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Experimental Study on Properties of Clay Bricks by Adding Cement, Lime and SCBA

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INTRODUCTION

Bricks are the artificial stones. These are used in building construction and for ornamental purposes. These are one of the basic materials used for wall construction. These are easily available, cheap and light weighted. They can be mould into required shape and size. The properly manufactured bricks are nearly as strong as stone.

Uses of Bricks

1. These bricks can be used as a building block to construct the buildings.
2. It can be used as a lining material for lining of wells, canals etc.
3. It can also be used as a flooring material.
4. It can also be used in Reinforced brick concrete.
5. It can also be used to construct the boundary walls.

Types of Bricks

Bricks can be of many types depending on –

1. Quality
2. Building Process
3. Manufacturing Method
4. Raw Material
5. Using Location
6. Weather-resisting Capability
7. Purpose of Using
8. Shape
9. Region

Literature Survey

S No	Authors	Journal & Year	Brief Findings
1	Ravindra Kumaret. al	IJERA 2017	Burnt clay brick is one of the major and widely used building units in construction around the world. The manufacturing of burnt clay bricks using waste materials can minimize the environmental overburden caused by waste deposition on open landfills and would also improve the brick performance at low production cost leading to more sustainable construction. These wastes utilization would not only be economical, but may also help to create a sustainable and pollution free environment. This study aims to evaluate the effect of the waste addition produced from two major crops: sugarcane and rice in clay bricks manufacturing.
2	Saif A. usmani	IJESC 2017	An attempt has been made to investigate the effect on mechanical properties of bricks when blended with various wastes. Puzzolonic material along with certain waste material blends will be studied, various mechanical properties and their variation with change in composition is involved in the scope of this study. Traditional brick-making would be the focus of research, the most suitable material will be suggested based on the finding.

Objectives

Establishment of best suited combination of SCBA, lime, cement and other constituents proportion for higher compressive strength brick.

Methodology

The scope of current study aims at identifying nonconventional materials for use in bricks, this can be achieved by making trial mixes of various materials to be added in varying percentages. These bricks can then be fired using traditional methodologies. The physico-mechanical tests will be carried out on fired product according to recommended Indian standards. The tests are compressive strength IS 3495 (Part-I): 1992, water absorption IS 3495 (Part-II): 1992 efflorescence IS 3495 (Part-III): 1992 and brick density IS 2185 (Part-I): 1979. The compressive strength will be determined using compression testing machine.

RESULTS AND DISCUSSION

Table 5.1 Specific Gravity of different materials those were used in manufacturing of bricks

S. No.	Material	Specific Gravity
1	SCBA	2.28
2	Cement	3.1
3	Lime	2.4

Compressive strength analysis of the bricks

The modular bricks samples of size 190 mm × 90 mm × 90 mm (IS: 12894-2002) were casted. The compressive strength tests were conducted on three Bricks from each mix. The results of the compressive strength tests are shown in Table 5.2. These results were found after testing the specimens. Before testing, the frogs of the specimen were filled up with cement sand mortar (1:1).

Table 5.2 Compressive strength of Clay Brick

Specimen No.	Load taken by the specimen brick (kg)	Compressive Strength (kg/cm^2)
1	7700	45.03
2	7800	45.61
3	7750	45.32

Average compressive strength of these specimen after testing = 45.32 kg/cm^2.

Table 5.3 Compressive strength of Brick Specimen (Mix-I)

Specimen No.	% of SCBA	Load taken by the specimen brick (kg)	Compressive Strength (kg/cm^2)
1	5	4702	27.47
2	5	4653	27.18
3	5	4711	27.48

Average compressive strength of these specimen after testing = 27.38 kg/cm^2.

Table 5.4 Compressive strength of Brick Specimen (Mix-II)

Specimen No.	% of SCBA	Load taken by the specimen brick (kg)	Compressive Strength (kg/cm^2)
1	10	3802	22.21
2	10	3852	22.50
3	10	3854	22.52

Average compressive strength of these specimen after testing = 22.41 kg/cm^2.

