

GOVERNMENT OF PUDUCHERRY
S.T.P.P.GOVERNMENT JUNIOR COLLEGE
YANAM

A report on Rashtriya Aavishkar Saptah 2018'

Water is essential to sustain life. Adequate, safe and accessible supply of water must be available to all. Every effort should be made to achieve safe drinking-water. Therefore, it is important from the educational point of view to make students aware of some testing procedures so that they become vigilant about the quality of water in their locality. Keeping this in view, "Testing of Water" has been proposed as a theme to observe "Rashtriya Aavishkar Saptah 2018". This may help in spreading a wave of awareness about the quality of water in our country. The procedures for testing the samples of water on three parameters, namely - Foaming Capacity, Hydrogen Ion Concentration (pH) and Total Alkalinity of Water, have been given in 'Guidelines for Rashtriya Aavishkar Saptah 2018'. At Secondary and Higher Secondary Stages of school education, systemic experimentation as a tool and working on locally significant projects involving science and technology are important parts of curriculum. In order to encourage school students for exploration and innovation, it is extremely important to engage them in experimentation.

Rashtriya Avishkar Saptah 2018 conducted during October 29 to November 02, 2018 in STPP Government Junior College, Yanam along with Students of Rajiv Gandhi English Medium School, Yanam.

The students participated in the event in STPP Government Junior College Yanam are

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|---|---------------|
| 1. Class XI of STPP GJC Yanam | - 20 Students |
| 2. Class XII of STPP GJC Yanam | - 20 Students |
| 3. Class IX of RGG EM High School Yanam | - 30 Students |
| 4. Class X of RGG EM High School Yanam | - 30 Students |

Teachers monitored the Experimentation are:

1. Mr. A.R.L. Rao, Lecturer in Chemistry
2. Mr. M. Nataraj, Lecturer in Chemistry
3. Mrs A. Satyavani, Lecturer in Botany
4. Mr. M. Khan, Lecturer in Zoology
5. Mr. Sri K. Ganga Raju, TGT, RGG HS, Yanam

DAY-1

On 29.10.2018, as a part of Rashtriya Avishkar Saptah 2018 in this college 40 students from Rajiv Gandhi Govt. English medium High School & 20 students of Junior Science group of this college interestingly in this inauguration day. The students were briefed about the week programme and experiments needed to be conducted in this week.

Sri A. Ramalingeswara Rao, Lecturer in Chemistry explained about the need and our responsibility to protect the water bodies in order to survive the future generations. He explained about the importance of COD (Chemical Oxygen Demand) and BOD (Biological Oxygen Demand) and their necessities to evaluate to test the water.

Sri K. Ganga Raju, Trained Graduate Teacher from Rajiv Gandhi Govt. English Medium School explained various technical terms viz PH, Alkalinity to the students and their testing methods.

Sri Mohibullah Khan, Lecturer in Zoology and Smt. A. Satyavani, Lecturer in Botany expressed the importance of potable water and how to preserve and protect the PH of water.

Four samples of Water collected from Savitri Nagar, Gueriampeta, Ayyanna nagar & Yanam Town areas of Yanam region by the students and performed the following tests and results were tabulated and evaluated to submit in the Google forms. All the experiments were demonstrated and performed by the students on their own and they were made to maintain their observation up to date.

Water Sample	Foam Test	PH Test	Alkalinity	Remarks
1 Savitrinagar	3 cm	6	1060 ppm	Can not be used for drinking
2 Gueriampeta	3 cm	6	900 ppm	Can not be used for drinking
3 Ayyanna Nagar	3 cm	6	800 ppm	Can not be used for drinking
4 Town	4 cm	7	369 ppm	Can be used for drinking

The uploaded reports of STPP GJC Yanam can viewed in URL:

<https://docs.google.com/forms/d/e/1FAIpQLSczjGPmnOCCokZsy1iBpn4FFOBcYeWjINUx17cimqurQaeAQQ/viewanalytics>

The calculations in connection with Molarity and Alkalinity can be viewed in the last pages



