



A review of the mechanical properties and durability of concrete containing recycled seashells as a partial cement replacement

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Received: 19 November 2022 / Accepted: 27 August 2023

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Abstract

The concrete industry consumes a significant number of natural resources and emits hazardous gases into the atmosphere, such as carbon dioxide for cement production, which influences global warming and climate change. Therefore, many attempts have been made to develop green and eco-friendly concrete from various waste materials. Seashells are one of these waste products that accumulate on beaches and landfills, which causes environmental problems. This review assesses the usage of multiple types of seashell waste materials in concrete as a partial cement replacement. The performance of seashell powder in concrete was also evaluated in terms of fresh concrete properties, mechanical properties, durability, and other factors. According to this study, using seashells as a cement replacement improves concrete setting time, diminishes workability, and increases density due to curing age. The mechanical properties of concrete, such as compressive strength and modulus of elasticity, generally decrease as the shell content increases. However, adding admixtures and applying chemical treatment can improve concrete's mechanical properties and durability. Nevertheless, adding up to 25% of cockle shells in concrete can reduce water permeability. Thus, it is demonstrated that using seashells in concrete as a cement replacement might have the potential to produce sustainable green building materials.

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