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Valorization of paper mill solid wastes: Partial replacement of cement by application of lime sludge and boiler ash synthesized nanosilica in concrete

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Millions of tons of solid waste are generated by the paper industries all over the world. For the reduction of solid waste threat to the environment, its application as raw material in other industries could be the suitable option. In this study, lime sludge was used with boiler ash synthesized nanosilica in cement concrete. Boiler ash was used for nanosilica synthesis, due to the presence of silica precursor in boiler ash. Sol-Gel method was used to prepare the nanosilica with methanol as solvent. Highest amount of silica obtained with 1:27 precursor:methanol ratio and 9 days of ageing time. Lime sludge from recovery section of paper mill and boiler ash synthesized nanosilica is used in concrete to partially replace cement. The cement was replaced by lime sludge in the range of 10%, 20%, 25%, 30%, 35% and 40% by weight. These blends of concrete were also prepared with 2% and 4% by weight nanosilica application with lime sludge. Produced concrete mixtures were tested for compressive strength and compared with conventional concrete. Compressive strength were evaluated with 7, 28, 90 days of curing. As a result, the compressive strength of concrete with only lime sludge increased up to 20% with addition of lime sludge, after that compressive strength of concrete decreased with further addition of lime sludge. Concrete blends with addition of 2% nanosilica along with lime sludge achieved the increasing compressive strength till 25% replacement of cement and concrete blends with 4% of nanosilica application further get increment in limit for 30% of cement replacement. This study helps in developing the sustainable utilization of lime sludge and boiler ash in the construction activities.

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Impact of waste disposal and treatment plant in the urban settings: A descriptive study from Kerala

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The objective of the study is to understand and compare the physical health status of the people living in the immediate vicinity and far vicinity village from the waste treatment plant. India is a developing nation as well as shown an increased waste generation pattern largely due to rapid population growth, the size of their urban populations and the adoption of high-consumption lifestyles. The waste management becomes an issue in Kerala due to its improper handling and disposal methods. Vilappilsala is a village 14 km away from the Thiruvananthapuram city and chosen for setting the waste treatment plant for the treatment of the solid waste generated in the urban community in the city. When the plant started functioning, it became threat to the life of local community due to the improper waste handling practices. The pollutants were extended through air, water, soil and the emergence of insects also increased the incidence of diseases. The local community has a significant impact on their health. A descriptive research design followed in the study and purposive sampling method were used for data collection. The data was collected by administrating the self-structured questionnaires among the test and control population. The study finding shows that there is a remarkable difference in the health status of the people (particularly in general health, respiratory health) living in the immediate vicinity and far vicinity village from the waste treatment plant in Vilappilsala. The study also reveals that there is a great discrepancy in skin problems between the two populations.

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