

# Construction water quality of Selaiyur Lake

Shamini Valentina D\*

Department of Civil Engineering, Bharath University, Chennai, Tamil Nadu, India

\*Corresponding author: E-Mail: sham\_spears2010@yahoo.com

## ABSTRACT

This study involves the investigation of surface water quality of Selaiyur Lake. This would include the physico-chemical analysis of the Selaiyur Lake. It is known that surface water bodies are important source for both drinking and construction purposes after Rain water. But Rain water is the ones to get polluted easily due to anthropogenic activities and industries. Thus it is very important to conserve Surface water and its quality for our basic human needs. This study will help us in identifying the quality of surface water and if it is safe for usage.

**KEY WORDS:** Construction, Selaiyur Lake, Rain water.

## 1. INTRODUCTION

Surface water are water bodies found on the surface of earth in the form of a river stream, lake, or ocean. Groundwater is also a source of surface water that discharges water and refills lakes and ponds. Pollution of surface water takes place when certain hazardous substances get mixed with the water body. It can be due to nature or also due to anthropogenic activities. Since there is a close relationship between sediments and surface water bodies, contaminated sediments are often considered part of surface water contamination that can lead to be termed as Turbidity in water.

Gorde & Jadhav (2013), stated that every known life form is dependent and needs water to survive and reproduce. Water exists in nature in various forms like river, ocean, clouds, lake, rain, fog and snow. Lake is a large body of water that is surrounded by land and is a habitat for numerous types of aquatic life.

## 2. MATERIALS AND METHODS

Due to water shortage and in order to monitor the rate at which water bodies are getting polluted, it became a must to analyse the water quality of Selaiyur lake. Around 15 surface water samples were collected from the Selaiyur lake in February 2015 and tested for important characteristics of water such as Odour, pH, Organic and Inorganic solids, Chloride, Sulphate, Iron, Total dissolved solids etc.

### Procedures of experiments under construction test odor:

**Procedure:** After collection of sample, pour the sample into a Wide mouth glass stoppered bottles (1 liter) half (500ml). Now insert the stopper and shake the glass bottle for 2 to 3 seconds and observe odor coming from the sample as soon as possible. The test for odor should be conducted in room temperature.

### pH Value:

**Procedure:** Set the temp knob in actual solution temperature which is finding by thermometer. Take 7.00 buffer solution and immerse the electrode then adjust the reading to 7.00 using CAL (7.00) knob. Take 4.00 buffer solution and immerse the electrode then adjust the reading to 4.00 using SLOP (4.00) knob. Repeat the steps which are given in above until the meter shows concordant values. Take sample water in beaker and immerse the electrode and stir gently note the reading after 30 seconds.

### Reagents:

- pH Buffer Solution 4.00 : Take 4.00 pH Buffer tablet and dissolved in 100ml of distilled water.
- pH Buffer Solution 7.00 : Take 7.00 pH Buffer tablet and dissolved in 100ml of distilled water.

### Organic & in-organic solids:

**Procedure:** Take a silica crucible. Wash and dry in an oven where temperature is maintained at 105°C for one hour and ignite at 550°C to remove organic substance in the sample. Using an analytical balance, weigh the empty silica crucible. Use a pipette to shift 75mL of sample which is unfiltered into a dish. Let the oven reach a temperature of 105°C. Oven and furnace temperatures should be checked frequently to maintain desired temperature. Put the dish into the oven in such a way that spilling of sample at the time of boiling and evaporation does not happen. The sample must be dried to a constant mass. Now allow the desiccators to cool the container. The desiccators have been designed to create a desired environment of dryness. This is maintained by the desiccant found inside. The lid should not be taken off for long time or the desiccant will depleted. Now weigh the dish after it has cooled to avoid absorption of moisture. The samples have to be weighed, dried and eventually, cooled. Weight of residue to be noted as Wz in grams. Allow temperature in furnace to reach 550°C. The temperature in furnace should be constantly checked to maintain the desired temperature and environment. Keep the crucible in the furnace. Allow the crucible to ignite for 18-20 minutes. Silica crucible should be cooled to room temperature. After the dish has cooled it has to be weight to check if no moisture has been absorbed. Note the weight with residue as Ws in grams.

