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Development of bricks using textile sludge

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ABSTRACT

Now a days the bricks are commonly consumed as a construction material. The textile sludge we are making the experiment of it for construction brick purpose for solid waste management. So, there are lack of clay in the earth, so we consumed textile sludge to substitute the clay this will lower the uses of clay in production of bricks . we have compared the sludge like 5%,10%, 15%, 20%

Keywords— Firing temperature; Textile sludge ; Compressive strength; Water absorption

1. INTRODUCTION

Bricks are usual material for construction & had a specified contribution. The dried -clay bricks were applied for the first time in 8000 BC and the fired clay bricks were consumed as early as 4500 BC. As day-to-day life the construction is growing & the demand of bricks is also increasing. But the bricks are frequently produced 1391billions unit worldwide & the shortage of clay is rise.

As there is lack of clay in many parts of the earth. so china has announced the few uses of bricks made up of clay. And the burning process of brick generate the large quantity of greenhouse gases. The civil engineer is been challenged to convert the process of bricks produce as it is usable construction material. And developing countries like India are in growth of environment concern.

Recycling worthless as building goods appears for number of solutions not only to such pollution problem but also to the problem of economical design of buildings.

2. MATERIAL USED

2.1 Clay

Clay is defined as affinely grained earth that can be shaped when wet & is dried & baked to make a brick, clay contain different amount of water trapped in mineral structure. Although many natural occurring caution include both site & clay, clay & distinguished from other fined grained soil by difference in size & minerally, mixing of sand & silt & less than 40% clay are loam. Loam make good soil & is used as a building material, for this research work, clay is procured from places near Nagpur . The collected soil samples are dried and then used for the preparation for bricks in Bombate brick yard, Mouda village, Nagpur, Maharashtra.



Fig 1: Clay

2.2 Textile Sludge

Textile industry is one of the oldest and largest industrial serving in India. Textile industries involves processing or converting of raw materials in to entire cloth materials by employing several processes, operations and consumes large quality of water and manufacture extremely polluting waste effluents is collected from Decora textiles, Mominpura, Nagpur, Maharashtra.



Fig. 2: Textile sludge

3. METHODOLOGY

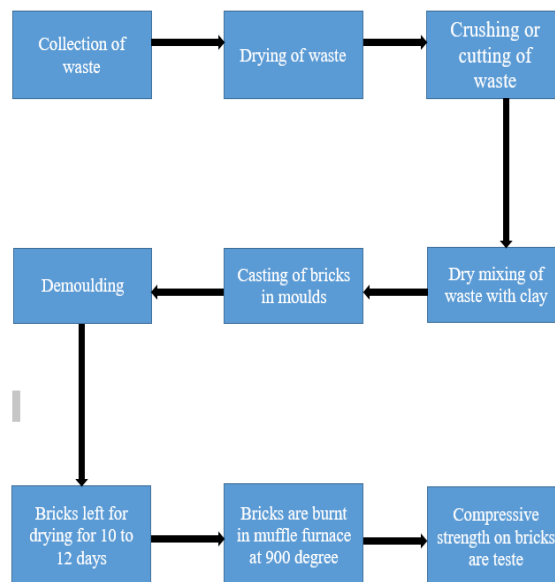


Fig. 3: Methodology

Table 1: Chemical properties of sludge

S. No	Chemical Determine	Presence in the sludge in %
1	Al ₂ O ₃	3.59
2	CaO	22.09
3	Cr ₂ O ₃	0.07
4	FeO	26.92
5	P ₂ O ₅	3.47
6	SiO ₂	15.16
7	TiO ₂	1.32
8	SO ₄	1.62

3.1 Mix Proportions For Test Specimens

Composition:

- The Specimens of Sizes 9 cm x 9 cm x 19 cm were prepared with the following mix proportions.
- Textile sludge is used with mix proportions of 5%, 10%, 15%, 20%

SAMPLES	SOIL (%)	SLUDGE (%)
M1	100	0
M2	95	5
M3	90	10
M4	85	15
M5	80	20

3.2 Technical Testing

The series of test are carried out according to IS 3495(Part 1-2). The compressive test and water absorption.

The following laboratory tests were conducted on bricks:

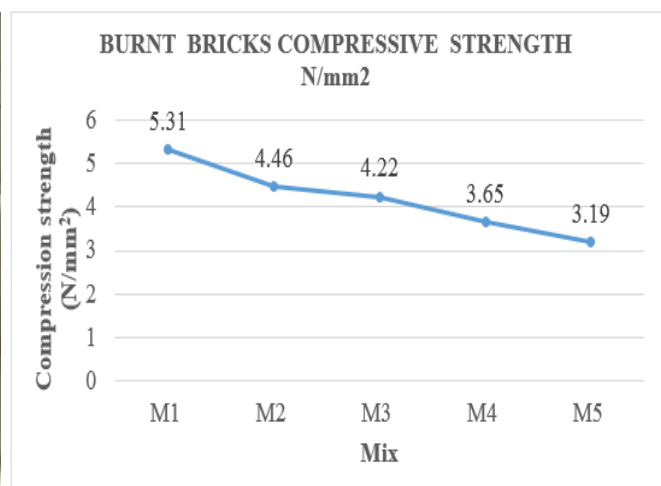
- Visual Tests
- Compressive strength Test
- Water absorption Test
- Efflorescence Test

3.3 Visual Test

Compressive strength test: Bricks are then used for compressive strength as per IS 3495 (Part-I) –1992.