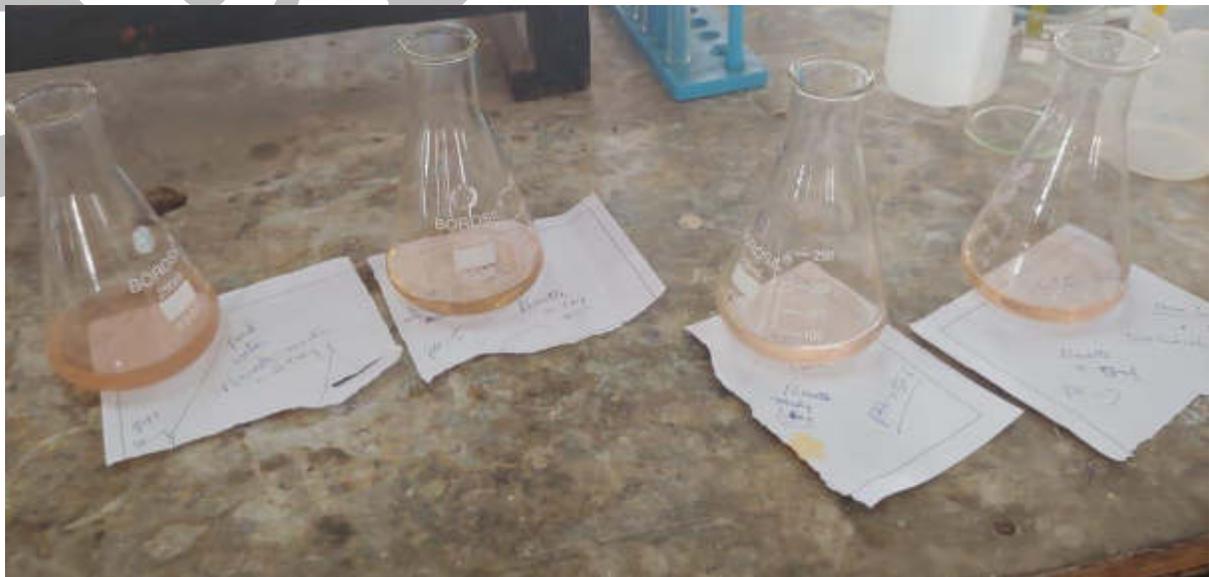
DAY-2

On 30.10.2018, Rashtriya Avishkar Saptah 2018 was observed in this college with 40 students from Rajiv Gandhi Govt. English medium High School & 20 students of Senior Science group of this college.

Four samples of Water collected from Mettakur, Ambedkar Nagar, Tank water near Acqua Culture & Distilled Water were collected by the students and performed the following tests.

Water Sample	Foam Test	PH Test	Alkalinity	Remarks
1 Mettakur	4 cm	7	300 ppm	Can be used for drinking
2 Ambedkar Nagar	4 cm	7	300 ppm	Can be used for drinking
3 Tank Water near Acqua Culture	1 cm	4	3800 ppm	Could not be used for drinking
4 Distilled Water	4 cm	7	300 ppm	Can be used for drinking



