

STUDY ON STRENGTH PARAMETERS OF CONCRETE USING RED MUD AS A PARTIAL REPLACEMENT OF BINDER CONTENT WITH AND WITHOUT HYDRATED LIME

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Abstract:- The examination was directed to study about the properties of cement by utilizing red mud as substitution of bond in cement. The Bayer Process for the generation of alumina from Bauxite metal is described by low vitality effectiveness and it results in the creation of huge measures of residue like, high alkalinity bauxite deposits known as red mud. Presently red mud is created nearly at equivalent mass proportion to metallurgical alumina and is arranged into fixed or unlocked counterfeit impoundments (landfills), prompting significant natural issues.

It involves oxides of iron, titanium, aluminum and silica alongside some other minor constituents. presence of Alumina and Iron oxide in red mud repays the inadequacy of similar parts in limestone which is the essential crude material for concrete generation. Presence of soda in the red mud which when utilized in clinker creation kills the sulfur content in the pet coke that is utilized for consuming clinker enrooted bond generation and adds to the concrete's setting attributes. In view of financial aspects just as ecological related issues, gigantic endeavors have been coordinated worldwide towards red mud the executives issues for example of use, stockpiling and transfer. Various roads of red mud usage are pretty much known however none of them have so far demonstrated to be monetarily reasonable or economically possible.

Tests have been led under research facility condition to survey the quality attributes of the aluminum red mud. The undertaking work centers around the appropriateness of red mud acquired for development. Seven test gatherings were established with the substitution rates 0%, 10%, 20%, 30%, 40%, half, 60% of red mud and 5% of hydrated lime with bond in every arrangement in M40 evaluation concrete. To accomplish Pozzolanic property of red mud, hydrated lime was included.

Keywords: *Cement mortars, Red mud, hydrated lime, monotonic load and Deflection.*

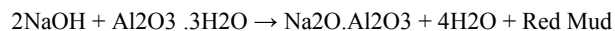
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I INTRODUCTION

Bayer's procedure for Alumina creation utilizes Caustic and Bauxite as the primary crude material for Alumina creation and creates Red mud which essentially doesn't have wide modern application and is by and large dumped as a non esteem by item in the patios of an Alumina Refinery called as Red Mud yard. Throughout the years the red mud delivered were lying in the yard not with no utilization. Colossal space of about 3.0 sections of land required per annum to store the Red Mud and dykes. Yet, an achievement was made when MALCO found that red mud could be attempted as an option for the Low Grade Bauxite (LGB) which the bond enterprises utilized for its concrete creation. A thought struck as why not attempt Red Mud in bond enterprises rather than Bauxite as the organization of

both are practically comparative. It's very conceivable as the bond ventures.

Red mud is the mechanical waste created during the generation of alumina. As per the evaluation of crude material bauxite and the creation procedure of alumina, red mud can be isolated into Bayer red mud and Sintering red mud Based on present innovations, there is 0.8~ 1.76 t red muds produced by each 1t alumina delivered. It is accounted for that, there are as much as 3 million tons of red mud delivered by China's biggest three alumina generation bases. The fundamental response that happens in the Bayer procedure can be schematized as pursues:



Objectives of the study

The specific objectives of the present investigation are listed below.

1. Red mud is one of the new waste materials that are rising in the solid business.
2. The principle point of this work is use of Red mud as bond which is blended (expansion and halfway substitution) with concrete to explore the effect of these waste materials on different parameters of solid evaluation for example M40.
3. To study the workability , compressive quality, split elasticity and flexural quality of M40 evaluation of cement by utilizing red mud and hydrated lime with standard cement.
4. To structuring properties of so upgraded bond for M40 (extension and fragmentary substitution) precedents with controlled mix concrete.
5. To guarantee the ideal utilization of red mud and hydrated lime.
6. The essential goal is to sum up the properties of cement with the utilization of red mud material.

II LITERATURE REVIEW

P. Ashok, M.P. Suresh kumar, et., al. (2010) This venture work centers around the reasonableness of red mud got for development Five test gatherings were comprised with the substitution rates 0%, 5%, 10%, 15%, 20% of red mud and 5% of hydrated lime with concrete in every arrangement. From this test consider it was presumed that After testing of 5 mixed concrete examples (5% to 25 % substitution of Cement by NRM) with an addition of 5 %, it tends to be said that the ideal utilization of NRM is 15% as a halfway substitution of bond by NRM. The expense of M30 grade

D.V. RIBEIROJ, A. LABRINCHA, M.R.MORELLI, et., al. (2012) The focal point of this paper is to ponder the chloride diffusivity of solid blends containing red-mud. The grouping of chlorides was checked by estimating the conductivity of the anolyte, which was refined The time slack increments with expanding red mud content because of the decrease in the general measure of fine pores.

