Development and Properties of Foamed Synthetic Lightweight Aggregates

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ABSTRACT

The purpose of this study is to create and evaluate various foamed synthetic lightweight aggregates (FSLA) with a reduced density for the possible use as coarse aggregate replacement within concrete. The synthetic aggregates were foamed utilizing extrusion processes with both chemical and physical foaming agents. The formulations incorporated high carbon fly ash with several different polymer matrix materials. Following the production of the synthetic coarse aggregates, concrete samples were produced using the FSLA as coarse aggregate. The unit weight and compressive strength of these concretes were compared to concrete made with normal weight crushed stone as the coarse aggregate.

The results of the study showed that creating FSLA was most successful utilizing physical foaming agents with the twin-screw extrusion process. When incorporated within concrete the samples produced a data population yielding about 20% - 25% lower density and a more ductile failure then those produced with crushed stone. However, this was accompanied with a 65% - 75% reduction in compressive strength.

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