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To study the effect of untreated kitchen wastewater on strength, workability characteristics of concrete as mixing and curing water's

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Abstract— **In construction industry, the cement concrete is most important and widely used material. The concrete is the conventional mixture of cement, sand, coarse aggregates and water in a mix proportion. The strength of concrete is more in the hardened state. Concrete is preferred and also easy in manufacturing process. For manufacture and curing of concrete, water is the most essential constituent. The main sources of water are river, lake, pond and well water etc. Due to rapid growth of industrialization and construction activity water is depleting day by day. Hence, we must take one step forward towards conservation or reuse of water in the construction industry. By reusing or recycling the water or wastewater in construction industry we can minimize water scarcity problem and wastewater disposal problems. The major source of wastewater is for domestic, industrial and commercial area. In the construction industry water is required in a large quantity as a curing waters for cement concrete structures. So an attempt has been made to study the effect of untreated kitchen wastewater on the strength characteristics of cement concrete as curing water's. For the present study the dissertation work is carried out on m30 grade of concrete, the curing of these specimens was carried out by using kitchen wastewaters for a period of 7, 14, and 28days. An attempt is made to study the strength characteristics of m30 grade of concrete. The analysis of the test results shows considerably increase in the compressive strength has 31.40 n/mm^2 for a curing period of 28days and also increase in split tensile strength as 3.42 n/mm^2 for a curing period of 28days is achieved by using kitchen wastewater's as a curing water's. This study will motivate and help for utilization of kitchen wastewater n the construction industry as curing water's effectively. Hence we can reduce the water scarcity problems and also reduce the usage of potable water in the construction industry.**

Key words— ***kitchen waste water, portable water concrete.***

I. Introduction

There is a large inadequacy of drinking water resources in every continent due to urbanisation, industrial needs and growing agricultural. Researches suggests, along with water large scale solutions are used but now a day's practically they are not efficient. For construction purpose, concrete is most largely used material, which is commonly made by mixing Portland cement with sand, water and crushed rocks. Annually 1 billion tons of mixing water is consumed by concrete industry in the world. More quantity of water is utilized for washing aggregates and for curing concrete.

II. OBJECTIVES

- The main objective is to study the effect of kitchen wastewater on a concrete as a mixing and curing and also compare with the conventional method.
- To study environmental characteristics of kitchen waste water.
- The effect will be studied on strength, workability characteristics with the use of kitchen wastewater and also with the portable water as mixing and curing water's.
- To achieve the mean target strength of M30 grade cement concrete by curing with kitchen waste water and portable water for 7, 14, and 28 days of curing and mixing period.

III. MATERIALS AND METHODOLOGY

A. Materials Used For Preparation Of Concrete

1. Cement

Cement used in ordinary Portland cement (OPC 53 grade) as a building material as per IS 12269-1970. The preliminary tests like normal consistency (amount of water to be added), specific gravity, initial and final setting time and compressive strength are conducted. Sieve analysis for the grading curve and fineness test were conducted as well as the determination of its moisture and with specific gravity tests are given in table 3.1

Table 1 Physical Properties Of Cement

Sl. No.	Materials Properties	Cement	
		Obtained values	Requirements as per IS 12269

1	Specific gravity	2.86	-
2	Normal consistency	33%	-
3	Initial setting time	55min	Not less than 30min
4	Final setting time	300min	Not more than 600min

2. Fine Aggregate

The river sand with zone ii, passing through 4.75mm sieve as per IS 383-1978. The physical properties of sand obtained by conducting specific gravity and sieve analysis test are given in table 3.2

Table 2 Physical Properties Of Fine Aggregates

Specific gravity	2.63
Water absorption	1%
zone	II

3. Coarse Aggregate

The stone of 20mm size is used in the project work. The physical properties of coarse aggregate are given in table 3.3

Table 3 Physical Properties Of Coarse Aggregates

Specific gravity	2.87
Water absorption	0.5%
Fineness modulus	5.65

4. Water

Portable water is used for mixing purpose in the preparation of concrete as per IS 456-2000.

5. Waste Water

In the project work, for curing and mixing purpose the canteen waste water has been utilized.

Canteen waste water was collected from the hotels and was used for curing of concrete specimens.

