

EXPERIMENTAL INVESTIGATION ON BRICK WITH PARTIALLY REPLACEMENT OF CEMENT BY “CORN COB ASH”

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ABSTRACT: This study aims to reduce the cement content in cement brick, and it replace the cement by using corn cob ash in bricks to achieve the nominal strength. Corn cob ash mixed with sand with various proportions (50%, 60%, 70%) to achieve the strength of the nominal bricks and also to possess thermal and sound insulation. Increase the strength of structure and weight reduction of bricks was tested for compressive strength. Based on the comparison of conventional and corn cob ash brick, optimum strength was analyzed. The results are clearly shows that corn cob ash used in the production of brick.

Keyword: Corn cob ash(CCA), cement, compressive strength, water curing, sand

1. Introduction

Bricks which play the most vital role in terms of construction material are usually associated with ordinary Portland cement (cement bricks). It has been estimate that the production of cement will increase from about rapidly growing at a rate over 8%. The global warming which is also another rising issue recently due to cement and is becoming vast day by day. This is mostly due to manmade activities which result in the emission of CO₂. Among Green House Gases CO₂ contribute about 65% of Global Warming. The aggregate and cement industries together produces nearly 80% of CO₂ emissions. It's calculated that 1ton of PC generates 1ton of CO₂. It's estimated that with demographic growth and industrialization, the pollution generated by cement production in a few years will present 17% of worldwide CO₂ emission. The use of OPC is still unavoidable until the foreseeable future many efforts are being made in order to reduce the use of Portland cement in brick. These efforts led to the utilization of supplementary cementing materials such as fly ash, silica fume, corncob ash etc, and finding alternative binder to OPC. In the Re-factories world thirty five year ago, no one was working with corncob ash and few knew what it was

2. MATERIALS AND METHODS

CEMENT: The cement to conforming the requirement of IS specification with respect to its physical & chemical properties. OPC is a common form of cement. It's the basis ingredient of concrete, cement brick, mortar & plaster.

Quarry dust (or) M-sand: The quarry dust passing through 4.75mm and retaining on 2.36mm IS sieve are taken. Specific gravity of 2.94 & fineness modulus has been used. Rock particles are broken into small pieces quarry dust formed. Its grey in color and used for replacement of sand.

Corn cob ash: To prepare corn cob ash, first corn cobs were broken down into small piece which helps in enhancement of combustibility and reduction in carbon content that affects the pozzolanic properties.

Manufacturing process: Quarry dust, cement plus corn cob ash in various proportion are mixer where water is added to the required proportion for homogeneous mixing. After mixing, then filled in the brick mould and hand press. The brick are placed and kept in curing for 7days, 14days, 28days.

Compressive strength test: Crushing strength of brick is determined by placing brick in compression testing machine. After placing the brick in compression testing machine, apply load on it until brick breaks. Note down the value of failure load & find out the crushing strength value of brick. Minimum crushing strength of brick is 3.50N/mm². If it's less than 3.50N/mm², then it's not useful for construction purpose.



FIG1: CCA BRICK



Fig2: compressive strength machine

TABLE 1 MIX PROPORTION

PERCENTAGE	CEMENT WEIGHT	CCA WEIGHT	SAND WEIGHT
50%	0.380kg	0.380Kg	2.28Kg
60%	0.304Kg	0.456Kg	2.28Kg
70%	0.228Kg	0.532Kg	2.28Kg

3. MATERIAL TEST

CEMENT TEST VALUE

S.NO	Properties of cement	Test value
1	Specific gravity	3.9
2	Fineness	10%
3	Initial setting time	30 min
4	Final setting time	10hrs
5	Consistency	26%

CORN COB ASH TEST VALUE

S.NO	Properties of cement	Test value
1	Specific gravity	2.95
2	Fineness	5%
3	Initial setting time	120min
4	Final setting time	18 hrs
5	Consistency	53%

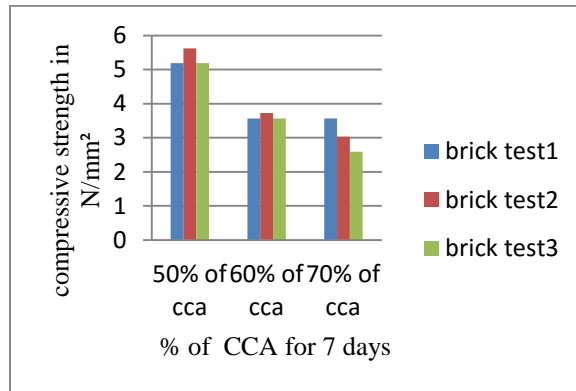
M-SAND (or) QUARRY DUST

S.NO	Properties of M-sand	Test value
1	fineness modulus test	6.38
2	Specific gravity test	2.94

