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Reuse of iron ore mineral wastes in civil engineering constructions: A case study

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Abstract

To make mining activities more eco-friendly, it is important to conduct mining operations in a manner that is more environmentally friendly, economically feasible and socially acceptable. The volume of solid waste generated, including tailings from mineral processing activities, is one of the main pollution concerns in the mining industry. In the tiny state of Goa (India), it is becoming increasingly difficult to find space for dumping these huge volumes. And therefore ways of utilizing mine waste need to be found. This paper examines the suitability of these wastes for use in construction. Studies by others were reviewed where it was found that these wastes contain acid producing mineral phases and high concentrations of heavy metals. The presence of such concentrations can jeopardize the environment, if management of these wastes is not addressed with due consideration and care. Particle size classification on these wastes suggests that mine wastes contain coarse-grained rock, sand, silt and clays. A number of tests were

then conducted on the aggregate part of mine wastes and the physico-mechanical properties were obtained. According to the results obtained the mean values of uniaxial compressive strength (UCS) of concrete cubes after 28 days of curing was found to be of the order of 21.93 and 19.91 MPa with mine aggregate and granite aggregate, respectively. Through toxicity leaching procedure tests the study also confirmed that the hydraulic binder arrests metal mobility from these wastes. This paper does not discuss the economic aspects as that was beyond the scope of the research. However, to some extent socio-economic perspective of mine waste utilization has been presented and discussed.



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Keywords

Mine aggregate; Granite aggregate; Compressive strength; Construction

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