MIX DESIGN OF M30 GRADE CONCRETE

MIX PROPORTIONS

Cement = 383.16 kg/m^3
Fine aggregate = 660.083 kg/m^3
Coarse aggregate = 1003.289 kg/m^3
Water/cement ratio = 0.5
Water =191.58 liters

IV RESULTS AND DISCUSSION

Slump and Compaction Factor Results

Table 4 Slump Factor Results Of M30 Grade

Sl. No	Slump (mm)	Compaction factor
1	76	0.92

Table 4.4 Comparassion Of Compressive Strength Of Normal Concrete And Untreated Domestic Waste Water Concrete

Sl. No	Designation (Water Sample)	Days	Loads In KN	Compressive Strength In N/mm^2	Average In N/mm^2
1	Normal Water (Tap Water)	7	543.60	24.16	24.63
			543.60	24.16	
			575.55	25.58	
		14	560.25	24.90	25.25
			571.72	25.41	
			572.85	25.46	
		28	636.75	28.30	29.60
			66.00	29.60	
			695.25	30.90	

2	Untreated Domestic Waste Water	7	378.00	16.80	17.72
			389.700	17.32	
			428.850	19.06	
		14	470.025	20.89	20.65
			471.150	20.94	
			453.150	20.14	
		28	633.77	30.39	31.40
			710.100	31.56	
			725.850	32.26	

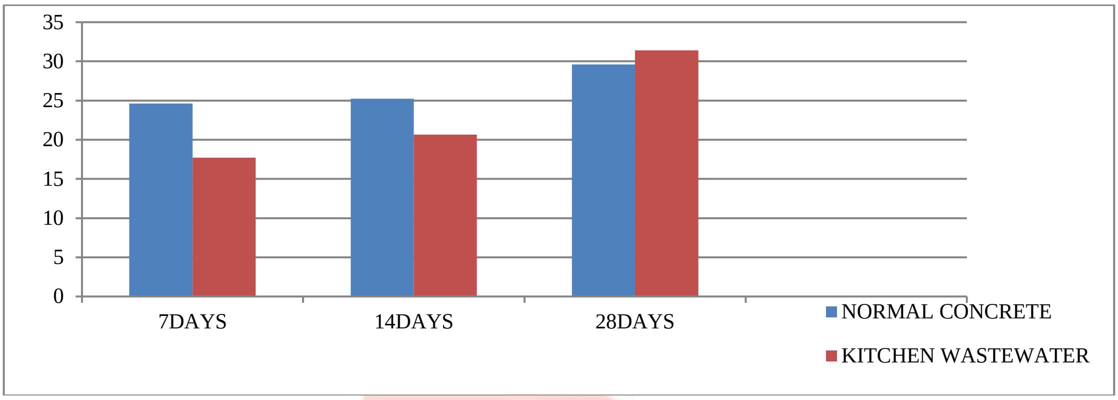

Figure 4.2 Comparassion Of Compressive Strength Of Normal Concrete And Untreated Domestic Waste Water Concrete

Table 4.5 Comparassion Of Split Tensile Strength Of Normal Concrete And Untreated Domestic Waste Water Concrete

Sl. No	Designation (Water Sample)	Days	Loads In KN	Split Tensile Strength In N/mm²	Average In N/mm²
1	Normal Water (Tap Water)	7	118.72	1.68	1.81
			129.72	1.83	
			137.53	1.94	
		14	154.48	2.18	2.3
			165.20	2.33	
			168.38	2.38	
		28	186.39	2.5	2.63
			196.20	2.6	
			196.20	2.8	
2	Untreated Domestic Waste Water	7	130.00	1.83	1.92
			139.00	1.96	
			140.90	1.99	
		14	150.90	2.13	2.17
			155.10	2.19	
			155.50	2.20	
		28	197.92	2.8	3.42
			245.90	3.48	
			281.30	3.98	