III MATERIALS AND METHODOLOGY

Cement

In this examination Ordinary Portland bond of 53 grade (ACC concrete) has been acquired and has been utilized.



OpC 53 grade cement

Coarse aggregate

Coarse totals are particles greater than 4.75mm yet by and large range between 9.5mm to 37.5mm in breadth. In this investigation coarse total of ostensible sizes of 20mm, 12mm are utilized.



Coarse aggregates of 20mm and 12.5mm

Fine aggregates

Fine aggregate are essentially sands won from the land or the marine condition. Fine totals by and large comprise of regular sand or squashed stone with most particles going through a 4.75mm strainer.

The fine total utilized in this investigation is waterway sand which is acquired from nearby organization is utilized.



Fine aggregate

Red mud

Red mud is made out of a blend of strong and metallic oxide-bearing polluting influences, and displays one of the aluminum business' most significant transfer issues. The red shading is brought about by the oxidized iron present,

which can make up to 60% of the mass of the red mud. Notwithstanding iron, the other overwhelming particles incorporate silica, unleached lingering aluminum, and titanium oxide. Red mud can't be discarded effectively. As a waste result of the Bayer procedure the mud is exceedingly essential with a pH extending from 10 to 13.

Chemical properties of Red mud

COMPOUND	WEIGHT[%]
Al ₂ O ₃	14.14
SiO ₂	11.53
Fe ₂ O ₃	48.50
TiO ₂	5.42
CaO	3.96
V ₂ O ₅	0.116
MgO	0.049
ZnO	0.027
Na ₂ O	7.50
P ₂ O ₅	0.297
MnO	0.17
K ₂ O	0.058
L.O.I	7.25

Hydrated lime

Hydrated lime is a sort of dry powder produced using limestone. It is made by adding water to quicklime so as to transform oxides into hydroxides. Joined with water and sand or bond, hydrated lime is regularly used to make mortars and mortars. Its synthetic name is calcium hydroxide, or Ca(OH)₂.

Tests to be conducted on concrete

Slump cone test

The slump cone test is used for the estimation of a property of new concrete. The test is a test that estimates the usefulness of new concrete. Even more especially, it measures consistency between bundles.



Slump cone test

Compaction factor test

The compaction factor test is completed to quantify the level of usefulness of new cement with respect to the inside vitality required for compacting the solid altogether.

Compressive strength test:

This test was coordinated by ([9] IS516-1959). The 3D squares of standard size 150x150x150mm were used to find the compressive quality of cement. Models were put on the bearing surface of CTM, of point of confinement 200T without abnormality and a uniform rate of stacking associated till the failure of the strong shape. The most outrageous burden was noted and the compressive quality ([21] AS Alumium) was registered.



Compressive strength of concrete

Split Tensile Strength Test:

This test was coordinated by IS516-1959. The barrels of standard size 150mmx300mm were used find the nature of bond. Precedents are put on the bearing surface of CTM, of breaking point 200T without whim and a uniform rate of stacking is associated till the failure of barrel. The best burden was noted and the quality was figured. Split inflexibility testing Procedure from IS5816-1999:



Split tensile strength of concrete

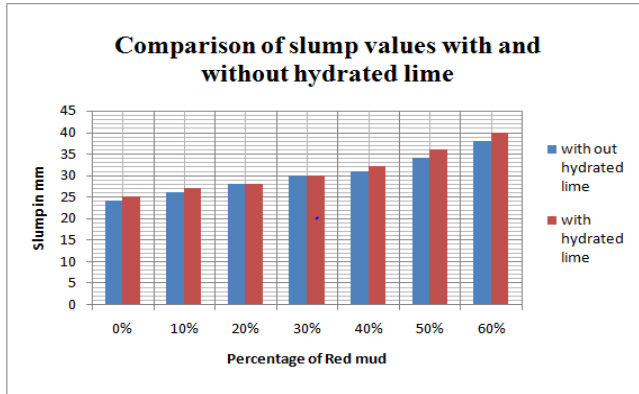
Flexural strength test:

Flexural quality is one proportion of the rigidity of cement. It is a proportion of an unreinforced solid bar or section to oppose disappointment in twisting. It is estimated by stacking 6 x 6 inch (150 x 150-mm) solid bars with a range length in any event multiple times the profundity. The flexural quality is communicated as Modulus of Rupture (MR) in psi (MPa) and is controlled by standard test