4. EXPERIMENTAL TEST & RESULT

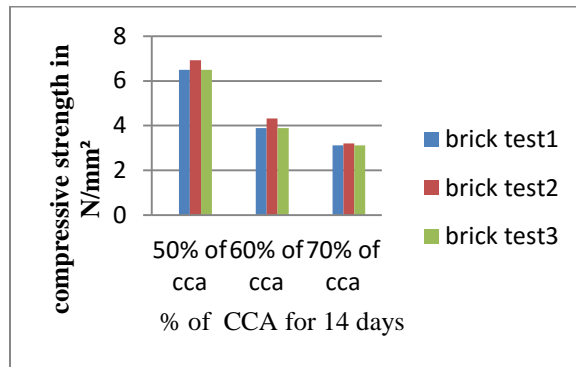
Compressive strength test(IS 3495-PART1-1992) on 7 days

PERCENTAGE OF CCA	COMPRESSIVE STRENGTH(N/mm ²)			
	Brick 1	Brick 2	Brick 3	Average
50%	5.19	5.62	5.19	5.33
60%	3.56	3.72	3.56	3.61
70%	2.59	3.03	2.59	2.73



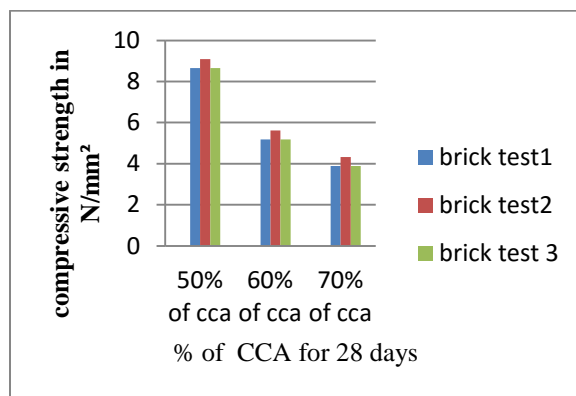
Compressive strength test(IS 3495-PART1-1992)on 14 days

PERCENTAGE OF CCA	COMPRESSIVE STRENGTH(N/mm ²)			
	Brick 1	Brick 2	Brick 3	Average
50%	6.49	6.92	6.49	6.63
60%	3.89	4.32	3.89	4.03
70%	3.12	3.20	3.12	3.14



Compressive strength test (IS 3495- PART1-1992) on 28 day

PERCENTAGE OF CCA	COMPRESSIVE STRENGTH(N/mm ²)			
	Brick 1	Brick 2	Brick 3	Average
50%	8.65	9.09	8.65	8.79
60%	5.19	5.62	5.19	5.33
70%	3.89	4.32	3.89	4.03



5. COST OF THE CCA BRICK

Cement 1 bag (50kg)	=Rs,350
1kg of cement	=Rs,7
0.380kg of cement	=Rs,2.5
Quarry dust 1ton (1000)	=Rs,900
2.28 kg of quarry dust	=Rs2.05
Corn cob ash manufacturing cost of 1kg	=Rs, 2
0.380kg of CCA	=Rs, 0.5
Total manufacturing cost of CCA brick	= Rs,5.05
	≈Rs, 6

Cement brick local rate = Rs,20

So, we production CCA brick is very economical compare to normal cement brick price

6. CONCLUSION

A study on the effect of addition of corn cob ash to production in different percentages subject to water curing is conducted to find the characteristic compressive strength value of bricks. The results show that the partial replacement of cement by corn cob ash at 50% to 60% has a good effect on compressive strength of the brick. However 70% of replacements of corn cob ash reduce the compressive strength compare with that of the control sample. Over all, the corn cob ash with make environmental issues can be used in brick mixture as a good substitute for cement. The brick gives a perfect sound when banged with each other. The colour, shape and texture of the brick were found to be satisfactory. The manufacturing (or) production cost of CCA brick is very economical.

7. REFERENCES

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