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AN EXPERIMENTAL STUDY ON PARTIAL REPLACEMENT OF SAND BY KOTA STONE DUST AND CRUMBED RUBBER IN STANDARD CONCRETE

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Abstract - *Concrete is the base of any construction, without concrete no construction could ever exist. Concrete consists of Cement, Sand (Fine Aggregate), Gravels (Coarse Aggregate), Water, Admixtures, Additives. In this study partial replacement of sand is done by Kota stone Dust and crumbed rubber in certain percentage (0%, 5%, 10%, 15% & 20%) in concrete.*

This section deals with common introduction on the concept of Use of Kota stone Dust and crumbed rubber as Partial substitute of sand in Concrete. Kota stone dust is waste material produced by Kota stone quarries while excavating and finishing kota stone. A large of waste powder is produced by such quarries only insignificant mass is used rest is dumped in nearby dumping yards. This can be used as a construction material by partially replacing Sand that can reduce overall cost.

Crumb rubber is recycled rubber produced from automotive and truck scrap tires. During the recycling process, steel and tire cord (fluff) are removed, leaving tire rubber with a granular consistency. Continued processing with a granulator or cracker mill, possibly with the aid of cryogenics or by mechanical means, reduces the size of the particles further.

For this purpose standard concrete of grade M 25 and M 30 in a design mix proportion was formed and then tested for compressive strength.

Key Words: Kota stone Dust, crumbed rubber, strength etc.

1. INTRODUCTION

Concrete is a most habitually used construction material which is a mixture of cement and filler mix along with water in desired proportion the term called concrete. For improving the properties of fresh concrete and harden concrete various engineer and scientist are trying to search a material which give equal strength to concrete and we called it spare(Additional) material which enhance the properties of harden as well as in fresh concrete . . The environmental aspects of Sand are now taking more concern of researchers, as Sand developing is responsible for about a large amount of total worldwide waste emissions from manufacturing sources. The trend of mixing several kinds of additional materials in building engineering is now growing. This has a double advantage to diminish the extent of deposited waste material and the second is to conserve natural resources for future generation. The main aim of this study is utilization of Kota stone Dust and crumbed rubber which is mixed (partial replacement in different proportion) with sand to investigate the effect on concrete.

2. LITERATURE REVIEW

- **A.Sathesh Kanna, G.Sangara Pitchai Raj(2019)**, performed compressive strength with concluding M15 mix gave greater, M 5 mix gave lower compressive strength & split tensile strength test with M 15 mix gave greater, M20 results lower split tensile strength
- **B.Senthil, S.Selvarani, M.Saranya, D.Suganya (2018)** reported that 30% replacement of fine aggregate by industrial waste give maximum result in strength and quality aspects than the conventional concrete and prepared the concrete containing 10, 20, 30, 40, 50% waste of quarry dust, and granite slurry with sand compared to the total quantity of normal concrete with studied in terms of their properties both in fresh and in hardened states.
- **Chandraprabha Sahu (2018)** reported that the inclusion of Marble powder the strength of concrete gradually increases up to a certain limit but then gradually decreases with Partial Replacement of Cement with Marble Dust Powder and tested at 3, 7, 28 days with taking five types of fly ash cement bricks specimens. In first three types sand percentage is taken as 30%, while the percentages of cement and fly ash have been changed by 5%. And in others percentage of fly ash is taken 60% with cement and sand having variation in their percentage by weight of the brick.

- **Lokesh Kumar, Gautam Bhadoriya (2017)** concluded compressive strength of 7th days cube is maximum for concrete mix M3 with addition of 25% fly ash as compared to other diverse concrete mixes & Increase in water cement ratio with addition of 25% fly ash.
- **N. J. Azmi et al (2016)** conducted study on mechanical properties of rubberized concrete. Crumb rubber contents of 10, 15, 20 and 30% by volume were chosen for partially replacing the fine aggregate and different water cement ratio (0.41, 0.57 and 0.68) was used. The strength properties were found. It was noted that a reduction in strength on concrete for crumb rubber mixture. Slump values increase as the crumb rubber content increase from 0% to 30%. Crumb rubber mixture is more workable compare to normal concrete. Inclusion crumb rubber in concrete reduced the static modulus elasticity. The deformability of crumb rubber concrete is increased compared to normal cement concrete.

  i.e. grade of concrete M 25 and M 30.

3. METHODOLOGY

1. Arranging the testing laboratory for conduction of experiments,
2. Listed out various tests involve in mix design of concrete, as per IS codes of reference,
3. Procurements of materials for testing and concrete preparation,
4. Performance of experiments for calculation of material properties which are used in mix design calculation,
5. Mix design calculation according to code of practice IS 10262: 2009,
6. Mix trials were performed to find target compressive strength at optimum water-cement ratio for controlled concrete i. e. standard concrete,
7. For controlled concrete - Making and curing compression test specimens in the laboratory as per code of practice IS : 516 - 2009,
8. Testing of specimens for compressive strength at 7 days and 28 days, as per code of practice IS : 516 - 2009, and
9. Graphical representation of compressive strength test result.
10. For specified concrete (concrete made with granite waste) - Making and curing compression test specimens in the laboratory as per code of practice IS 516 - 2009, with different combinations of using alternative material with partial replacement of coarse aggregates,
11. Testing of specimens for compressive strength at 7 days and 28 days, as per code of practice IS : 516 - 2009, and
12. Graphical representation of compressive strength test result comparing with controlled concrete strength.

