



Study of Effect of Red Mud on the Properties of Concrete

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Abstract— In India and worldwide, variety of waste is generated in different forms, shape and texture. These industrial wastes mostly possess threat to the environment and the society living nearby. Various researches have been done on this waste material to either degrade or to utilize it in some or the other way. One such hazardous waste generated by industry is Red mud. It is the residual waste generated by Bayer's Process of aluminum extraction. Red mud is the most hazardous waste than the other waste mainly due to its high fineness and Ph. Steps have been taken to utilize this waste as partial replacement of cement in concrete without compromising the strength and economy. For this mortar cubes were casted using cement with varying percentage of red mud with the addition of lime and the same procedure followed for silica to find the optimum red mud replacement with addition of either lime or silica. After this test result showed that 10% red mud replacement with 20% silica to the weight of red mud can be added effectively in concrete without compromising the strength and also decreasing the cost of cement in concrete by 6.43% thereby achieving economy. This paper also speaks about the future possibilities of using red mud as a partial replacement in concrete for work such as buildings, pavements, dams, etc after few more test is conducted and various other parameters found on this optimized concrete.

Keywords— Cement mortars, concrete, lime, silica fume, compressive strength, tensile strength.

I. INTRODUCTION

Today, the utilization of cement in India and around the world is so much that it is on the verge of extinction and also creating numerous environmental problems after its use. Simultaneously there is an increase in generation of industrial waste such as fly ash, red mud, rice husk ash, etc in developing and developed countries. There is a great problem around the world regarding the decomposition of waste as it neither is non-decomposable nor can be utilized for the benefit of human life to its fullest. Only possible way to dispose is to dump on barren lands or to use in construction industry. Hence various researches have been done and are going on to make it utilized in construction industry.



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One such industrial waste is Red Mud. It is generated in aluminum production by the Bayer's Process and is considered Hazardous due to its high Ph of 12.5. It is generated of the order of 142 million tons per year in the world. There is a need to utilize this waste. In this work attempt has been made to use red mud as a partial substitute of cement to its full extent by adding admixtures such as lime and silica. Since huge quantities of concrete are used in construction such as pavement in today's context, it has been tried to utilize this waste in the construction industry with optimum lime or silica use in it without compromising the strength.

II. PROPERTIES OF RED MUD

A. Physical properties of red mud

- Fineness-in between 10-30 m²/g, Red mud is very fined grained material.
- It's Ph -10.5 to 12.5.
- Specific gravity of red mud 2.51

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