MUD Concrete

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Abstract

This report present the results from study of the possibilities of using red mud, a waste product derived from the production of bauxite with a versatile mineralogical composition, known as red mud. Currently red mud is produced almost at equal mass ratio to metallurgical alumina and is disposed into landfills, leading to important environmental issues. It comprises of oxides, titanium, aluminum and silica along with some minor constituents. Presence of alumina and iron oxide in red mud compensates the deficiency of the same components in limestone which is the primary raw material for cement production. Based on economic as well as environmental related issues, enormous efforts has been directed worldwide towards management issues i.e. of utilization, storage and disposal. By talking cementations behavior of red mud into account, an experiment was carried out to replace the cement by red mud in concrete and also know its effects on the strength and other properties of the concrete.

Keyword- *Compression test, red mud.*

I. INTRODUCTION

Concrete is the primary construction material used around the world and most widely used in all typed of civil engineering works and it is a man made product, essentially consisting of cement, aggregates, water and admixtures. Concrete in spite of being the most popular and most economical construction material has major shortcoming in term of embedded energy and is also one of the major causes of greenhouse gases. However, the production of cement leads to the dissipation of significant amount of carbon dioxide, and greenhouse gas emission. To reduce the emission of co2 consuming the production of cement, we must reduce the usage of cement. Therefore, there is a need to look for alternate types of materials. In this project loss and production cement can be overcome by the increased use of red mud in different percentages with hydrated lime.

Concrete is a composite material composit of gravels or crushed stones (coarse aggregate), sand (fine aggregate) and hydrated cement. It has been in used for over a century in all construction works. A variety of new materials in the field of concrete technology have been developed during the pass with the ongoing demand of construction industries to meet the functional, strength, economical and durability requirement

II. RED MUD

Red mud; a solid waste generated from the aluminum plants all over the world. In western countries, about 35 million tons of red mud is produced early in addition to iron, the other dominant particles include silica , and bleached aluminum, and titanium oxide. The search for an economically and an economically viable alternative has led to the study of rub mud for various applications in construction industry . it is estimated that annually 70 million tons of red mud is produce all over the world. As a solid waste , red mud is usually disposed in mud lakes in the forum of slurry or stalked in pounds as dry mud near alumina plants or directly discharge through a pipeline into a nearby sea. Over the years extensive work has been done by researchers worldwide to develop various economic ways for utilization of red mud .

III. HISTORY OF RED MUD

Byers process for alumina production uses caustic and bauxite as the raw material for alumina production and generates red mud which partially doesn't have wide industrial application and is generally dumped as a non value by product in the backyard of alumina refinery called red mud yard. Over the years the red mud produced were lying in the yard not without any usage. but a breakthrough was made when MALCO discovered the red mud could be tried as an alternative for the Low Grade Bauxite (LGB) which the cement industries used for its cement production

IV. FLY ASH

Fly ash is a fine powder produced as a product from industrial plants using pulverized coal or lignite as fuel it is the most widely used pozzolana, siliceous in

nature in a finely divided they are spherical shaped balls finer than cement partials .

A. *Sources of fly ash*

Fly ash is a fine glass like powder recovered from the gases of coal fired electricity production inexpensive replacement of Portland cement improves strength segregation and case of pumping concrete.

V. OBJECTIVE OF THE STUDY

The objective of this process is to use red mud and fly ash as a replacement of cement in building construction in order to reduce the cost of construction.

The purpose of carrying out this development program is to reduce the release of co2 gas and other harmful gases during the production of cement and construction of building . with the use of mud in concrete we can also reduce the amount of heat generated and the amount of electricity during the production of cement

The main aim of the project is to decrease the construction cost of the building for the development of rural areas

VI. MATERIALS USED

A. *Cement*:

Ordinary Portland cement of 53 grade confirming to IS 10262-2009 was used as it is readily available in the local market with the specific gravity 3.5

B. *Red mud*:

The red mud used was brought from the nearby nursery. The red mud is obtained from manufacturing of alumina from bauxite ore by bayers process.

C. *Fly ash*:

Fly ash is a fine glass like powder recovered from the gases of coal fired electricity production inexpensive replacement of cement improves strength, segregation and case of pumping the concrete.

D. *Coarse Aggregate*:

The coarse aggregate used in this investigation is 20mm down size locally available cursed stone obtained from quarries. Specifications are as per IS:10262-2009.

E. *Fine Aggregate*:

The locally available sand was used as fine aggregate is the present investigation. The sand was free from clay matter, salt and organic impurities. Sand was tested for various properties like specific gravity, bulk density etc, and in accordance with IS10262-2009 specifications.

VII. USES OF RED MUD

A. *Benefits to environment:*

Replacement 25% of cement all over the world by industrial waste will reduce carbon dioxide emissions by 320 million tones. Replacing industrial waste in concrete will reduce scarcity of place for dumping and also contamination of ground water during monsoon.