### Total Volatile Solids Calculation:

Initial dish weight+ sample 1 weight (W<sub>1</sub>) = ..... g

Final dish weight+ sample weight after drying in desiccators at 105°C ( $W_2$ ) = .... g

Final weight of dish + sample weight after drying at 550° C ( $W_3$ ) = ..... g

Weight of volatile substance ( $W$ ) =  $W_2 - W_3$  .....grams

Calculation of Total solids present =  $1000 - 1000/v$

$W$  = total residue weight in mg ( $W \times 1000$ ) = ....

$V$  = Volume of the sample ( $V \times 1000$ ) = ....Litres

#### Calculation of Total Fixed Solids

Weight of dish initially + ( $W_1$ ) = ..... g

Final weight of dish + weight of sample after drying in desiccators at 105°C ( $W_2$ ) = ..... g

Final weight of dish + weight of sample after drying in desiccators at 550° C ( $W_3$ ) = ..... g

The weight of volatile substance ( $W$ ) = ( $W_2 - W_3$ ).....g

The total solids found in sample =  $1000 - \frac{1000}{Vol}$

$W$  - total residue's weight in mg ( $W \times 1000$ ) = .....

$V$  = Volume of the sample ( $V \times 1000$ ) = .....Litres

#### Alkalinity:

**Procedure:** Take 100 ml of sample add few drops of Phenolphthalein as an indicator (after adding phenolphthalein indicator, If there is no pink colour (or) pH of the sample is less than 8.3 means phenolphthalein alkalinity is absent). If pink colour present titrates the solution against 0.02N Sulphuric Acid end point is disappearance of pink colour (A). If phenolphthalein alkalinity absent add few drops of mixed indicator solution directly into sample or If phenolphthalein alkalinity present add mixed indicator in already titrated solution then Titrate against 0.02N Sulphuric Acid. End point is presence of pink colour (B).

#### Calculation:

Alkalinity, Mg/l =  $\frac{(A+B) \times 0.02 \times 50,000}{\text{Volume of the Sample taken (100ml)}}$ .

A – Phenolphthalein titration value.

B – Mixed indicator titration value.

#### Chloride:

**Procedure:** Take 100 ml of sample add 1ml of potassium chromate titrate against Silver Nitrate (0.0141N) end point presence of brick red colour.

**Formula:** Chloride, Mg/l = Titration value  $\times$  0.0141  $\times$  34,450 Volume of the Sample taken (100ml)

#### Sulphate:

**Procedure:** Take 6 No's of 50ml Nessler's Cylinders Nessler's Cylinder, take 25ml of sample Nessler's Cylinder, take 25ml of Blank (Distilled Water) Nessler's Cylinder, take 1 ml Stock Sulphate Solution (1ml = 0.1Mg of SO<sub>4</sub>) Nessler's Cylinder, take 2ml Stock Sulphate Solution Nessler's Cylinder, take 3ml Stock Sulphate Solution Nessler's Cylinder, take 4ml Stock Sulphate Solution Add each cylinder 1ml of Hydrochloric Acid (1:9) and 1 ml of Conditioning Reagent and 1 g of Barium Chloride dissolved well and makeup to 50ml with distilled water. Take the OD (or) ABS Values in spectrophotometer at 420 nm. Draw the graph ABS Values Vs Mg of sulphate solution. Then take the graph values from graph.