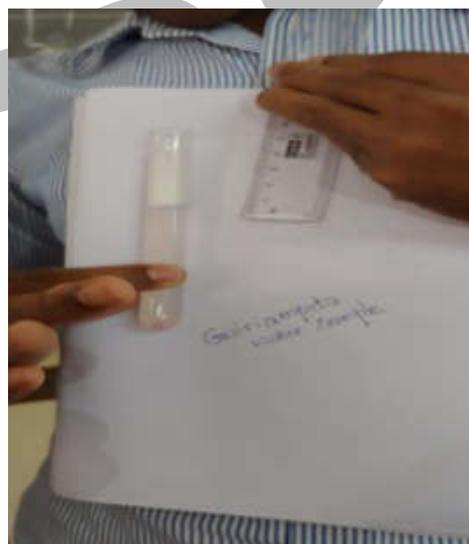


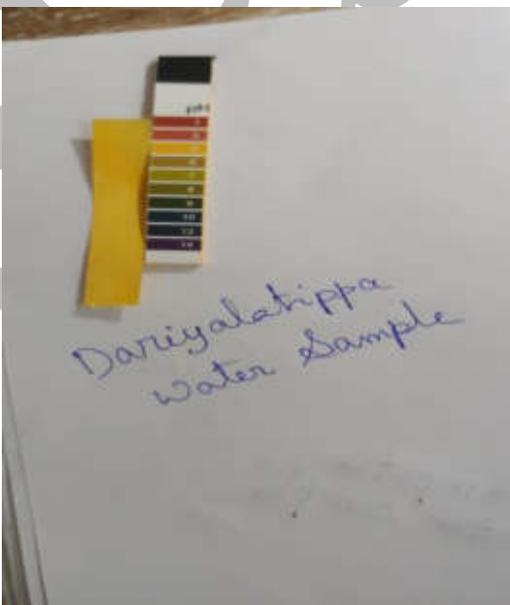
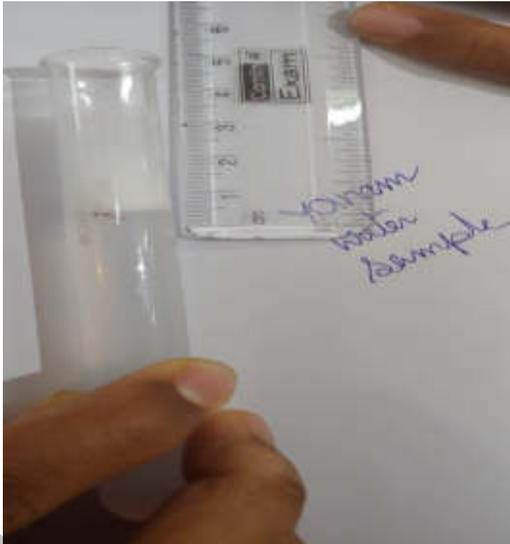
DAY-3

On 31.10.2018, Rashtriya Avishkar Saptah 2018 was observed in this college with 20 students from Rajiv Gandhi Govt. English medium High School & 20 students of Junior & Senior Science group of this college.

Three samples of Water collected from Kanakala Peta, Bezawada Gardens Bore well water, Kurasam Peta tap water were collected by the students and performed the following tests.

Water Sample	Foam Test	PH Test	Alkalinity	Remarks
1 Kanakala Peta	4 cm	7	306 ppm	Can be used for drinking
2 Bezawada Gardens Bore well water	3.5 cm	7	710 ppm	Can be used for drinking
3 Kurasam Peta tap water	3 cm	7	680 ppm	Can be used for drinking





