World Journal of Research and Review (WJRR)
ISSN: 2455-3956, Volume-12, Issue-2, February 2021 Pages 01-03

An Experimental Study on Partial Replacement of Sand by Kota Stone Dust and Crumbed Rubber in Standard Concrete

Megha Pareek, Mr.Sanjeev Sipani, Dr. Vishnu Sharma

***Abstract*— Concrete is the basic material of any infrastructure project, without concrete development in construction industry will be difficult.. Concrete consists of Cement, fine aggregates, Gravels, Water, Admixtures. In this research work partial replacement of sand is done by Kota stone Dust and crumbed rubber in different percentages (0%, 5%, 10%, 15% & 20%) in concrete.**

Kota stone dust is waste product obtained by Kota stone quarries while placingkota stone. A large amount of waste is produced by such quarries only small quantity is used and rest is dumped . This can be used as replacement of fine aggregate.

Crumb rubber is recycled rubber produced from automotive and truck scrap tires. Rubber pollution involves the accumulation of plastic products in the environment that adversely affects wildlife, wildlife habitat, or humansFor this dissertation concrete of grade M 25 & M 30 in a design mix proportion was formed and then tested for compressive , spilt tensile and flexure strength.

***Index Terms*— Kota stone Dust, crumbed rubber, concrete etc.**

I. INTRODUCTION

This research focuses on studying the effect of Kota stone Dust and crumbed rubber on the Properties ofConcrete Mixes as a partial replacement of Sand. The successful use of spare material will help in reducing the land area needed for disposal and also diminishing the environmental problems related to the disposal.

- 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 i.e. grade of concrete M 25 and M 30.
- To evaluate the results of Workability, Compressive Strength, Splitting Tensile Strength, forconcrete by using different proportion of Kota stone Dust and crumbed rubber in Concrete.
- To Compare the Engineering Properties of Concrete with (partial replacement of sand) specimens of different mix concrete.
- To assess optimum use of Kota stone Dust and crumbed rubber Scrap an industrial waste and reduce the emission of Dust and Suspended Particle and make environment clean and clear.

II. LITERATURE REVIEW

Ki sang son et al [1] investigate the reinforced concrete column with waste tyre rubber particles of different sizes and percentages by considering the concrete compressive strength 24mpa and 28mpa to examine the concrete properties. In this study 600 µ to 1 mm size of rubber particle was used. 27 control specimen were prepared, the result indicated that the rubber filled RC column gives slightly lower compressive strength andmodulus of elasticity . But energy absorption capacity and ductility increases. Therefore this type of concrete is suitable for seismic application .

Eshmaielganjian et al [2] investigated the concrete mixture by using tyre chipped replaced to coarse aggregates and waste tyre crumb powder replaced to cement at 5%, 7.5% and 10% to examine the concrete properties. The result showed that with increase in percentages of rubber compressive strength reduction was less than 5% and with 7.5% and 10% replacement higher reduction occure modulus of elasticity reduces up to 17-28% for 5 to 10% replacement of chipped rubber to aggregate in concrete, tensile strength and flexural strength reduced with increased percentages of rubber in concrete.

Cammille A Issa, et al [3] have been used recycled crumb rubber as a substitute for fine aggregate in concrete at 0% to 100% replacement to crushed sand in concrete mix. The result showed that 25% Replacement of crushed sand gives good compressive strength and by using crumb rubber up to 25% results in 8% decrease in density of concrete and ductility of concrete increases therefore it is useful in shock resisting element , highway barrier etc. And also damping properties improves.

F pache co- Torgal et al [4] have been studied the effect on fresh and hardened concrete properties by using polymeric waste like tyre rubber and PET bottles in concrete mix. The results of many researchers showed that with increase in rubber content workability (slump) increases, and the properties like compressive strength, split tensile strength , flexural strength and modulus of elasticity decreases. But for higher content of tyre rubber in concrete mix increases the toughness of concrete.

Megha Pareek, Professor, Department of civil engineering, YIT, Jaipur
Mr.Sanjeev Sipani, Professor, Department of civil engineering, YIT, Jaipur
Dr. Vishnu Sharma, Professor, Department of civil engineering, YIT, Jaipur

N.J. Azmi, B.S. Mohmmed et al [5] have been investigated the effect of recycled tyre rubber partially replaced to fine aggregate in concrete to examine the properties of concrete like compressive strength splitting tensile strength and flexural strength, they have selected concrete mix with water cement ratios 0.41, 0.57, and 0.68. Total 15 different concrete mixes were cast. The results showed that, there was decrease in strength of tyre rubber concrete mixture, but with increase in rubber content from o to 30% slump values increases. It means that this type of concrete is more workable than normal concrete.reducing the potential for bearing capacity failure and minimizing soil settlement.

