

Utilization of Sludge in the Manufacturing of Fired Clay Bricks

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Abstract : The extensive amount of sludge generated throughout the world, as a part of water treatment works, have caused various social and economic issues, such as a demand on landfill spaces, increase in environmental pollution and raising the waste management cost. With growing social awareness about toxic incinerator emissions and the increasing concern over the disposal of sludge on the agricultural land, the recovery of sewage sludge as a building and construction raw material can be considered as an innovative approach to tackle the sludge disposal problem. The proposed work aims at studying the recycling ability of the sludge, generated from the water treatment process, by incorporating it into the fired clay brick units. The work involves initial study of the geotechnical characteristics of the brick-clay and the sludge. Chemical compatibility of both the materials will be analyzed by X-ray fluorescence technique. The variation in the strength aspects with varying proportions of sludge i.e. 10%, 20%, 30% and 40% in the sludge-clay mix will also be determined by the proctor density test. Based on the optimum moisture content, the sludge-clay bricks will be manufactured in a brick manufacturing plant and the modified brick units will be tested to determine the variation in compressive strength, bulk density, firing shrinkage, shrinkage loss and initial water absorption rate with respect to the conventional clay bricks. The results will be compared with the specifications given in Indian Standards to arrive at the potential use of the new bricks. The durability aspect will be studied by conducting the leachate analysis test using atomic adsorption spectrometry. The lightweight characteristics of the sludge modified bricks will be ascertained with the scanning electron microscope technique which will be indicative of the variation in pore structure with the increase in sludge content within the bricks. The work will determine the suitable proportion of the sludge - clay mix in the brick which can then be effectively implemented. The feasibility aspect of the work will be determined for commercial production of the units. The work involves providing a strategy for conversion of waste to resource. Moreover, it provides an alternative solution to the problem of growing scarcity of brick-clay for the manufacturing of fired clay bricks.

Keywords : eco-bricks, green construction material, sludge amended bricks, sludge disposal, waste management

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