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(57) Abstract :
Abstract Title: Process of Manufacturing F-slag Sand with the Combined Use of Fly Ash and Ground Granulated Blast Furnace Slag The present invention discloses a novel method and process of producing artificial sand with the combined use of fly ash (FA) and ground granulated blast furnace slag (GGBS), as binder or precursor materials. This innovation focuses on manufacturing fine aggregates, a newer geo-material, within particle sizes ranging from 4.75 mm to 0.075 mm, which is equivalent to the gradation of natural river sand. The method leverages on geo-polymerization technique, wherein the binder materials are activated with alkaline solutions such as sodium hydroxide and sodium silicate which promotes the binding and bonding of binder particles, and use of pelletizer to convert bonded individual particles into artificial sand. The artificial sand, named F-Slag sand, is manufactured by blending FA and GGBS in proportions of 90:10, 80:20, 70:30, 60:40, and 50:50. This approach relies on the custom designed disc pelletizer, which converts moistened precursor particles into artificial sand in the envisioned size range by rotating the drum at 5-20 rpm for 5-20 minutes. To ensure the particles agglomeration which ultimately forming sand particles of desired size range and optimal hardening and stability, the alkaline activator solution to binder solids ratio is maintained at 0.06-0.12, NaOH molarity is varied at 4-14 M, and ambient curing for 28 days. The amalgamation of FA and GGBS circumvents the need for elevated curing for artificial sand, this is also novelty of the invention. This innovative approach not only provides an efficient solution for manufacturing artificial sand but also promotes the utilization of industrial by-products, contributing to environmental sustainability.
Figure 1

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