing palm oil fuel ash

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Abstract

The increasingly generated oil palm shell (OPS) and palm oil fuel ash (POFA) which is a by-product of Malaysian palm oil mills annually, has lead towards the effort of integrating palm oil fuel ash as mineral admixture in lightweight aggregate concrete which produced using 100% oil palm shell as lightweight aggregate. This paper addresses the compressive strength of this oil palm shell lightweight aggregate concrete upon usage of different ash replacement level, water cement ratio, superplasticiser, sand and cement content. At the early state of investigation, cubes of (100x100x100mm) containing various replacement level of ash were produced and tested for it compressive strength. Then, the 20% replacement levels of POFA which give the highest compressive strength value were used for further experimental work. Experimental work to investigate the effect of water content, percentage of superplasticiser, sand content and amount of cement used were conducted using two types of mixes. Plain oil palm shell lightweight aggregate concrete (0% POFA) as reference specimen, and oil palm shell lightweight aggregate containing 20% palm oil fuel ash (20% POFA) were prepared in form of cubes. All the specimens were subjected to water curing until the testing date. The compressive strength test was conducted following the procedures in BSEN 12390 – 3 at 28 days. Integration of 20% POFA in oil palm shell lightweight aggregate concrete leads to production of a greener lightweight aggregate concrete product with optimum strength. Inclusion too much of water should be avoided as it diminishes the concrete compressive strength. Only right formulation of palm oil fuel ash, water, superplasticizer, sand and cement content would be able to produce oil palm shell lightweight aggregate concrete containing palm oil fuel ash exhibiting optimum strength.

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