Study on Red Mud and Natural Fiber: A Brief Survey

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***Abstract*: Rapid industrialization and faster growth rate are the requirements for leading a competent life but a holistically approach with environmental/weather consideration are essential for sustainable development. Iindustries are partially fulfilling their tasks since many factors are not overcome by them successfully and one of that is safe disposal of waste like red mud generating at the end. Red mud is a waste product from the industry of Alumina and it creates a lot of dangerous to the ecology, if it is left disposed without necessary precautions, hence safe disposal practices and reuse of the product are one of the most solutions. Disposal method entails a huge land area and enormous mass of earth material for construction of embankment. Many countries are disposing red mud waste directly into the sea due to shortage of land area and absence of earth material. Many researches are still being carried out on the counteraction of red mud in various ways. This report is one of the parts of using the red mud in a very good and economic manner. In this paper the red mud is used as an alternative construction material in the concrete. This gives a cost effective neutralization method as well as abundant material which can easily used in construction.**

***Keywords*: Red Mud, Concrete, Industries, Environment Alumina**

INTRODUCTION

Concrete structures are used for construction area, concrete made structures such as roadways, bridges, tunnels and many other constructions are used for developments, trains run on rails supported on concrete sleepers and for airway we need concrete runways for landing and taking off, we store water behind massive concrete dams, water tank for drinking and growing crops and is distributed by systems of concrete conduits, canal, pipe and waterway.

In industrial production of aluminum from bauxite ore there are two main steps are involved. In the 1st step alumina is obtained by Bayer's process and 2nd step involves electrolysis of alumina in Hell-Harold cell to yield aluminum metals. Red Mud is the major industrial waste produced out of Bayer's process.

Coconut fiber is a natural fiber; coconut fiber is extracted from the outer shell of a coconut. Its scientific name and the plant family of the coconut fibber is "Coco's Nucifera" and "Arecaceae (Palm)" respectively, while it is commonly referred to as "Coir".

Figure- Red Mud & Coconut fiber

LITERATURE SURVEY

Many efforts are being made globally to find suitable uses for red mud and natural fiber so that the alumina industry may end up with no residue at all. Some literatures are -

Rathod et al. (2012) find the effect of red mud on the properties of hardened concrete of grade M30. Portland cement was replaced with red mud by wt of cement and its compressive strength & splitting tensile strength evaluated.

Ribeiro et al. (2012) reported that the high alkalinity of red mud, which was initially a factor of environmental concerned, had proved to be the main advantage of using red mud as a rebar corrosion inhibitor in reinforced concrete without affecting its passivity.

Savant and Kumthekar (2013) studied the effect of replacement of cement by red mud on design mix concrete of grade M50. The water-cement ratio 0.36 kept constant for different percentage of replacement of cement by neutralized red mud.

Ramakrishna et al (2002) compared the experimental and theoretical investigations on the compressive strength and elastic modulus of coir and sisal fiber reinforced concretes for various volume fractions. It was observed that both the experimental and analytical values of elastic modulus had shown 15% discrepancy, which can be regarded as comparatively small.

Robert S. P. Coutts (2005) reviewed critically the Australian research into natural fiber cement composites. It was mentioned that over the last three decades considerable research has been committed to finding an alternative fiber to replace asbestos and glass fibers.

Sundararajan (2005) on the durability of natural fibers like coconut fiber and the effect of corroded fibers on the strength of mortar. Coir fibers were found to retain higher percentages of their initial strength than all other fibers after the specified exposure in the various mediums.

MATERIALS AND PROPERTIES

Red mud and its properties- Red Mud is a solid waste product of the industries, the principal industrial means of refining bauxite in order to supply alumina as raw material for the electrolysis of aluminum by the various process. Several years ago, a few investigators abroad showed interest in the relation between grain size and flocculation settling, as well as in the geotechnical analysis of red mud. Domestic research focused largely on flocculation settling and ways of disposal according to grain shape. The tests on basic properties of red mud with the definition of the size dimension given our rheological constitutive relations.

Coconut fiber and its properties- Coconut fibers obtained from coconut husk, belonging to the family of palm fibers, are natural waste products obtained in the processing of coconut oil, and are available in large quantities in the tropical regions of the world, most especially in Asia, Africa and America. Coconut fiber has been used to enhance concrete and mortar, and has proven to improve the toughness of the concrete and mortar (Gram, 1983, and Ramakrishna, et al., 2005). However, the problem of long-term durability has not yet been solved. It has also been noticed that the degree of enhancement of concrete by coconut fibers (Natural Fiber) depended on the type of coconut species and the sub-region that the coconut plant was cultivated.

CONCLUSION

1. The toxicity of red mud is the main cause for which it cannot be used. The toxicity is due to the high alkaline in nature so in this research the red mud is neutralized by microbes so that it can be used in construction material as well as lessen the environmental effect and cost for storage of red mud.
2. There is a potential to use in huge quantities as a fill and embankment material, but very little efforts have been made to neutralize and characterize neutralized red mud as a geotechnical engineering material, particularly the Indian red mud.
3. The natural fiber is give high strength in the concrete.

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