Strength of concrete in compression, is measured by compressive strength test as mentioned in the IS Code of reference. These tests are used regularly as control tests during construction. The designer can evaluate compressive and tensile loadings in the terms of compression, flexure or bending and tension.

4. RESULT AND DISCUSSION

Workability of Concrete

Workability of concrete is an important property to determine before placing of concrete. Concrete with high compaction factor is said to be more workable.

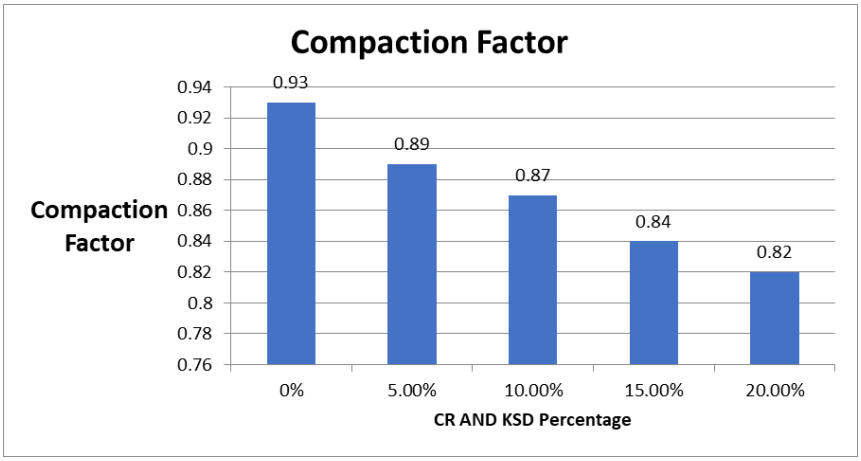

Fig 4.1: Compaction factor

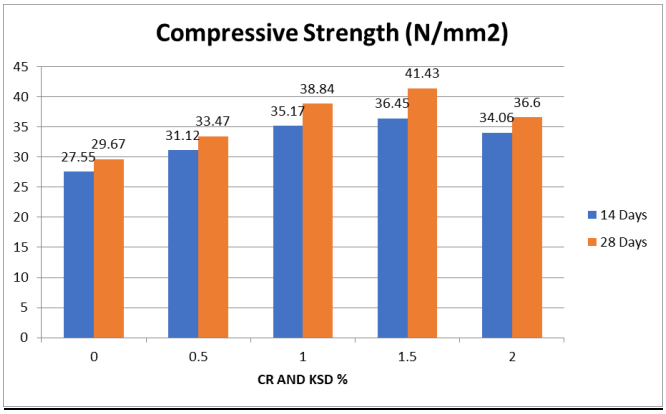

Fig 4.2: Comparative Compressive Strength of M30 Grade

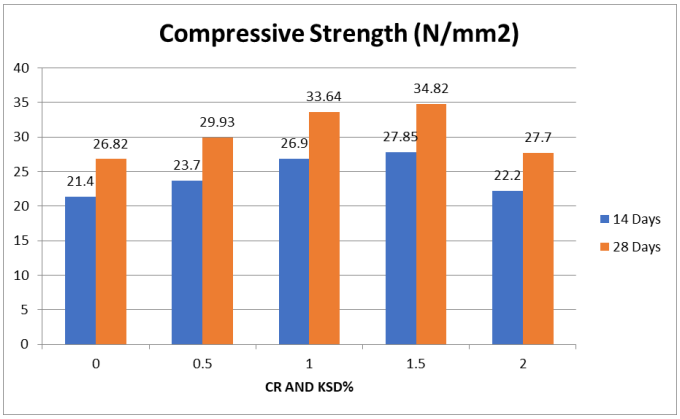

Fig 4.3: Comparative Compressive Strength of M25 Grade

5. CONCLUSIONS

In the project work these Experimental Scenarios were considered during experimentation.

- Accomplish Compressive strength test on concrete having different Percentage (0%, 5%, 10%, 15% and 20%) of crumbed rubber and Kota stone dust.
- Results: In this experiment, Mix-Design of M-30 grade concrete; reference IS 10262: 2009, having water-cement ratio 0.45 is considered. Percentage of crumbed rubber and Kota stone dust (0% to 20%) is added in concrete. Total 60 specimens of crumbed rubber and Kota stone dust Concrete were cast with great precision and were cured for 14 days and 28 days. After completion of maturity period of concrete Compressive strength test, split tensile test and flexural strength test were conducted on all the specimens with respective date of casting. From the study it was observed that compressive strength increased as increase the percentage (%) of alternate material (0% to 15%) after 15% of CR and KSD compressive strength decreases for both 14 days & 28 days cube strength. it was also observed that optimum percentage increment in compressive strength of concrete was 32.3% for 14 days curing and 39.6% after 28 days curing (from 0% to 15% addition of CR & KSD).

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