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AN EXPERIMENTAL STUDY OF FULLY REPLACEMENT OF COW DUNG ASH (CDA), ALUMINA AND LIME FOR CEMENT

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Abstract - *In our research project the result on the study for the use Cow Dung Ash (CDA), Alumina and Lime is fully replacement for cement in the concrete. Normally Cow Dung Ash (CDA) is required much more water content. So it is replaced only 10 to 20%. Alumina is to be reduced the setting time of the concrete. So it is contributes 30%. The lime powder has contributes 50% for replacement of cement. Now a days, the modern construction materials and technologies were well developed. Inspite of quality of materials and availability of materials is less and also economically very high. So in this scenario in our project, we have to choose an economically low as it is possible materials like Cow Dung Ash (CDA) and Lime. These materials are used alternative by cement. I hope that, these materials are good quality and durability. Specialty of my project is Self-Curing Concrete. Cow Dung (CDA) has normally collect the more amount of water when we mixing the concrete. After finishing the casting process, the water will slowly reacts with the concrete. The lime has also same property to store the water then it's released at the curing time.*

Key Words: Cow Dung Ash, Lime Powder, Self Curing Concrete, Alumina

1. INTRODUCTION

Basically lime has a very good building material. Ancient days, in our ancestors used lime powder in the building binding material. At the time lime has plays an important role on a construction process. Economically low and also high durability was there. It has been using elsewhere in repairing the cracks in buildings. Cow dung was habitually used in concrete and so one may suppose there were particular benefits in its inclusion. Recent publications suggest that dung may improve workability and durability or may act as an additional binder. Knowledge has also been lost as to whether fresh, old or weathered dung was used. Since there is no historic reference to the dung being old or weathered, it is conceivable that this is a recent invention resulting from modern attitudes toward odour and hygiene. In any case, dried and fresh dung differ mainly in the water content and so are likely to affect only the amount of water, if any, added during mixing of the concrete. Normally, the cow dung ash as health friend, water PH balances, oxygen generator, good fighter against bacteria , germs and protected the UV rays. Lime as it is breathable (vapour permeable), absorbing and evaporating moisture from surrounding masonry. This also helps to protect the masonry; there is less risk of salt and frost damage.

2. MATERIAL PROPERTIES AND TESTS:

In our study we have to fully replacement of Lime, Cow Dung Ash (CDA) and Alumina for cement.

2.1. Material Properties:

2.1.1. Natural Lime powder:

Fig 1 Natural Lime powder

The natural lime powder is normally available in coal seam fires and volcanic ejecta. In ancient days, this material was used to make constructions. It has a good adhesive property. In Engineering sector it has been using mortar, concrete, cement. Natural lime can arrest the moisture content itself. So then it is reduce the curing age. In our project the lime powder contributes 50% of whole cement content.

2.1.2. Cow Dung Ash:

Cow Dung Ash (CDA) is normally available in farm regions. It is a byproduct of cow. The chemical properties of cow dung ash have rich in nitrogen, potassium and calcium. It has relatively high carbon to the Nitrogen ratio. Cow dung ash has normally added upto 30%. So in our project, we have to add only 10%. Because cow dung ash requires more water content. That's why we have to reduce the percentage.

Fig 2 Cow Dung Ash

2.1.3. Alumina:

Fig 3 Alumina

Alumina is otherwise called as Plaster of Paris. It is normally available in mineral corundum. It has extreme thermal and electrical insulator. Initial setting time of alumina is very high. Basically, alumina has used for cement, refractories, ceramic products, etc.

2.2. Laboratory tests:

- Specific gravity test
- Workability test
- Compression cube test

2.2.1. Specific Gravity test:

2.2.1.1. Lime:

We have to conducted specific gravity test by using of Pycnometer apparatus. We have done in three trials. The average specific gravity value of lime is 2.106.

2.2.1.2. Cow dung ash

Cow dung ash has normally light weight. It requires more amount to put in this trial. The average specific gravity value of cow dung ash is 2.166.

2.2.1.2. Alumina:

Alumina also tested by Pycnometer apparatus. Same three trials were done. The average specific gravity value of alumina is 2.125.

2.2.2. Workability test:

2.2.2.1. Lime:

It is in moderate workability performance

Water content	Slump value in "mm"	Type of slump
0.35	130	Shear

Fig 4

2.2.2.2. Cow dung Ash:

It is in true slump

Water content	Slump value in "mm"	Type of slump
0.43	225	True

2.2.3. Compression cube test:

Compression test for 7 days curing

S.No	% of CDA	% of Lime	% of Alumina	Load in KN	Compression strength (Mpa)
1	20	50	30	290	12.88
2	15	50	35	310	13.77
3	10	50	40	355	15.77

Compression test for 14 days curing

S.No	% of CDA	% of Lime	% of Alumina	Load in KN	Compression strength (Mpa)
1	20	50	30	390	17.33
2	15	50	35	415	18.4
3	10	50	40	425	18.88

Compression test for 28 days curing

S.No	% of CDA	% of Lime	% of Alumina	Load in KN	Compression strength (Mpa)
1	20	50	30	450	20
2	15	50	35	483	21.46
3	10	50	40	502	22.31

Tests	**Cement concrete**	**CDA, Alumina and Lime using concrete**
Compression test	29.03	22.31
Split tensile test	2.22	1.17
Flexural test	6.04	3.21

3. CONCLUSIONS

Finally, we concluded that it is the proportion of materials can be called as 'Future of Cement'.

- It is obtained lateral strength and also durability is very high.
- It is in Self Curing Concrete (SCC). We hope that CDA can reduce the water content.
- The cow dung ash (CDA) only material can resist 50% of diseases in our household.
- Economical wise, we can possible to reduce the material cost.
- The availability of material is normally high.
- We also remember our traditional construction materials.

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