S. No	TESTS	Y/N
1	The bricks should be well full-fledged, smooth and are free from cracks.	Yes
2	They should posses sharp and class edges.	Yes
3	They are of identic colour, shape and size as per standard.	Yes
	Clear ringing sound is produced when the bricks are struck together .	Yes
5	Fracture of good bricks showed uniform and bright dense structure without any voids.	Yes
6	Bricks should not be broken down when dropped from 1m height.	Yes
7	The water absorption shouldn't be more than 20 % when immersed in water for 24 hours.	Yes

Symbols	Burnt Bricks Compressive Strength (N/mm ²)
M1	5.31
M2	4.46
M3	4.22
M4	3.65
M5	3.19



3.4 Water Absorption Test

Symbol	Burnt Bricks 24 hrs. Water Absorption (%)
M1	10.97
M2	12.58
M3	16.17
M4	18.27
M5	21.64

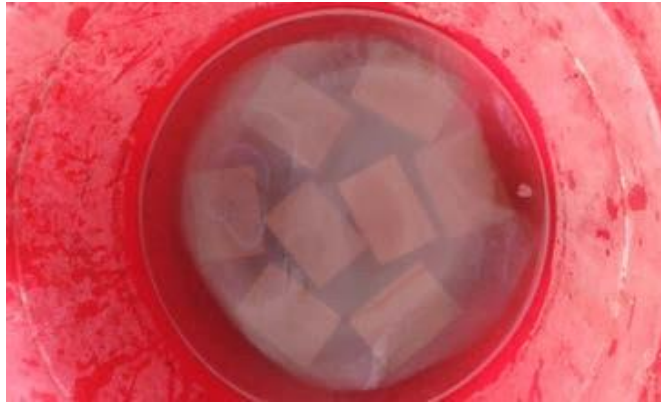
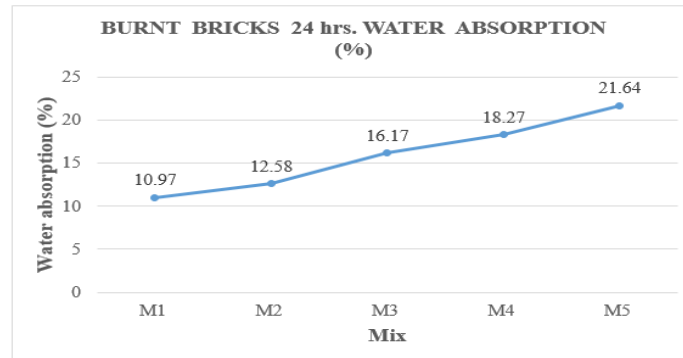


Fig. 4: Water absorption test



3.5 Efflorescence Test

No	OBSERVATION	Mix proportion
a	Nil: No patches	M1, M2 and M3
b	Slight: 10% of area covered with deposits	-
c	Moderate: 10 to 50% area covered with deposit but unaccompanied by flaking of the surface.	M4
d	Heavy: More than 50 per cent area covered with deposits but unaccompanied by flaking of the surface.	M5
e	Serious: Heavy deposits of salt accompanied by flaking of the surface.	-

4. CONCLUSION

The characterization and tests of bricks, Textile sludge waste and its establishment into clay material used for brick producing, led to the following conclusions.

- Textile Sludge can be a successful partial substitution material for clay soil in the manufacture of bricks.
- The manufactured burnt bricks strength stability observed to be above the minimum recommended compressive strength value of 3.5 N/mm². Comparing the recommended compressive strength, sample gives superior compressive strength. The water absorption property of proportions of burnt Brick is greater than the water absorption of normal good potency burnt clay bricks.
- From the results of technological tests, it is suggested that textile Sludge wastes can be incorporated up to 5% by weight of clay materials for the manufacture of bricks and the optimum amount of textile Sludge waste was found to be 5% by weight of clay which gives better establishment, higher compressive strength and lower water absorption.
- The possibility to use the Textile effluent treatment plant wastes as a choice of raw material in the production of clay-based effect will also provoke a relief on waste disposal concerns.
- The Textile Sludge can also be enhanced and used for the manufacture of paver blocks and footpath construction etc. Thus, the use of Textile Sludge reduces the both the land and air pollution problems and its environmentally efficacious.
- The compressive strength of the bricks attained is about 4 N/ mm² for 5% substitution. But the minimum strength should be around 3.5 N/mm² for non-bearing walls or partition/division walls . Where as for Bearing wall receive load of around 10 N/mm² to 14 N/mm² . Hence the bricks can be use for non bearing/carriage walls construction only.

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