

Replacement of Cement with Kota Stone (Green) Powder in Concrete

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Abstract— At present time concrete having more used in civil construction such as building construction, Bridge construction & Dam construction etc. For these purpose huge quantity of concrete consume in civil construction work. Concrete is made up of in gradients such as Cement, Sand, Aggregate, Water etc. Kota stone’s powder or dust is easily available in stone industries because kota stones having used in various types of civil construction in huge quantity like-exterior, pathway, corridors, driveways, balconies etc. During the process of cutting stone 25% dust formed. The generated stone dust from stone cutting factory prohibited from being discharge to public sanitary system and as well as agricultural land because of land fertility decreases through stone dust. Engineering application can solve the problem of disposing stone waste with the help of using replacement of cement in concrete. The in gradients of concrete, cement is more expensive material as compare to others in gradients of concrte In these study cement is partially replaced with different percentages as 0%,10%,20% & 30% of kota stone (green) powder .In this study tested compressive strength, flexural strength , split tensile strength and workability of concrete. For these purpose total 88 specimens of concrete made like cubes. The use of kota stone (green) powder as replacement of cement offer cost reduction, increase strength, supiers products.

Key words: Cement, Sand, Aggregate, Kota Stone (Green) Powder, Compressive Strength

I. INTRODUCTION

Concrete is made up of ingredients such as cement , sand , aggregate and water .cement is more expansive material in concrete ingredients for this purpose of obtaining economical cost of concrete we can used kota stone powder as partially replacement of cement .kota stone chips and powder are easily available in kota stone industries and now a days kota stone having huge used for flooring purpose in all types of building so we can get easily kota chips for making concrete strength able and economical. Total 48 cubes were casted by using kota stone powder with partially replacement of cement in various percentages of (0%, 10%, 20% and 30%) and compressive strength tested.



Fig. 1: Kota Stone Chips & Kota Stone Powder

II. LITERATURE REVIEW

Ankuit et al – studied that replacement of ordinary Portland cement with 30% and 20 % replacement of Portland pozzolanna cement with stone waste obtained maximum compressive sgtrength.

M.S. Ruchi Chandrakar, Mr.Avinash – studied that dumping of waste material of stone is environmental problems. The industrial marble stone generated 15-20% stone slurry.In this studied the replacement of cement with marble dust powder at percenetages of 0%,5%,10%,15% ,20% & 30% and obtained maximum compressive strength at 10% replacement of cement with marble stone.

Baera et al [2] – studied as partially replacement 30% of Portland cement with the help of marble dust and sewage sludge ash & obtained 9% greater compressive strength as compared to control sample.

Jitesh Mehta, or Chentanaben M. Vyas Dr. Jayashankar Pitroda – studied that 25% stone waste powder formed in stone industries during mining and cutting stone.The engineering problems can solved by using stone waste like Kota stone.In this study effective utilization of kota stone sludge as replacement of marble slurry waste in brick.

III. TESTING PROCEDURE & RESULTS

A. Compressive Strength Test on Cubes

In this study total 48 cubes were casted for both M-20 and M-25 grade of concrete .Cubes having size of 150x150x150 mm .Cubes were tested at 7 days and 28 days after completing curing period with the help of C.T.M.

Kota Stone Powder (%)	7 days strength of concrete							
	For M-20 (N/mm2)				For M-25 (N/mm2)			
	1	2	3	AVG.	1	2	3	AVG.
0%	19.66	19.80	20.88	20.11	21.66	21.38	22.77	22.10

10%	21.13	21.45	21.13	21.24	23.44	23.66	23.44	23.51
20%	17.80	16.95	17.00	17.25	19.00	18.55	19.00	18.85
30%	13.45	13.45	13.30	13.40	15.44	15.00	15.00	15.14

Table 1: Results for 7 Days Compressive Strength

Kota Stone Powder (%)	28 Days Strength Of Concrete							
	For M-20 (N/mm ²)				For M-25 (N/mm ²)			
	1	2	3	AVG.	1	2	3	AVG.
0%	19.80	25.83	26.85	24.16	21.66	27.88	28.33	27.73
10%	32.20	31.66	29.90	30.92	33.22	33.66	31.88	32.92
20%	24.55	24.50	23.33	24.13	26.55	26.11	25.22	25.96
30%	18.90	19.60	18.80	19.10	20.77	21.66	20.77	31.07

Table 2: Results For 28 Days Compressive Strength



Fig. 2: Cube Testing

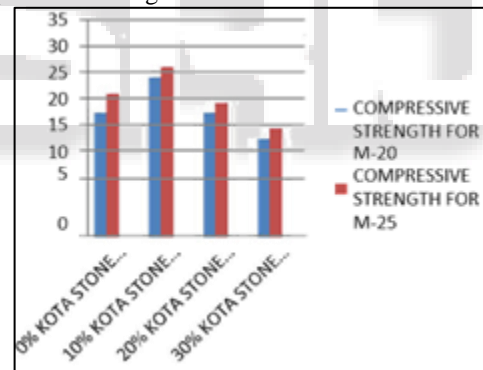


Fig. 3: Graph of 7 Days & 28 Days Compressive Strength for Both M-20 & M-25 Grade of Concrete

IV. CONCLUSION

A. General

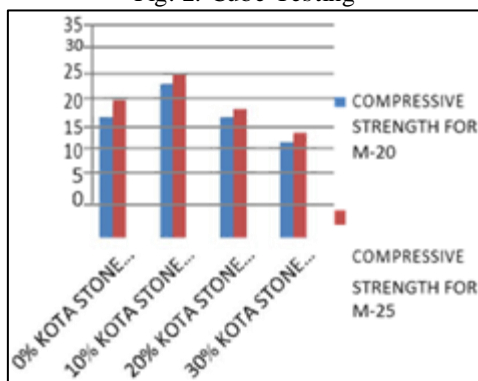
(A) Compressive strength for both M-20 & M-25 grade of concrete -

In compressive strength test result obtained maximum compressive strength at 10% replacement of cement with kota stone powder in both M-20 & M-25 grade of concrete.

B. Future Scope

Future studies should be continued in the following areas as part of the extension of this research work

- 1) In this thesis particular kota stone powder used, It will be helpful for using different types of stone powder.



- 2) This research done on M-20 & M-25 grade, it will be helpful for using different types of concrete grade.
- 3) In this research used OPC cement, NARMADA RIVER'S sand and 200mm size of aggregate which will be helpful for using different types of cement ,sand and aggregate
- 4) This research done for compressive strength test at 7 & 28 days which will be helpful for testing at 3days, 20 days etc.
- 5) In this thesis cement replaced with kota stone powder at 10%, 20%, 30% which will be helpful for cement replacing at different percenetages.

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