III. 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.

IV. 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.

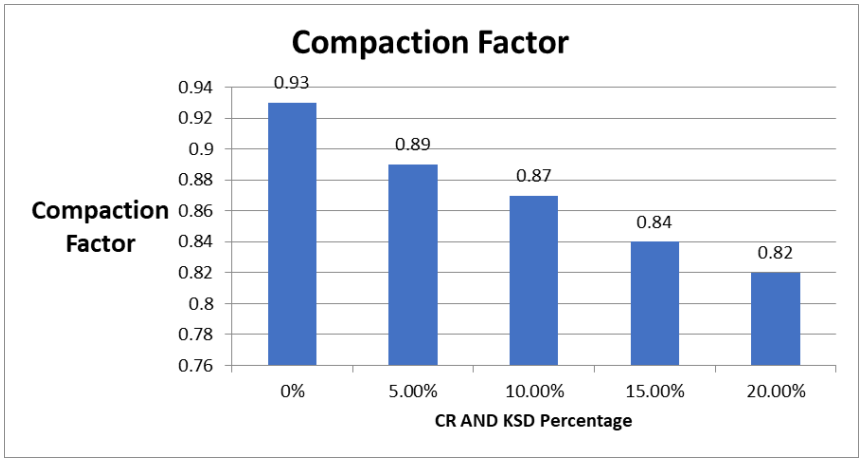

Fig 1 Compaction factor

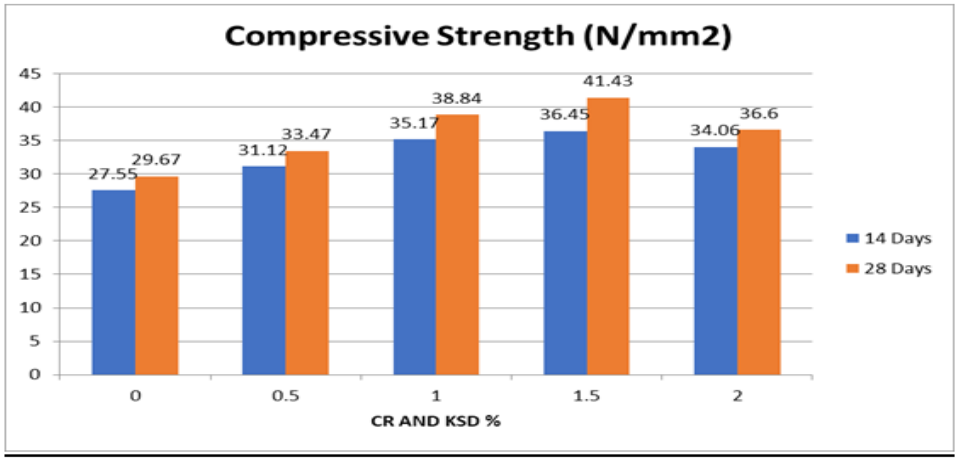

Fig 2 Comparative Compressive Strength of M30 Grade

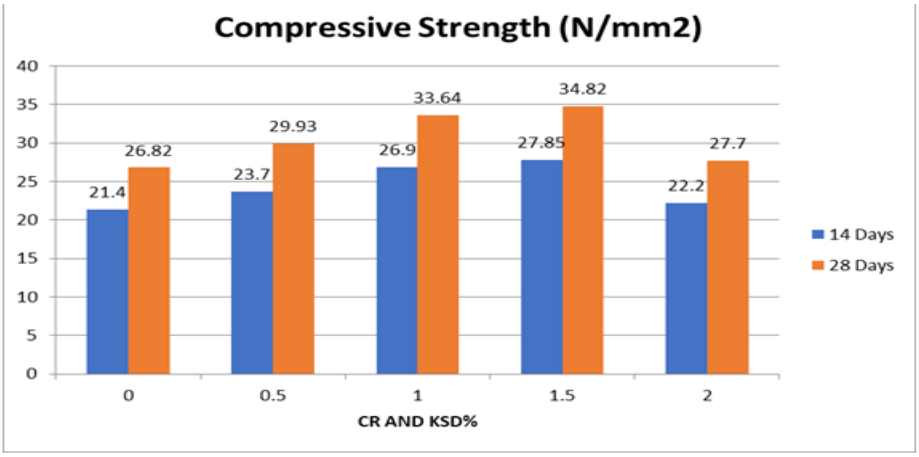

Fig 3**:** Comparative Compressive Strength of M25 Grade

V. Conclusion

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).

References

[1] ki sang son, ImanHajirasouliha, KyprosPilakoutas . Strength and deformability of waste tyre rubber filled RC column. Elsevier 2011 pp 218-226

[2] EshmaileGanjian, MortezaKhorami, Ali Akbar Maghsoudi. Scraptyre-rubber replacement for aggregate and filler in concrete. Elsevier 2009 pp 1828-1836

[3] Camille A. Issa, George Salem. Utilization of recycled crumb as fine aggregates in concrete mix design. Elsevier 2013 pp 48-52.

[4] F. Pacheco-Torgal, Yining Ding, Said Jalali. Properties and durability of concrete containing polymeric wastes (tyre rubber and polyethylene terephthalate bottles) 2012 pp 714-724

[5] N. J. Azmi, B. S. Mohammed, H. M. A. Al-Mattarneh Engineering properties of concrete containing recycled tyre rubber. ICCBT 2008 - B - (34) – pp 373-382