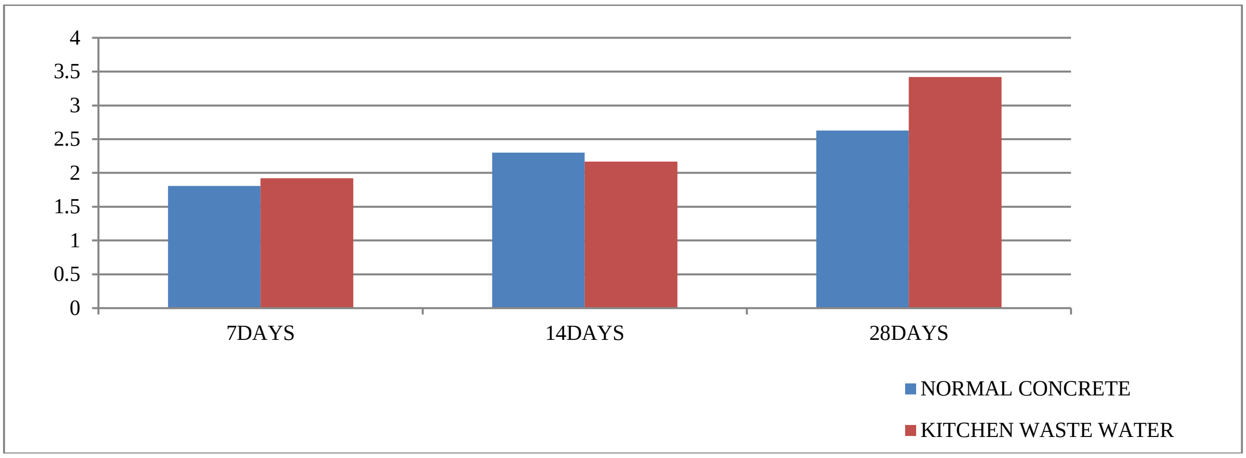

Figure 4.4 Comparassion Of Split Tensile Strength Of Normal Concrete And Untreated Domestic Waste Water Concrete

Table 4.6 Comparassion Of Flexural Strength Of Normal Concrete And Untreated Domestic Waste Water Concrete

Sl. No	Designation (Water Sample)	Days	Loads In KN	Flexural Strength In N/mm^2	Average In N/mm^2
1	Normal Water (Tap Water)	7	5.96 6.02 6.08	2.98 3.01 3.04	3.01
		14	6.80 7.00 7.38	3.34 3.50 3.69	3.51
		28	6.42 7.26 7.88	3.21 3.63 3.94	3.59
2	Untreated Domestic Waste Water	7	6.22 6.62 6.72	3.11 3.31 3.36	3.26
		14	6.78 7.12 7.60	3.39 3.56 3.80	3.58
		28	6.82 7.36 7.96	3.41 3.68 3.98	3.69

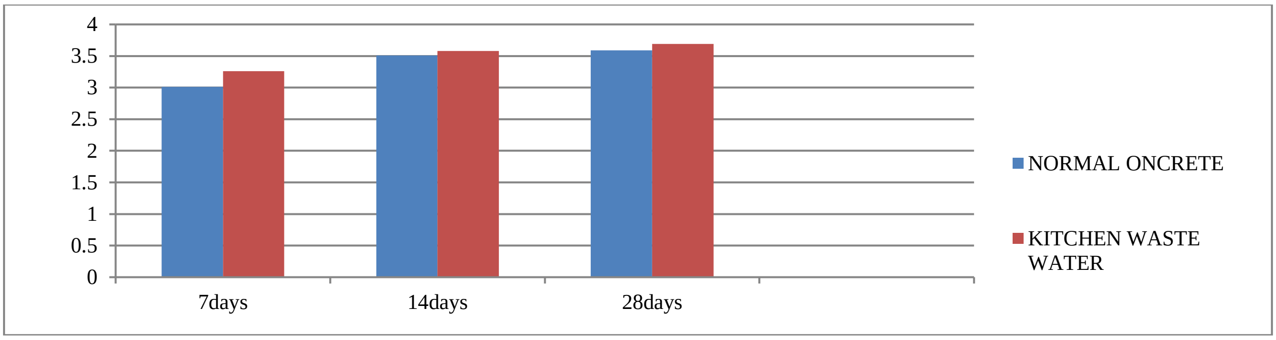

Figure 4.6 Comparassion Of Flexural Strength Of Normal Concrete And Untreated Domestic Waste Water Concrete

CONCLUSION

From the above experimental work it is concluded that:

1. The test results shows, the slump value is 76mm.

2. From this experimental work we can conclude that, Kitchen waste water used for curing and mixing of concrete structures shown considerable increase in a compressive strength compared to the normal concrete for a period of 28 days, average in 31.4 N/mm^2.
3. With this test results we can conclude, Kitchen waste water used for curing and mixing of concrete structures shown considerable increase in a spit tensile strength compared to the normal concrete for a period of 28 days, average in 3.42 N/mm^2.
4. Similarly, Kitchen waste water used for curing and mixing of concrete structures shown considerable increase in a flexural strength compared to the normal concrete for a period of 28 days, average in 3.69 N/mm^2.
5. The test results shows with the use of kitchen wastewater used in concrete as mixing and curing waters there is an increasing in compressive, tensile, flexure strength and workability characteristics compare to conventional concrete.
6. From the present study we can conclude that the curing and mixing with waste water can be done in the construction industry with more efficiency, and also it can be used when there is a scarcity of portable water.
7. The characteristics like pH, BOD, alkalinity, acidity, chloride, total solids, total dissolved solids, suspended solids and oil and grease whose strength has been increased by 1%.

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