**Formula:** Sulphate, Mg/l = Graph Value  $\times$  1000 Volume of sample taken (25ml)

#### Iron:

**Procedure:** Take 6 No's of 250ml Conical Flasks Conical Flask, take 50ml of sample Conical Flask, take 50ml of Blank (Distilled Water) Conical Flask, take 1 ml Standard Iron Solution (1ml = 0.02Mg of Iron) + 49 ml Distilled water Conical Flask, take 2ml Standard Iron Solution + 48 ml Distilled water Conical Flask, take 3ml Standard Iron Solution + 47 ml Distilled water Conical Flask, take 4ml Standard Iron Solution + 46 ml Distilled water Add all Conical Flasks 1ml of Hydroxylamine Hydrochloride Solution + 2ml of Con. HCL. Then Kept the all flask in hot plate and reduce the value about 20ml. After cooling add all flasks 10ml of Ammonium Acetate Buffer Solution + 10ml of 1,10 Phenantroline solution then make up to 100ml with distilled water using nessler cylinder respectively. Take the OD value of standards and sample in spectrophotometer at 510NM. Draw the graph Mg of Iron Vs OD Values of Standards.

**Formula:** Iron, Mg/l = Graph Value  $\times$  1000 Volume of sample taken (50ml)

#### Total suspended solids:

**Procedure:** Clean the filter paper with distilled water by using filter disk. Remove the filter paper from filtration apparatus and transfer to aluminum weighing dish. Dry in an oven at 103- 105°C for 1hr. Choose sample volume to yield between 2.5 to 2 } }mg dried residues. Assemble filtering apparatus and filter and begin suction. Wet filter with a small volume of reagent grade water to seat it. Well mixed sample pipette a measured volume onto the seated glass fiber filter. Wash the filter with distilled water, allowing complete drainage and continue suction for about 3 min

after filtration in complete. Carefully remove the filter from filtration apparatus and transfer to an aluminum weighing dish as a support. Dry for at least 1 hr at 103- 105°C. Cool in the desiccators. Weigh the dish and calculated. Total suspended solids mg /L - (A-B) x 1000 /V. A is filter weight + dried residue. B is filter weight in mg. Vis Volume of sample in ml.

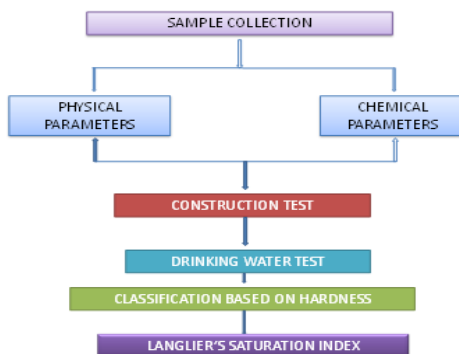


Figure.1. Flow chart

### 3. RESULTS AND DISCUSSIONS

The following test were conducted with IS 456-2000 Plain and Reinforced Concrete - Code of Practice is an Indian Standard code of practice for general structural use of plain and reinforced concrete as the permissible limits. The latest revision of this standard was done in year 2000, reaffirmed 2005. This code uses the limit stat design approach. It is written for use in India. It gives extensive information on the various aspects of concrete. IS 456 is considered as the Bible for Civil Engineers in India.

After the construction tests were analysed, all the water samples showed presence of iron in them. Presence of Iron in the water is dangerous and it reduces the strength of concrete and causes no strength at times. Rusting of RCC takes place. Iron in water also causes health problems. The water will be discoloured (brownish red coloured) and it stains plumbing pipes, clothes when washed with it.

Table.1. Construction test

Sno	Odour	pH	Organic Solids mg/L	Inorganic Solids mg/L	Quantity of 0.02N NaOH required mg/L	Quantity Of 0.02N H <sub>2</sub> SO <sub>4</sub> Required mg/L	Cl mg/L	SO <sub>4</sub> mg/L	Fe mg/L	TSS mg/L
1	Unobjectable	8	28	701		18.8	372	110	0.56	20
2	Unobjectable	8	28	688	-	17.1	358	105	0.58	23
3	Unobjectable	8	29	712	-	17.8	372	109	0.58	18
4	Unobjectable	8	22	718	-	16.6	360	105	0.54	16
5	Unobjectable	8	20	708	-	17.4	364	107	0.54	18
6	Unobjectable	8	24	684	-	17.8	382	104	0.59	18
7	Unobjectable	8	26	718	-	18.1	388	144	0.51	11
8	Unobjectable	8	22	681	-	17.1	373	138	0.44	13
9	Unobjectable	8	21	675	-	17.6	381	142	0.53	14
10	Unobjectable	8	26	701	-	18.2	391	141	0.52	16
11	Unobjectable	8	23	684	-	17.5	389	156	0.49	15
12	Unobjectable	8	25	668	-	16.9	401	152	0.44	12
13	Unobjectable	8	22	661	-	16.2	369	142	0.56	11
14	Unobjectable	8	25	702	-	16.9	378	139	0.48	19
15	Unobjectable	8	24	697	-	17.6	395	148	0.52	14