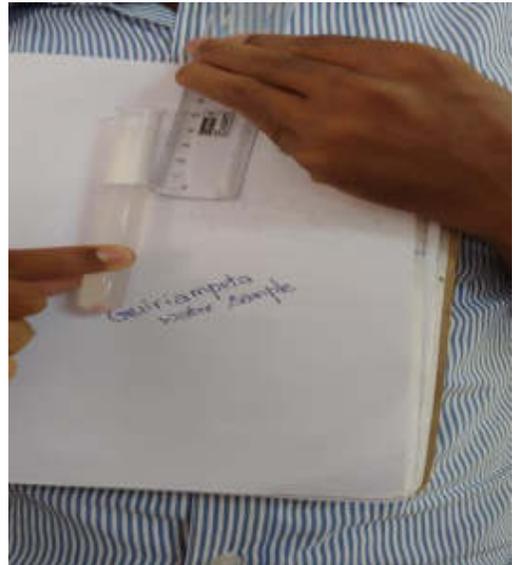
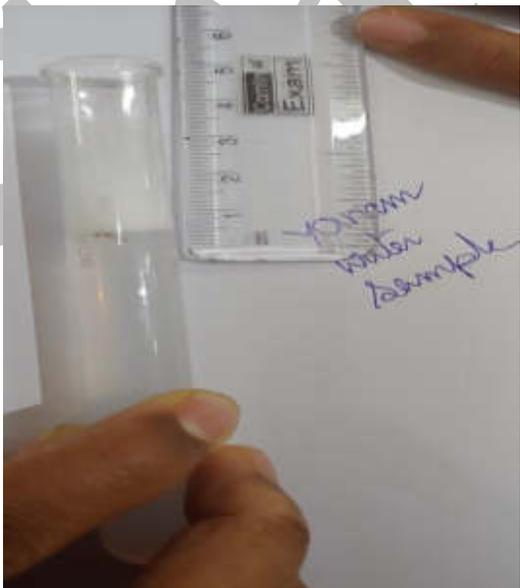
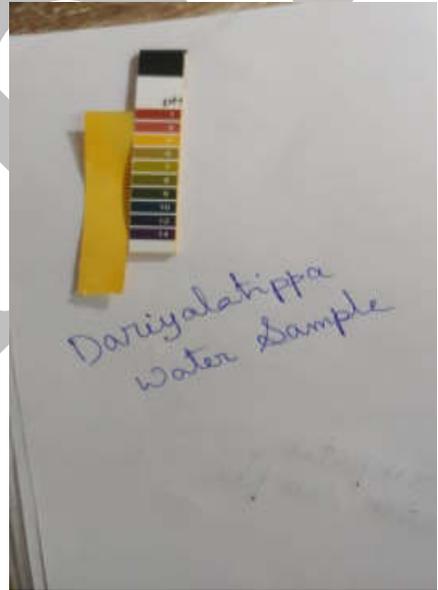
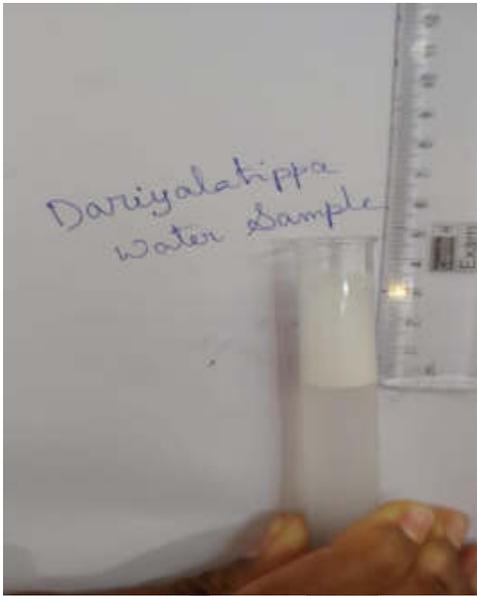
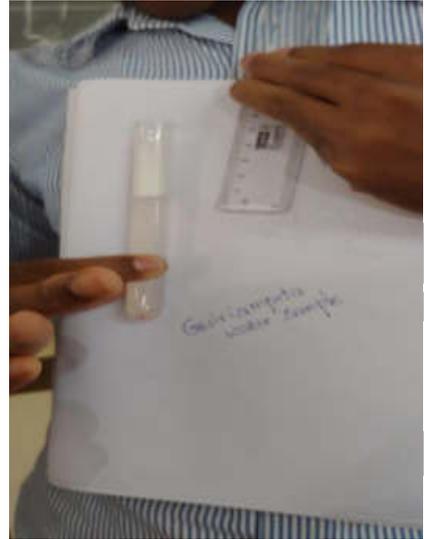
DAY-4

On 03.11.2018, as a part Rashtriya Avishkar Saptah 2018 was observed in this college with 20 students of this college.

Two samples of Water collected from Old Rajiv Nagar & River Gowatami Water were collected by the students and performed the following tests.

Water Sample	Foam Test	PH Test	Alkalinity	Remarks
1 Old Rajiv Nagar	3 cm	7	470 ppm	Could be used for drinking
2 River Water	1.5 cm	6	1080 ppm	Could not be used for drinking















Sample

Day-2

30-10-2018

To find the alkalinity of River Water against distilled water

Sample : 1 (Distilled Water)

PH measured : 7 (Neutral)

Titration of sample against 0.1 M standard HCl.