Table 5.5 Compressive strength of Brick Specimen (Mix-III)

Specimen No.	% of SCBA	Load taken by the specimen brick (kg)	Compressive Strength (kg/cm^2)
1	15	2602	15.21
2	15	2651	15.48
3	15	2552	14.92

Average compressive strength of these specimen after testing = 15.20 kg/cm^2.

Table 5.6 Combine table for compressive Strength of Brick

Specimen No.	% of SCBA	Load taken by the specimen brick (kg)	Compressive Strength (kg/cm^2)
1	5	4687	27.43
2	10	3832.2	22.27
3	15	2597	15.25

Figure5.2 Compressive strength v/s SCBA

Table 5.7 Compressive strength of Brick Specimen (Mix-IV)

Specimen No.	% of Cement	Load taken by the specimen brick (kg)	Compressive Strength (kg/cm^2)
1	5	10252	59.94
2	5	10202	59.64
3	5	10301	60.23

Average compressive strength of these specimen after testing = 59.94 kg/cm^2.

Table 5.8 Compressive strength of Brick Specimen (Mix-V)

Specimen No.	% of Cement	Load taken by the specimen brick (kg)	Compressive Strength (kg/cm^2)
1	10	12010	70.17
2	10	12108	70.76
3	10	12152	71.05

Average compressive strength of these specimen after testing =70.62 kg/cm^2.

Table 5.9 Compressive strength of Brick Specimen (Mix-VI)

Specimen No.	% of Cement	Load taken by the specimen brick (kg)	Compressive Strength (kg/cm^2)
1	15	18002	105.26
2	15	17002	99.42
3	15	17251	100.88

Average compressive strength of these specimen after testing =101.86 kg/cm^2.

Table 5.10 Combine table for compressive Strength of Brick

Specimen No.	% of Cement	Load taken by the specimen brick (kg)	Compressive Strength (kg/cm^2)
1	5	10248..2	59.93
2	10	12072.7	70.06
3	15	17416.4	101.85

Figure5.3 Compressive strength v/s Cement

Table 5.11 Compressive strength of Brick Specimen (Mix-VII)

Specimen No.	% of Lime	Load taken by the specimen brick (kg)	Compressive Strength (kg/cm^2)
1	5	8000	46.78
2	5	8100	47.37
3	5	8150	47.66

Average compressive strength of these specimen after testing = 47.28 kg/cm^2.

Table 5.12 Compressive strength of Brick Specimen (Mix-VIII)

Specimen No.	% of Lime	Load taken by the specimen brick (kg)	Compressive Strength (kg/cm^2)
1	10	10100	59.06
2	10	10000	58.47
3	10	10200	59.65

Average compressive strength of these specimen after testing = 59.07 kg/cm^2.

Table 5.13 Compressive strength of Brick Specimen (Mix-IX)

Specimen No.	% of Lime	Load taken by the specimen brick (kg)	Compressive Strength (kg/cm^2)
1	15	13002	76.02
2	15	13105	76.61
3	15	12854	75.15

Average compressive strength of these specimen after testing = 75.95 kg/cm^2.

Table 5.14 Combine table for compressive Strength of Brick

Specimen No.	% of Lime	Load taken by the specimen brick (kg)	Compressive Strength (kg/cm^2)
1	5	8083.9	47.27
2	10	10099.25	59.06
3	15	12984.02	75.95

CONCLUSION

On the basis of observation the following conclusions are:

1- Increase the compressive strength of bricks around 60 – 64 % with use of 15 % lime in manufacturing of bricks.

2- Increase the compressive strength of bricks around 120 – 125 % with use of 15% cement in manufacturing of bricks.

3- If add SCBA in the mix, it reduces the compressive strength of brick.

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