International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 01 | January - 2024 SJIF Rating: 8.176 ISSN: 2582-3930

Effect of Gray Water on the Concrete

Mr. Dudhal Prashant Dnyanoba[1] (Head of Department), Mr. Gayke Amol Sanjay[2] (Lecturer), Ms. Pawar Vaishnavi Laxman[3] (Lecturer), Mrs. Deshpande Preshita Girish[4,] (Lecturer),
Mr. Pathan Shoeb Taher Khan [5](Lecturer)
Department of Civil Engineering Mitthulalji Sarda Polytechnic, Beed.

Abstract - Water from the kitchens, bathrooms, showers, tubs, and washing machines are referred as the grey water. Even though the grey water looks dirty, the treated grey water can be made useful in several beneficial purposes like irrigation and laundry purposes. The aim of this experimental study is to use the treated grey water in concrete making and to analyse its effects on the workability and strength aspects which can be utilized in concrete structures. The mortar and concrete compressive strength results obtained at 7 days moist curing time showed a significant increase. Mortar and concrete mixes using TGW cast at curing times of 28 days led to no significant effects on compressive strength.

Key Words: Index Terms— Drinking Water, Grey Water, Used Water, Sewage Water, Ph meter, BOD, COD, compression testing machine, M25 grade concrete

1. INTRODUCTION

Water, the most abundant source found to be one of the most essential basic needs in our daily life. It can be used for domestic, agricultural and industrial purposes. In India, the world's population is existing around 17 percent. From which it is contributed about 4% of world's renewable water resources to people. Apart from domestic, agricultural and industrial use, constructional activities also highly depends on water thus it plays a major role development of construction technology. In civil water has an undeniable use in construction so that it should be available in very large and sufficient quantity.

One quarter of the world's population is affected by economic water scarcity. Symptoms of economic water scarcity include a lack of infrastructure, causing the people without reliable access to water to have to travel long distances in or fetch water, that is often contaminated from rivers for domestic agricultural uses. Large parts of Africa suffer from economic water scarcity; developing water infrastructure in those areas could therefore help to reduce poverty.

2. SCOPE OF THIS STUDY

The nature of the wastewater and in particular its high organic strength direct the selection of appropriate processes towards biological systems. Thus the decision of treatment systems was done by the environment lab as a separate project and we followed it up by checking the suitability of that treated Grey Water in concrete preparation. The broad objective for Treated Grey Water to be used in concrete preparation was that the concrete must be defined on the basis of mechanical and durability properties. To define this, tests such as compressive strength, flexural strength, permeability and RCPT were done to compare critical factors of performance.

3. LITERATURE REVIEW

Grey water should be disinfected before use to avoid health risks to people at work. Compared with tap water lesser amount of grey water is required to achieve Standard Consistency of cement. Soundness of Grey water mixed cement paste is almost same to the tap water cement paste. Grey water reduces the initial and final setting time but that reduction is marginal and still within the prescribed limits. Cement mixed with Grey water has more compressive strength than the cement mixed with tap water. Increase in compressive strength may be due to the presence of higher soaps, detergents and surfactants in grey water.

4. NEED OF STUDY

To conduct a feasibility study of using treated grey water in concrete production, assess the durability of concrete made with grey water by the durability tests Acid Attack, Water Permeability, Chloride Attack and Sea Water Checked by doing RCPT and determine mechanical properties of concrete (compressive, tensile and flexural strength of concrete mixtures).

5. MATERIALS

5.1 Cement

We have chosen Ultratech Cement 53 Grade is selected. Ultratech cement it was tested as per IS: 4031 Fine aggregate. These are material passing through an IS sieve that is less than 4.75mm gauge beyond which they are known as coarse aggregate. Coarse aggregate form the main matrix of the concrete, whereas fine aggregate form the filler matrix between the coarse aggregate. The

most important function of the fine aggregate is to provide workability and uniformity in the mixture. The fine aggregate also helps the cement paste to hold the coarse aggregate particle in suspension.

