

The present state of the use of eggshell powder in concrete: A review

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ABSTRACT

Eggshell (ES) is a bio-waste material obtained from bakers and fast-food restaurants. This waste material is generally disposed of in landfills, causing health hazards and polluting the environment. Eggshell powder (ESP) has high amounts of calcium and can be combined with pozzolanic materials, such as fly ash, which have low calcium content. This paper presents the results of the latest studies on the utilization of ESP as a filler, cement and fine aggregate. The chemical composition, physical properties and fresh and hardened properties of ESP concrete at different proportions are also presented. Results indicate the potential of using ESP with other pozzolanic materials to improve concrete properties and reduce cement production, thereby minimizing environmental pollution. The compressive, flexural and tensile strengths have also been improved with the use of some materials with ESP as cement replacement. However, some studies reported a reduction when cement is replaced with high percentages of ESP, particularly those larger than 10%. Furthermore, the modulus of elasticity decreases with high levels of replacement. The specific gravity of ESP was found to be lower than that of cement. The durability and water absorption of concrete were reduced with the addition of ESP.

KEYWORDS

Eggshell powder; Bio-waste; Environmental pollution; Cement; Pozzolanic materials

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