

# Staging Rain Water Reuse in Temporary Concrete Structure by Activated Carbon Treatment

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**ABSTRACT:** Rainwater is a natural Source, so we need to preserve as large contribution in our daily lives. Staging and improper rainwater harvesting lead to lagging of rainwater in empty plots. In an empty plot normally 2400sqft the rain water staggered there where there is no drainage to the water. In that case the water can stagger upto 2400cft. We can use that water for the temporary construction purpose on the plots. The water is collected as samples and tested as per procedure then the test results are checked for the water can be used for concrete as per IS 456:2000. In case the water is not suitable for concrete as per specification we need to treat the water. Hence the attempt was made to analyze the state of rainwater re usage in construction.

**KEYWORDS:** Staggered rainwater, Aggregates, Flame photometer, BOD, Mortar.

## I. INTRODUCTION

Lack of protection of freshwater resources is considered an important long-term strategy for the reuse of wastewater. The reuse of treated wastewater for irrigation in World to remedy the lack of water, the effort has been practiced for years. About 262 million cubic meters of treated wastewater, it is expected that the size of the year 2025. Construction of new buildings as well as residential and commercial construction activities, including the largest, trade Office, World's construction sector growth rates have increased dramatically in the last 10 years. It is hoped that this volume increases due to growth in the construction sector. As a result of construction activities wastewater is blocked again. Overall, a billion tons of concrete industry uses a mixture of water annually. In addition, the concrete mixers, concrete pumps, equipment, aggregates, cement and ready concrete is hardening [7, 8] large amounts of fresh water used to rinse. Many extensively studied the use of laboratory-scale studies of wastewater in the concrete mix. These studies such as wastewater previously treated wastewater, wastewater and secondary treatment of wastewater clean-up one by those three types of testing different types of wastewater treatment and the treated effluent. However, concrete mix, using a pilot-scale use of domestic rainwater sample has rarely been studied. Primary treated wastewater (PTW) and secondary treatment of wastewater (STW) compounds from empty plots of Mayiladuthurai area Nagapattinam district in Tamilnadu state of Indian country was collected and used in mortar and concrete.

# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 3, March 2017

## II. RELATED WORK

Staggered rain water from the empty plots from Mayiladuthurai area is collected as a test samples and they are tested in a laboratory. The test conducted on the water is pH, NACL, COD and BOD for the contaminant content in the water measurement. The water is free from NaCl and itsnot acidic in nature. So the water is used for concrete surely but the others tests must be conducted to prove the water cannot become harm and corrode the reinforcements in concrete. Further test conducted are Tss, Tds, Ts. If the water contain calcium, potassium it affect the nature of the concrete and lead to deterioration. IN that case the test for calcium and potassium is conducted in flame photo meter.

### Preparation and testing of raw materials:

Materials: Aggregates

In general aggregates are chemically inactive materials. These large inert materials are used in concrete to reduce the cost because the cost of the cement is more when compare to aggregates. The properties of the raw materials used in preparing mortar and concrete mixtures were tested in laboratories according to national and international standards. These materials include coarse aggregate, Fine aggregate, and cement.

## III TEST CONDUCTED ON THE RAW SAMPLE

### pH:

pH is a scale used to specify the alkalinity or acidity of an liquid solution. It is basically the negative of the logarithm to base 10 of activity of the hydrogen ion. Pure water is neutral. Samples with a pH value less than 7 are acidic and samples with a pH greater than 7 are basic. At pH 7, being neither an acid nor a base.

### FLAME PHOTOMETER:

A flame photometer is a equipment which is used to determine the concentration of certain metal ions, among Potassium, Calcium and Sodium as shown in fig (1). It is a controlled flame test with intensity of the flame color. It has the range of metals that could be analyzed and the limits are also considered. The intensity of color will depend on the energy that has been absorbed by the atoms that was sufficient to vaporize.