B. *Minimizing Greenhouse Gas Effect:*

The challenge for the civil engineering service will be the sustainable development in construction field and the concept for sustainable development includes the usage of ecofriendly high performance materials and produced at economic cost with the least possible environmental impact. By considering this sustainable improvement, the industrial waste can be used to replace the large quantity of cement in the concrete manufacturing

C. *Saving in the Energy Requirement in the Production of Ordinary Portland Cement:*

The production of one ton of Portland cement requires 1.62-1.9 tons of raw materials. These materials are primarily of good quality clay and limestone. A proper usage of industrial waste such as red mud and fly ash would conserve the resource exploitation and saves natural resources. It would also save the energy consumption and provide strength to the concrete structure.

D. *Economical Benefits:*

Cement production consumes large quantities of energy. Replacement of cement can give considerable energy savings. These waste does not need an additional energy input before use. It is clear that the energy savings for cement replacement by such admixture in concrete will be in proportion to cement used

VIII. MIX PROPORTIONS

The percentage replacement of mud in place of cement is given below

S. No	Percentage Replacement {Mud: fly ash: cement}
1.	60:40:0
2.	70:30:0
3.	60:40:10
4.	45:40:15

Table 1: Percentage Replacement

IX. TEST METHODS

A. *Workability*

The workability of M15 concrete with various proportions of mud and fly ash was estimated in terms of slump test

B. *Slump Test*

The slump test was conducted as per IS 1199-1999. The slump test is method used to determine the consistency of concrete. The consistency, stiffness, indicates how much water has been used in the mix. The stiffness of the concrete mix should be matched to the requirements for the finished products.

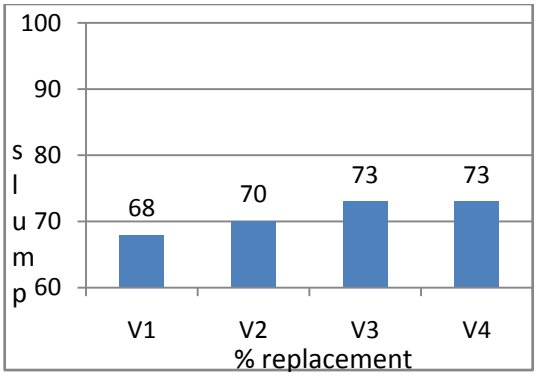

Chart 1: Slump Cone Test

V1= Red mud (60%): fly ash (40%): cement (0)

V2= Red mud (70%): fly ash (30%): cement (0)

V3= Red mud (60%): fly ash (30%): cement (10%)

V4= Red mud (45%): fly ash (40%): cement (15%)

C. *Compressive test:*

The compressive test was conducted as per IS-516-1979. The results of compression strength test conducted on different grades of concrete are tabulated below

Table 2: Compression Strength

SAMPLES	7 DAYS STRENGTH	28 DAYS STRENGTH
Variation 1	2.1	3.5
Variation2	2.8	4.0
Variation 3	6.3	9.0
Variation 4	9.5	14

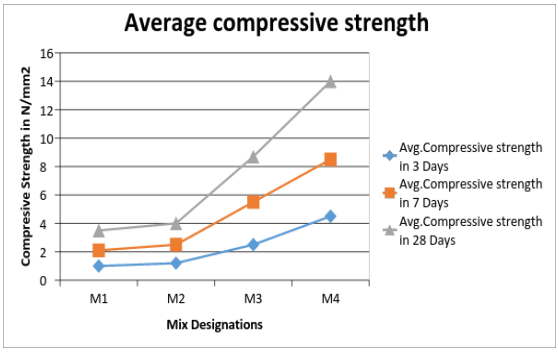

Chart 2: Average Compression Test

X. CONCLUSION

From the above discussion we can come to the conclusion that red mud for being replaced with cement can be used in concrete for the development of rural areas and proves to the economical. On the basis of the literature survey , it is evident that red mud serves as a good binder material and has proved to be a good cementatious material. Red mud reduces the capillary coarse of concrete thus for the purpose of economical construction red mud has proved to be effective in all aspects. Red mud does not impart much compressive strength when compared to fly ash but it has been observed that flexural strength and resistance to permeability increases in red mud cement concrete . Although using red mud is less feasible than using fly ash but it is a necessary to use or recycle red mud as it has many harmful environmental effects.

XI. SCOPE FOR FURTHER STUDIES

As replacing cement with red mud yields the satisfactory results for mechanical properties of concrete o it can be used in different proportions and can be used for mass concreting . literatures reveal that along with red mud 10% gypsum is added than there would be much more increase in strength . this project can continue for further researches because as per our project red mud is used for rural development where there is less load on the members, so research can be done whether the red mud is suitable for load bearing members or not. Red mud can be used along with other admixtures like fly ash , glass , fiber , micro silica etc . in concrete technology and the results obtained on the test performed on mechanical purpose can be tested.

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