### 4. CONCLUSIONS

Due to water shortage and in order to monitor the rate at which water bodies are getting polluted, it became a must to analyse the water quality of Selaiyur lake. Around 15 surface water samples were collected from the Selaiyur lake in February 2015 and tested for important characteristics of water such as Odour, pH, Organic and

Inorganic solids, Chloride, Sulphate, Iron, Total dissolved solids etc. After the construction tests were analysed, all the water samples showed presence of iron in them. Presence of Iron in the water is dangerous and it reduces the strength of concrete and causes no strength at times. Rusting of RCC takes place. Iron in water also causes health problems. The water will be discoloured (brownish red coloured) and it stains plumbing pipes, clothes when washed with it.

## REFERENCES

- Anbazhagan R, Prabhakar S, Vanangamudi S, Thamotharan C, Electromagnetic engine, Middle - East Journal of Scientific Research, 20 (3), 2014, 385-387.
- Anbazhagan R, Satheesh B, Gopalakrishnan K, Mathematical modeling and simulation of modern cars in the role of stability analysis, Indian Journal of Science and Technology, 6 (5), 2013, 4633-4641.
- Anju Verma, Biswajeet Thakur, Shashwat Katiyar, Dharam Singh and Madhu Rai, Evaluation of ground water quality in Lucknow, Uttar Pradesh using remote sensing and geographic information systems, International Journal of Water Resources and Environmental Engineering, 5 (2), 2013, 67-76.
- Biswajeet Pradhan and Saied Pirasteh, Hydro-Chemical Analysis of the Ground Water of the Basaltic Catchments, Upper Bhatsai Region, Maharashtra, The Open Hydrology Journal, 5, 2011, 51-57.
- Brindha G, Krishnakumar T, Vijayalatha S, Emerging trends in tele-medicine in rural healthcare, International Journal of Pharmacy and Technology, 7 (2), 2015, 8986-8991.
- Brintha Rajakumari S, Nalini C, An efficient cost model for data storage with horizontal layout in the cloud, Indian Journal of Science and Technology, 7, 2014, 45-46.
- Chatterji C and Raziuddin M, Determination of water quality index (W.Q.I) of a degraded river in Asanil industrial area, Raniganj, Burdwan, West Bengal', Nature Environment and pollution Technology, 1 (2), 2002, 181-189.
- Devendra Dohare, Shriram Deshpande and Atul Kotiya, Analysis of Ground Water Quality Parameters, Research Journal of Engineering Sciences, 3 (5), 2014, 26-31.
- Gopalakrishnan K, Prem Jeya Kumar M, Sundeep Aanand J, Udayakumar R, Analysis of static and dynamic load on hydrostatic bearing with variable viscosity and pressure, Indian Journal of Science and Technology, 6 (6), 2013, 4783-4788.
- Haroon Sajjad, Syed Mohammad Rashid, Sandip Prasad, Rahisuddin, Assessment of Groundwater Quality in Meerut City, India, International Journal of Environmental Protection, 3 (2), 2010, 20-26.
- Hemant Pathak and Limaye SN, Assessment of Physico-Chemical Quality of Groundwater in rural area nearby Sagar city, MP, India, Advances in Applied Science Research, 3 (1), 2012, 555-562.
- Jeyanthi Rebecca L, Susithra G, Sharmila S, Das MP, Isolation and screening of chitinase producing *Serratia marcescens* from soil, Journal of Chemical and Pharmaceutical Research, 5 (2), 2013, 192-195.
- Kavitha R and Elangovan K, Review article on Ground water quality characteristics at Erode district, (India), of I.J.E.S., 1(2), 2010.
- Kerana Hanirex D, Kaliyamurthie KP, An adaptive transaction reduction approach for mining frequent itemsets: A comparative study on dengue virus type1, International Journal of Pharma and Bio Sciences, 6 (2), 2015, 336-340.
- Mangukiya Rupal, Bhattacharya Tanushree and Chakraborty Sukalyan, Quality Characterization of Groundwater using Water Quality Index in Surat city, Gujarat, India, International Research Journal of Environment Sciences, 1 (4), 2012, 14-23.
- Natarajan Venkat Kumar, Samson Mathew, Ganapathiram Swaminathan, Analysis of Groundwater for Potability from Tiruchirappalli City Using Back propagation ANN Model and GIS, Journal of Environmental Protection, 1, 2010, 136-142.
- Neerja Kalra, Rajesh Kumar SS, Yadav and Singh RT, Physico-chemical analysis of ground water taken from five blocks (Udwanthnagar, Tarari, Charpokhar, Piro, Sahar) of southern Bhojpur (Bihar), Journal of Chemical and Pharmaceutical Research, 4 (3), 2012, 1827-1832.
- Oladipo MOA, Njinga RL, Baba A and Mohammed I, Advances in Applied Science Research, 2 (6), 2011, 123-130.