Fig (1)

### DISSOLVED OXYGEN (DO):

DO is the most important indicator of the health of a water body and its capacity to support a balanced aquatic ecosystem of plants and animals. The equipment is such a small one to find out the do as shown Dissolved Oxygen is known as the amount of oxygen dissolved in water such as a lake, river, or stream. Wastewater containing organic and inorganic pollutant (oxygen consuming) depletes the dissolved oxygen and may lead to the death of marine organisms.

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Vol. 6, Issue 3, March 2017



FIG(2)

### AMMONIA NITROGEN TEST

To find out the concentration of ammonical nitrogen in the water sample the test is conducted as per standard procedure. The initial value of the test is orange in color as shown in fig (3). Then the water is titrated against 2N sulphuric acid the sample water turns from orange to yellow as result as shown in fig (4)



INITIAL fig(3)      FINAL fig (4)

### Treatment of water

The rainwater sample is treated by using activated carbon with fly ash. Treatment is conducted by slow horizontal flow method. The rainwater sample is collected from the wastelands staggered rainwater. For 1m length of pipe approximately 5 liters of rainwater sample is to be collected.

The samples are collected from the source properly. The water waste used for the test is kept without any changes before treatment. Sufficient quantities of rainwater sample samples were taken from the source periodically. The initial effluent characteristics such as pH, DO and COD were determined in the raw effluent.

After the initial process the rainwater sample were treated with Activated Carbon as adsorbent which is mixed with uniform size fly ash in the ratio of **1:27** (1part activated carbon-27 part fly ash) for the reduction of chemical oxygen demand. The burned coconut shell is used as an adsorbent.

For the continuous flow of rainwater sample the Peristaltic Pump **RH-P120S** is a single channel pump for the use in laboratory and extensively in industrial applications. The treatment was conducted by applying the various rpm levels such as 3,5,7 etc.,. For the different stage of rpm, the rainwater sample parameter such as pH, DO and COD were analyzed. The COD removal efficiencies for the various rpm levels are calculated. The equipment's used for analyze pH is **ELICO-LII26** iron analyzer, for DO is **LT-LUTRON model no-DO-5509** and for COD is **COD analyzer-IPM-1906** is used shown in fig (3).



Fig (3)

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### Concrete preparation:

After the test results, the treated water is used to make concrete of M10 grade as per IS 456:2000. The concrete is placed as cube of diameter 150mmx150mmx150mm as per specification. Then the concrete is cured for 28 days and tested in the compression testing machine for find out the compression values. The concrete can have the compression value of 9.13n/mm<sup>2</sup> as shown in the result.

### IV. TEST CONDUCTED IN COCNRETE

#### COMPRESSION TEST:

To find out the compression strength the cube made with the water sample as mixture is taken out after cured for 28 days and dried for 1 hour and cleaned with the white cloth. After that the cube is tested in the compression testing machine as shown fig (5)



Fig(5)

#### RESULT AND DISCUSSION FOR CONCRETE

GRADE	DAYS TESTED	COMPRESSION LOAD
M10	7	143.25KN
	14	199.49KN
	28	205.60KN

#### LOAD CALCULATION

After 28 days it attains a load of 205.6 kn it has been converted in to a load of n/mm<sup>2</sup> so the actual load by area gives the perfect load.

Load:

$$205.6 \times 10^3 / 150 \times 150 = 9.13 \text{ N/mm}^2$$

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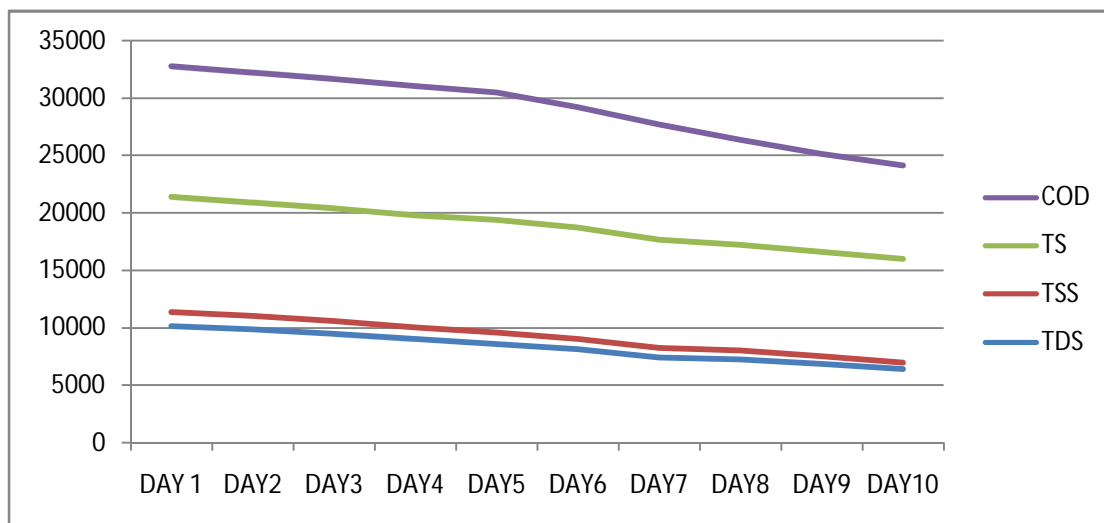
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### V. RESULT AND GRAPH DISCUSSION FOR SAMPLE WATER AFTER TREATMENT

#### STUDY OF TREATMENT PROCESS:

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
<b>pH</b>	7.40	7.21	7.03	6.98	6.97	6.97	6.96	6.96	6.97	6.96
<b>DO (mg/l)</b>	4.2	4.9	5.6	6.2	6.9	7.9	8.8	8.9	9.0	9.1
<b>TDS (mg/l)</b>	10120	9830	9440	8990	8590	8110	7400	7250	6850	6420
<b>TSS (mg/l)</b>	1210	1160	1090	1020	970	920	840	750	690	550
<b>TS (mg/l)</b>	10080	9920	9870	9790	9820	9690	9410	9210	9010	8990
<b>COD (mg/l)</b>	11350	11300	11250	11230	11120	10470	10060	9160	8590	8160



### VI. CONCLUSION

From this the water from waste lands which is staggered during the rainy seasons are used efficiently for temporary construction in concrete structures. This decrease the lead to the lack of water in the world for construction and drinking purpose. By using that water the depletion of water for construction is reduced in greater level.

### REFERENCES

- [1] Shekarchi, M.; Yazdian, M.; Mehrdadi, N. Use of biologically treated wastewater in concrete. Kuwait J. Sci. Eng. 2012, 39, 97–111. 8.
- [2] Naik, T.R. Sustainability of the cement and concrete industries. In Sustainable Construction Materials and Technologies; Chun, Y.M., Claisse, P., Naik, T.R., Ganjian, E., Eds.; Taylor and Francis: Coventry, UK, 2007; pp. 19–25.
- [3] Silva, M.; Naik, T.R. Sustainable use of resources—Recycling of sewage treatment plant water in concrete. In Proceedings of the Second International Conference on Sustainable Construction Materials and Technologies, Ancona, Italy, 28 June 2010.
- [4] Cebeci, O.Z.; Saatci, A.M. Domestic sewage as mixing water in concrete. ACI Mater. J. 1989, 86, 503–506.
- [5] Al-Ghusain, I.; Terro, M.J. Use of treated wastewater for concrete mixing in Kuwait. Kuwait J. Sci. Eng. 2003, 30, 213–228. 15.
- [6] Lee, O.S.; Salim, M.R.; Ismail, M.; Ali, M.I. Reusing treated effluent in concrete technology. Jurnalteknologi 2001, 34, 1–10. 16.
- [7] American Public Health Association (APHA). Standard Methods for the Examination of Water and Wastewater; APHA: Washington, DC, USA, 2006. 17.
- [8] Moavenzadeh, F. Concise Encyclopedia of Building and Construction Materials; The MIT Press: Cambridge MA, USA, 1990; p. 689.