

Brief write-up on S&T (Mines) completed projects

Project Title: Estimation of Morphodynamicity and its Remedial Action Using Red-Mud Based Concrete at Coastal Zone of Eastern Odisha (S-27).

File no : Met 4-14/8/2017- Metal –IV

Objective :

Utilization of stabilized red mud / geopolymer blocks for application in controlling sea bed erosion.

The process includes three major aspects

- (a) Laboratory scale product optimization (fine tuning etc) for production of stabilized red mud and geopolymer blocks
- (b) Study of physical and chemical properties of prepared blocks
- (c) Identifying the coastal area in Kendraparha area in Odisha coastline for field trial

Background :

India being a peninsula has a coastline of 7516.6 Km which is undergoing constant erosion. In phase-1 of the above project it was proposed to develop some materials for controlling sea bed erosion. At present tetrapods made of concrete are used as wave-dissipating blocks in costal areas.

In this regard, an initiative was made to replace these concrete blocks with blocks made of industrial waste with the overall objective of waste utilization. Aluminium industry is generating a large amount of waste namely red mud which can be utilized for preparing fired stabilized red mud and geopolymer concrete blocks for controlling sea bed erosion. These blocks exhibit good strength and can substitute conventional rocks and cement concrete blocks thus saving natural resources and utilizing waste generated from aluminium industry which is presently lying unused in red mud ponds.

Outcome :

- The pahse-1 studies led to the successful development of red mud based stabilized fired red mud bricks prepared using 70 % red mud, 25 % high silica plastic clay and 5 % Talc exhibit good compressive strength (25-28 N/mm²), moderate water absorption (18-19 %), almost nil efflorescence & almost negligible leachability of caustic soda in sea water.
- The geopolymer concrete blocks prepared by IIT, Bhubaneswar, Odisha also show a good compressive strength above 40 N / mm² and it utilizes around 35 % of red mud and 65 % fly ash along with sand & caustic soda/sodium silicate.
- The cost of Blocks/metre length 3 rows is Rs. 2,150/m for stabilized hard blocks and Rs. 2,325/m for geopolymer concrete blocks + cost of transportation.
- The costal site proposed suggested by Orissa state pollution control board and Chilka development authority in the area of duhadia river muhana close to the

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Puri beach which enters the bay of Bengal is presently not approachable by road. Thereby it will pose the problem of transporting the blocks to the beach location.

- The Centre has approached the Odisha state pollution control board and District authorities to suggest further sites facing the problem of erosion so that the second phase of the project i.e field trials with blocks and use of simulation software for modelling can be carried out.
- From the above studies it is concluded that the blocks are much more cheaper as compared to cement concrete blocks and moreover it would lead to utilization of industrial waste.