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Experimental Study on Research of Bricks with Copper Tailing Waste

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ABSTRACT

Construction industry is the quickest developing sectors in India. Speedy construction interest and growing call for of homes has cause the short fall of conventional building substances. Bricks, Cement, sand and timber at the moment are turning into scarce materials. Demand of proper great of constructing substances to replace the conventional materials and the need for cost powerful and sturdy materials for the low price housing has necessitated the researchers to develop range of recent and revolutionary constructing materials.

Keywords: Bricks, Copper, Tailing and Waste.

1. INTRODUCTION

Bricks are crucial and necessary in constructing construction. Conventional brick making process had several drawbacks which includes base materials clay; shale causes assets depletion, environmental degradation. Mining activities generates air pollution via operational method of mining. Treatment and commercial waste disposal are the principle issues in developing nations like India. Few waste substances from industries used as constructing substances like Fly ash. By way of product from matte melting and purifying of copper referred to as Copper slag. Additionally it's used in concrete for example a substitute of Fine aggregate and cement. Because of scarcity traditional fabric sand, need to go looking the alternate material for sand to compensate the material shortage. A examine well-known shows the opportunities of cement alternative as plastering material and conventional clay brick specimens with the composition of cement, sand and copper slag.

2. METHODOLOGY

Figure 1 shows the methodology of the study.

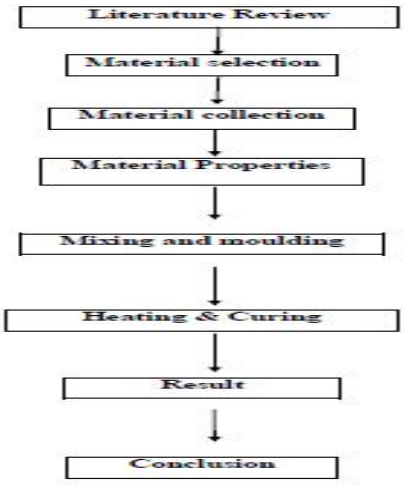

Figure 1 Methodology

3. MATERIAL COLLECTION AND PROPERITIES

3.1 Red Soil

Red soil is a sort of soil that develops in a heat, temperate, wet weather underneath deciduous or blended forest, having thin organic and natural-mineral layers covering a yellowish-brown percolatedfilmlatent on an alluvial red layer. Red soils are typically derived from crystalline rock. Figure 2 shows the red soil brick.

Figure 2 Red soil brick

Table 1 shows the geotechnical properties of red soil.

Table 1: Geotechnical Properties of Red soil

S.NO	PROPERTIES	VALUES
1	Specific gravity	2.85
2	Liquid limit	35%
3	Plastic limit	25.5%
4	Shrinkage limit	25%
5	OMC	19.5%
6	MDD	14kN/m^3

Table 2 shows the chemical properties

Table 2: Chemical Properties

S.NO	PROPERTIES	VALUES
1	Iron Oxide Fe_2O_3	40.45%
2	Aluminate Al_2O_3	18.22%
3	Titanium Oxide TiO_2	12-20%
4	Silicates SiO_2	8-10%
5	Sodium Oxide Na_2O_3	3-5%
6	Calcium Oxide CaO	3%

3.2 Copper Slag

Copper slag exists a derivative at some stage in copper smelting and refining method. Copper slag is taken into consideration as one of the waste material generated at some stage in the manufacturing of copper that can need a promising upcoming in construction enterprise. Figure 3 shows the copper slag content. Figure 3 shows the copper slag content.

Figure 3 Copper Slag content

Table 3 shows the physical and chemical properties of copper slag.

Table 3 Physical and chemical properties of copper slag

S.NO	PROPERITIES	SOIL
1	Specific gravity	4.12
2	Bulk density	2.31 g/cc
3	Fineness modulus	3.4
4	Deleterious materials	Not present

Table 4 shows the organic properties of clay soil.

Table 4 Organic Properties of clay Soil

Plasticity index (I_P, or PI)	Degree of Plasticity	Type of Soil
0	Non-Plastic	sand
< 7	Low-Plastic	silt
7-17	Medium Plastic	Silty clay or clayey silt
>17	Highly	Plastic clay

4. EXPERIMENTAL TEST RESULTS

4.1 Compressive Strength

It is also called humiliating strength of brick. Generally, blocks are occupied to laboratory for analysis one by one.

Compressive strength = load/area = P/A

Table 5 shows the compressive strength test results.

Table 5 Compressive strength Test Results

S.NO	SPECIMEN	COMPRESSIVE STRENGTH TEST	
		LOAD IN KN	STRENGTH IN N/mm^2
1	S0	68	3.97
2	S1	94	5.49
3	S2	89	5.20
4	S3	82	4.79
5	S4	80	4.67

Figure 4 shows the graph of compressive strength results.

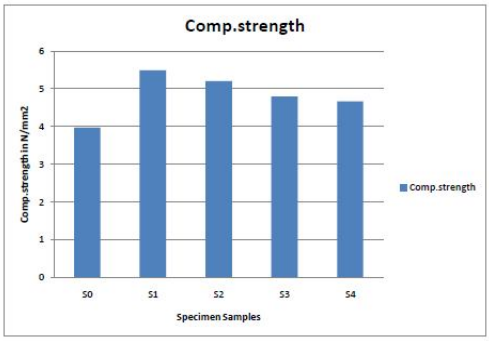

Figure 4 Graph of compressive strength Results

S0 – Conventional Brick
S1 - 40% copper slag + 15% molarity
S2 - 40% copper slag + 20% molarity
S3 - 70% copper slag + 15% molarity
S4 - 70% copper slag + 20% molarity

4.2 Water Absorption

In this bricks are weighed in dry situation and led them immersed in smooth water for twenty-four hours. Then brick is weighed in wed condition. The distinction between weights is the water absorbed via brick.