5.2 Coarse Aggregates

The general size of coarse aggregate is 10mm and 20mm. The important parameters of coarse aggregate that influence the performance of concrete are its shape, texture and the maximum size. Since the aggregate is generally stronger than the paste, its strength is not a major factor for normal strength concrete, or for HES and VES concretes. However, the aggregate strength becomes important in the case of high performance concrete.

5.3 Water

Two types of water were chosen for this study and both the sources were checked as pre the testing procedures of IS: 3025 and checked for permissible limits as per I.S.456 - 2000 regarding water for Mixing and Curing.

6. EXPERIMENTAL WORK

In the experimental program, three basic tests for mechanical properties of concrete were conducted i.e. tests for compressive strength, flexural strength and split tensile strength. The mechanical properties of concrete were tested at the various ages. The compressive strength was tested on concrete cubes of 150 x 150 x150 mm after water curing for 3days, 7 days, 14 days, 28 days and 56 days. The flexural strength was tested using concrete beams with dimension of 150 x 700 x 700 mm after curing in the water for 28 days. The split tensile strength was tested using concrete cylinders with dimension φ150 mm x 300 mm after curing in the water for 28 days. Besides those strength tests of the concrete, the durability tests of concrete were also conducted which consisted of rapid chloride penetration test and permeability test.

6.1 METHODOLOGY

Manufacturing Collection of sample.

Performing tests on collected water sample:- a) pH b)

Chlorination c) BOD d) COD.

Analyzing test Results.

Comparing test results with potable water sample.

Collection of materials

Performing tests on materials collected.

Test to be conducted:-

a) Workability: - 1) Slump cone, 2) Compaction

Factor test casting of concrete cubes using Grey water & potable water. Performing tests On both cubes

a)Compressive strength Test Comparison of compressive strength at 7 days and 28 days of curing.

Fig. Slump Cone Test

Fig. Compressive test on concrete

TYPE OF CONCRETE	7 days (MPa)	28 days (MPa)	CURING METHOD
Concrete made using potable water	15.62	22.23	Ordinary Tap water
Concreting done using treated grey water	18.11	26.95	Ordinary Tap water
Concreting done using treated grey water	17.54	27.6	Grey water
Concrete made using treated grey water		23.94	Steam curing

Results

7. *CONCLUSIONS*

Since there is a large and considerable availability of grey water, it has been utilized in our project to meet the water demand. It was found that Grey water before use should be strictly disinfected so as to avoid the health risks of people who are working with the kind of treated water. From this experiment, it is concluded that the secondary treated grey water which we collected contains minor fraction of contaminants and it was found to be suitable as per IS provision.
The use of different types of curing also has an impact on strength of concrete structure. The strength was checked at the end of 28 days to get the ultimate strength. Thus by making use of grey water the cost of construction of concrete structures will be reduced considerably in case of plain cement concrete works.

8. FUTURE SCOPE

• 1 As a result of reuse, fresh water drinking supplies are conserved enabling it to remain in natural ecosystems.
• Grey water has the potential to save on average 50 per cent of an average household's water use. Apart from savings to the consumer, grey water reuse saves water authority money, reduces sewage flows and reduces the demand on potable water supplies.
• load on wastewater disposal systems is reduced and therefore their life is prolonged and capital expenditure required for upgrading and expansion is delayed, if not potentially decreased.

REFERENCES

[1] [1"Lynn Schneider" (2-6-2009 to 17-9-2009), "Grey water Reuse in Washington State". Chapter 246-247(pg-1,2,13)
[2] "Lucy Allen Juliet, Christian-Smith, Meena and Palaniappan" (Nov 18-2010) "Overview of Grey water Reuse" vol-7.(pg-24,27)
[3] Rajesh T.Peche, Dr.Sanjay S. Jamkar, Dr.Parag A. Sadgir, "Influence Of Grey Water As Mixing Water On Properties And Strength Of Cement", International Journal of Technology Enhancements and Emerging Engineering Research Volume 3,Issue 05 ISSN 2347- 4289
[4]Abdul Razak.B.H, Dr.D.L.Venkatesh Babu, Experimental investigation on usage of grey water in concrete production, International Research Journal of Engineering and Technology, volume-2, Issue- 08, nov2015.