



Green and Sustainable Concrete – The Potential Utilization of Rice Husk Ash and Egg Shells

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Received 05 September 2018; Accepted 15 December 2018

Abstract

Concrete which is widely used material in the construction industry, has a carbon footprint. Approximately 10% of global Carbon Dioxide (CO₂) gas is emitted during the production of cement which is vital ingredient of concrete. The increase in production of cement affects global warming and climate change. Therefore, many attempts have been made to develop green and sustainable concrete by utilizing different waste materials. With the utilization of waste materials as cement replacement, the CO₂ gas emissions can be reduced as well as resolve the environmental issues that the inhabitants face during the disposal of such waste materials. This paper reviews the potential and innovative utilization of Rice Husk Ash (RHA) and Eggshells as partial cement replacement to develop green concrete. RHA which is rich in silica and eggshells contain identical amount of calcium oxide as cement, when finely grinded and used together as partial cement replacement, can trigger a pozzolanic reaction, in which silica reacts with calcium oxide resulting in the formation of calcium silicates which are responsible for achieving higher strengths.

Keywords: Sustainable Concrete; Solid Waste Management (SWM); Hazardous Wastes; Supplementary Cementitious Materials (SCMs); Pozzolanic Activity.

1. Introduction

Concrete is the single most widely used building material in the world and is continuously being used to construct various infrastructures. Its ability to resist freezing, chemical resistance, workability, durability and flexibility [1] are what makes concrete so demanding. Concrete has been utilized in countless architectural eyesores. But despite having many advantages, concrete's environmental credentials have come under scrutiny, due to it being unsustainable.

Concrete is made up of four main ingredients, cement, fine aggregates (sand), coarse aggregates and water. Out of which, cement is the most vital ingredient of concrete which acts as a binder and glues all other ingredients. With the growing demand of concrete in construction of infrastructures across the world, the production of cement has also increased. The cement industry has been reported to contribute approximately 8% to 10% of anthropogenic global

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 <http://dx.doi.org/10.28991/cej-2019-03091226>

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