Sachithanatham P, Sa Nkaran S, Elavenil S, Experimental study on the effect of rise on shallow funicular concrete shells over square ground plan, International Journal of Applied Engineering Research, 10 (20), 2015, 41340-41345.

Sarala C, Ravi Babu P, Assessment of Groundwater Quality Parameters in and around Jawaharnagar, Hyderabad, International Journal of Scientific and Research Publications, 2 (10), 2012, 2250-3153.

Satyanarayana P, Appala Raju N, Harikrishna K and Viswanath K, Urban Groundwater Quality Assessment: A Case Study Of Greater Visakhapatnam Municipal Corporation Area (Gvmc), Andhra Pradesh, India ” International Journal of Engineering Science Invention, 2 (5), 2010, 20-31.

Sharmila S, Jeyanthi Rebecca L, Das MP, Production of Biodiesel from Chaetomorpha antennina and Gracilaria corticata, Journal of Chemical and Pharmaceutical Research, 4 (11), 2012, 4870-4874.

Sharmila S, Jeyanthi Rebecca L, Naveen Chandran P, Kowsalya E, Dutta H, Ray S, Kripanand N.R, Extraction of biofuel from seaweed and analyse its engine performance, International Journal of Pharmacy and Technology, 7 (2), 2015, 8870-8875.

Thamotharan C, Prabhakar S, Vanangamudi S, Anbazhagan R, Coomarasamy C, Hydraulic rear drum brake system in two wheeler, Middle - East Journal of Scientific Research, 20 (12), 2014, 1826-1833.

Vanangamudi S, Prabhakar S, Thamotharan C, Anbazhagan R, Collision control system in cars, Middle - East Journal of Scientific Research, 20 (12), 2014, 1799-1809.

Vanangamudi S, Prabhakar S, Thamotharan C, Anbazhagan R, Drive shaft mechanism in motor cycle, Middle - East Journal of Scientific Research, 20 (12), 2014, 1810-1815.

Vanangamudi S, Prabhakar S, Thamotharan C, Anbazhagan R, Dual fuel hybrid bike, Middle - East Journal of Scientific Research, 20 (12), 2014, 1819-1822.

Vanangamudi S, Prabhakar S, Thamotharan C, Anbazhagan R, Turbo charger in two wheeler engine, Middle - East Journal of Scientific Research, 20 (12), 2014, 1841-1847.

Venkata Mushini, Rao Subba, Rao Vaddi Dhilleswara and Bethapudi Samuel Anand Andrews, Assessment of Quality of Drinking Water at Srikurmam in Srikakulam District, Andhra Pradesh, India, International Research Journal of Environment Sciences, 1 (2), 2012, 13-20.