

Effect of R.O. Waste Water on Properties of Concrete



G.Ganesh Naidu, M.Sri Durga Vara Prasad, U.Upendra Varma, S.Sandhya

Abstract: This paper concentrates on preparing concrete in which reverse osmosis waste water is incorporated in mixing and to cure. Experimental procedure consists of 4 mix proportions of various water cement ratios. Fresh concrete is tested for workability and flowing ability. Cubes were casted and tested to find out compressive strength of concrete. Test results of potable water concrete and RO waste water concrete were compared. Results show that workability of both the concretes is almost same. When coming to the compressive strength, RO waste water concrete shows less strength at 28days compared to normal concrete.

Keywords: RO waste water, mixing, curing, hardened properties, fresh concrete.

I. INTRODUCTION

Construction industry is contributing about 8.2% of Indian GDP. Concrete is one of the major constituted of constructions today. One of the major constitute of concrete is water for mixing the components. As per the world statistics production of concrete is consuming highest amount of water compared to other industries. So, the scenario of increasing construction make the usage of water more and more and finally lead to depletion. To overcome this problem, RO waste water is adopted to mix in concrete. As we know water purified through reverse osmosis process will leave large quantity of untreated waste water. So to preserve the water resources on earth, this study has adopted RO waste water to mix in concrete and also for curing. RO waste water is collected from Pace college, ongole, Andhra Pradesh which has its resource of drinking water from ground water. During purification process nearly 12000 litres of waste water is lost in single cycle.

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II. EXPERIMENTAL PLAN

A. Materials

OPC of 53 grade was used. Cement is tested for fineness, soundness and setting time. Values are in acceptable limits.

Ro waste water is collected from pace institute of technology and sciences. Water tests are conducted and details are furnished in table below



Fig: 1 conducting fineness test on cement

s.no	Parameter tested for	result	Acceptable limits
1	pH	7.9	6.5-8.5
2	Total dissolved solids(mg/L)	400	100
3	Hardness(mg/L)	128	300
4	BOD(mg/L)	32	20
5	COD(mg/L)	320	250

Fig: 2 Test results of RO waste water

River sand is taken as fine aggregate and 16mm aggregates from local factory are used.

B. Design of concrete mix proportions

Four mixes are designed for water to cement ratios of 0.4, 0.45, 0.49 and 0.55. Mixes were renamed as shown in table 1

Water cement ratio	Normal water mix	RO waste water mix
0.3	NC1	RO1
0.35	NC2	RO2
0.4	NC3	RO3
0.45	NC4	RO4

Table 1 notation for mix

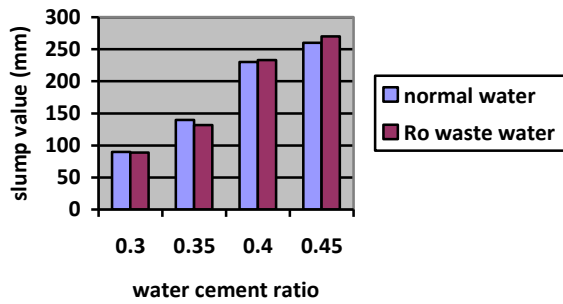


III. TEST RESULTS OF COMPARISON

I. Slump value:

Slump values for normal concrete and RO waste water concrete are compared based on IS code .slump values for w/c cement ratio of lesser value using RO waste water shows a less difference in slump value compared to normal concrete. Fig 1 shows the comparison graph of concrete.

Fig . 1 .Slump variation with w/c ratio and type of water.



II. Compressive strength:

Cubes of standard size (150mm×150mm×150mm) were made to find out 7 and 28 days strength of both concrete. Test results are shown n the Fig 2 along with the comparison.



Fig: 2 casting of concrete cubes using RO waste water



Fig: 3 curing of concrete specimen in RO waste water



Fig: 4 compressive strength test of RO Waste water specimen

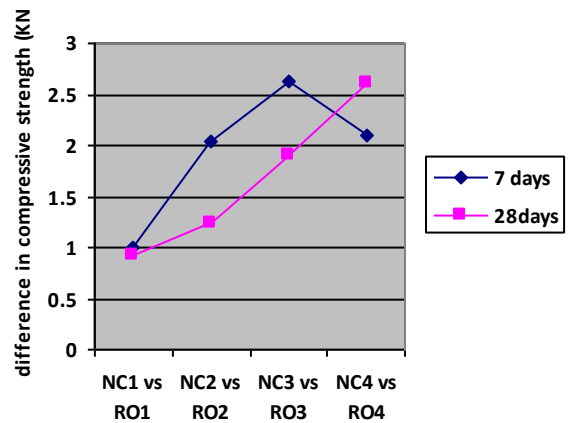


Fig: 2 comparison of compressive strengths for 7 and 28 days

IV. CONCLUSION

- Ro waste water shows a minute difference in slump values when compared to the potable water.
- Compressive strengths of both concretes have a difference not more than 3KN.
- For the workability and hardened properties RO waste water exerts a good behaviour.

- But due to presence of highest dissolved solids, concrete made with RO waste water should also be tested for durability.

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