Water adsorption (%) = [(W2 – W1)/W3] × 100

Table 6 shows the water absorption results.

Table 6 Water Absorption results

S.NO	SPECIMEN	% OF WATER ABSORPTION
1	S0	14
2	S1	10.2
3	S2	10.8
4	S3	11.4
5	S4	12.8

Figure 5 shows the graph of the water absorption test results.

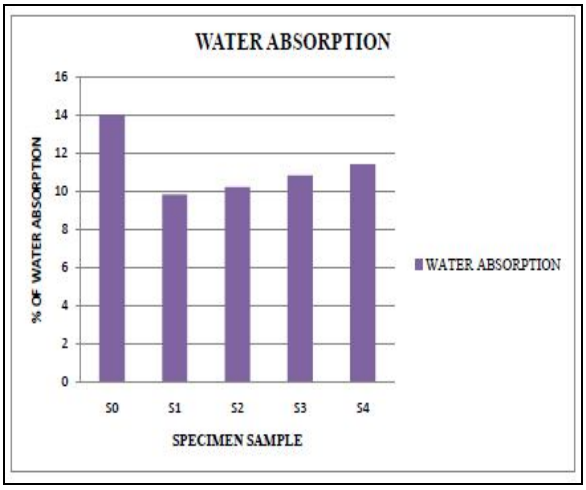

Figure 5 Graph of Water adsorption Test Results

4.3 Density Test

Density is how dense an item; it's far calculated with the aid of separating the quantity by way of volume of an object. Density may be changed through converting the size or form of the object. The standard international unit to degree density is kilogram according to cubic meter (kg/m^3). Table 7 shows the density test results.

Table 7 Density test results

S.NO	SPECIMEN	DENSITY KG/M3
1	S0	3.72
2	S1	3.52
3	S2	3.64
4	S3	3.68
5	S4	3.56

Figure 6 shows the graph of density test results.

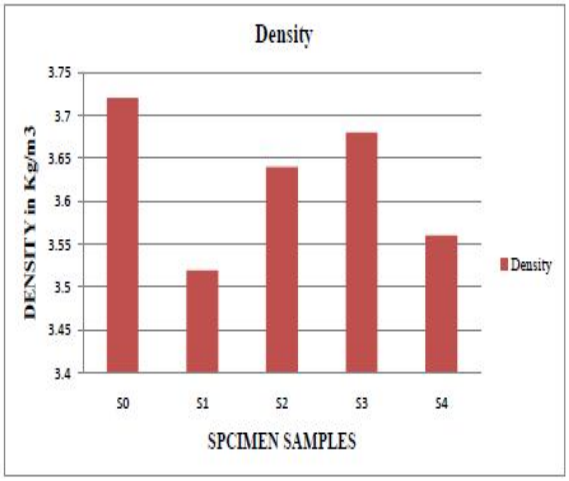

Figure 6 Graph of density test results

5. CONCLUSION

This assignment includes trying of dual sorts of bricks and equating the outcomes of compressive strength, density and water adsorption of conservative blocks. Bricks are manufactured by mixing red soil, clay soil and alluvial soil with copper slag in various percentages 0%, 40% and 70%. Compressive power reduces while increasing the copper slag in brick. As in step with our experimental result copper slag, percent increases compressive electricity decreases. The water absorption of brick emerge as poor in big percentage of copper slag as compared to other percentage. If the brick consists of low quantity of copper slag the water absorption value can be decreased examine to traditional brick. Highest quality strength values are acquired at 40 % replacement of copper slag and above which there is a decrease in strength.

AUTHOR

Prof. Dr. T. Subramani Working as Professor and Dean of Civil Engineering in Vinayaka Missions Kirupananda Variyar Engineering College, Vinayaka Missions Research Foundation (Deemed to be University), Salem, Tamilnadu, India. Having more than 28 years of Teaching experience in Various Engineering Colleges. He is serving as reviewer for many International Journals and also published 250 papers in International Journals. He has presented more than 107 papers in conferences, especially 77 in International and 30 National Level. He has authored 07 books. Guided more than 259 students in PG projects. Currently he is guiding 03 Ph.D., Research Scholars. He is serving as examiner and Valuer for B.E & M.E Degree Theory and Practical Examinations for Madras University, Periyar University, Anna University, Annamalai University and Vinayaka Missions Research Foundation [Deemed to be University]. He is Question paper setter and Valuer for UG and PG Courses of Civil Engineering in number of Universities. He is serving as Chairman of Board Of Studies (Civil Engineering), Vinayaka Missions Research Foundation [Deemed to be University], also a member of Board of studies in Periyar University. He is Life Fellow in Institution of Engineers (India) and Institution of Valuers. Life member in number of Technical Societies and Educational bodies like MISTE, MIGS, MIRC,ISRMTT, UWA, Salem District Small and Tiny Association (SADISSTIA), SPC – Salem Productivity Council. He has delivered much technical talk in various field. He is a Chartered Civil Engineer and Approved Valuer for many banks. He is a Licensed Building Surveyor in Salem City Municipal Corporation-Salem, and Licensed Civil Engineer in Salem Local Planning Authority- Salem. He is the recipient of many prestigious awards.

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