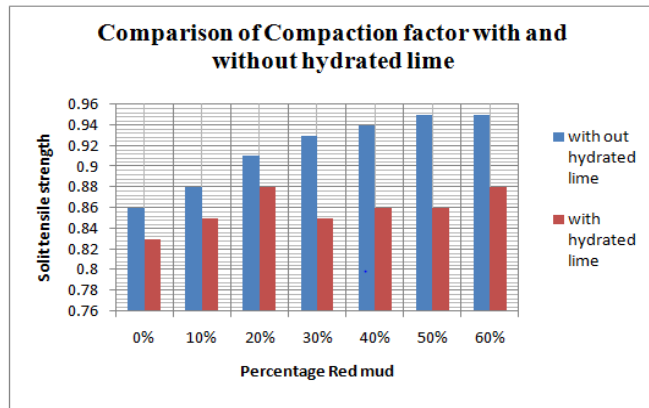
strategies ASTM C 78 (third-point stacking) or ASTM C 293 (focus point stacking).

IV RESULTS AND ANALYSIS

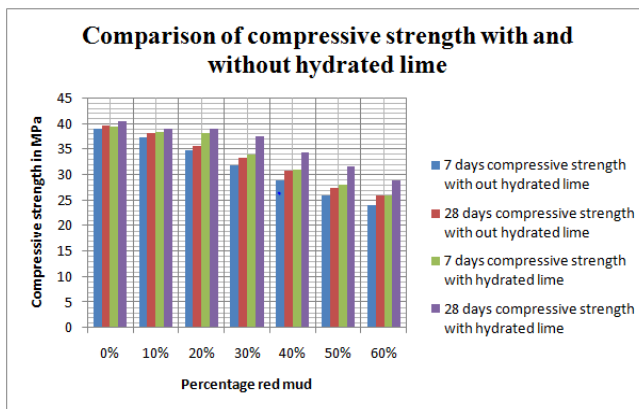
Slump cone test



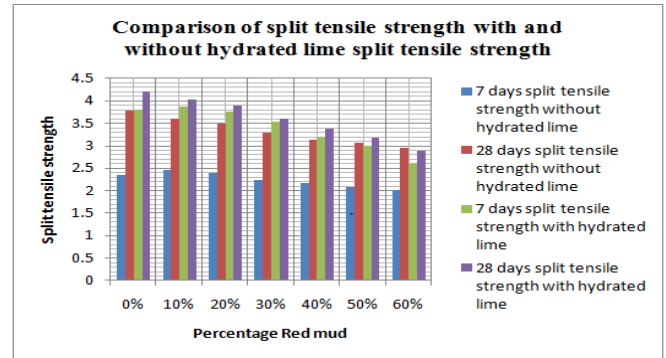
Compaction factor test



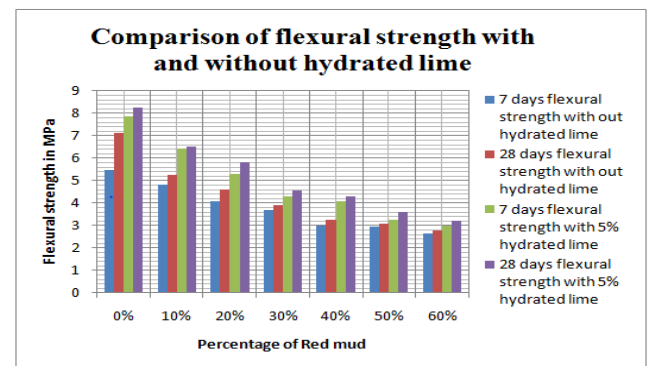
Compressive strength of concrete



Split tensile strength of concrete



Flexural strength of concrete



IV CONCLUSIONS

From the above examination the below conclusions were made

- 1) The utilization of red mud and hydrated lime as an incomplete substitution of bond gives us an elective source to utilize the loss into a helpful material.
- 2) The transfer of red mud and hydrated lime can be utilized as a cementitious material gives the decrease in weight on landfill arranging and ecological contamination.
- 3) The red mud solid thickness is less as 28 days and the regular solid which diminishes the expense of the solid and produces the light weight solid structure.
- 4) The estimation of droop increments with increment in the level of red mud from 0% to 60% for both with and without utilizing hydrated lime.
- 5) The estimation of compaction figure increment with increment the level of red mud from 0% to 60% for both with and without utilizing hydrated lime.
- 6) The ideal worth (most extreme worth) of compressive quality was seen at 10% red mud for 7 days and 28 days restoring. After 10% the compressive quality of solid reductions.

- 7) The perfect regard (most outrageous regard) of split versatility was seen at 10% red mud for 7days and 28 days reestablishing. After 10% the split quality of solid abatements.
- 8) The ideal worth (greatest worth) of flexural quality was seen at 0% red mud for 7days and 28 days relieving. After 0% the compressive quality of solid declines.
- 9) This exploratory investigation plainly demonstrates that legitimate determination of red mud materials, hydrated lime can improve the great quality of cement.

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