Formula

$$\frac{M_1 V_1}{n_1} = \frac{M_2 V_2}{n_2}$$

$$\Rightarrow M_2 = \frac{n_2}{n_1} \times \frac{M_1 V_1}{V_2} \quad \text{Where}$$

M_1 = Molarity of HCl = 0.1 M

V_1 = Volume of HCl consumed = x ml

n_1 = no. of moles of HCl = 2

M_2 = Molarity of sample = ?

V_2 = Volume of sample = 50 ml

n_2 = Molarity of sample = 1.

SL No.	Volume of Sample (ml)	Burette readings		Volume of HCl (ml)
		Initial	Final	
1	50	0.0	0.5	<u>0.5 ml</u>
2	50	1.0	1.8	0.8 ml
3	50	3.0	3.5	<u>0.5 ml</u>

Concurrent value : 0.5 ml.
Hence $V_1 = 0.5$ ml.

$$\text{So } M_2 = \frac{1}{2} \times \frac{0.1 \times 0.5}{50} \\ = 0.0005 \text{ M.}$$

\therefore Weight of Ca^+ present in the sample = 0.0005×100 (\because molecular wt of $\text{CaCO}_3 = 100.08699/\text{mol}$)
= 0.05 gm/lit

Sample 2 . (River water)

River water vs Standard HCl

Formula : $\frac{M_1 V_1}{n_1} = \frac{M_2 V_2}{n_2}$

\Rightarrow $M_2 = \frac{n_2}{n_1} \times \frac{M_1 V_1}{V_2}$ where

M_1 = Molarity of HCl = 0.1 M

V_1 = Volume of HCl = from burette

$n_1 = 2$.

M_2 = Molarity of the sample

V_2 = Volume of sample = 50 ml

$n_2 = 1$

Sl No	Volume of the sample (ml)	Burette readings		Volume of HCl (ml) consumed
		Initial	Final	
1	50	0.0	1.6	<u>1.6 ml</u>
2	50	3.0	4.6	<u>1.6 ml</u>

\therefore Volume of HCl = 1.6 ml is V_1

$$\begin{aligned} \text{Then, } M_2 &= \frac{1}{2} \times \frac{0.1 \times 1.6}{50} \\ &= 0.0016 \text{ M.} \end{aligned}$$

$$\begin{aligned} \therefore \text{Wt of Ca}^{2+} \text{ present in sample - 2} &= 0.0016 \times 100 \\ &= \underline{0.16 \text{ gm/lit}} \\ &\text{or } \underline{160 \text{ ppm}} \end{aligned}$$

Sample - 3

To find out the alkalinity of tank water near the Aqua culture

Formula

$$\frac{M_1 V_1}{n_1} = \frac{M_2 V_2}{n_2}$$

Where

M_1 = molarity of std. HCl = 0.1 M

V_1 = Volume of HCl = from burette

n_1 = 2

M_2 = molarity of sample - 3 = to be calculated

V_2 = Volume of sample - 3 = 50 ml

n_2 = 1

Sl No	Volume of the sample	Burette readings		Volume of HCl consumed in ml
		Initial	Final	
1	50 ml	0.0	7.5	7.5 ml
2	50 ml	8.0	15.0	<u>7.0 ml</u>
3	50 ml	20.0	27.0	<u>7.0 ml</u>

\therefore Volume of HCl V_1 = 7 ml

$$\therefore M_2 = \frac{M_1 V_1}{n_1} \times \frac{n_2}{V_2}$$

$$= \frac{0.1 \times 7 \times 1}{2 \times 50}$$

$$= \frac{0.7}{100} = 0.007 \text{ M.}$$

Wt. of Ca^{2+} present in the sample - 3 = $M_2 \times 100.0869$

Alkalinity of bottled mineral water (sample-4)

Volume of std. HCl = $V_1 = x$

Molarity of std. HCl = $M_1 = 0.1 \text{ M}$

Nb. of moles of HCl = $n_1 = 2$

Volume of sample-4 = $V_2 = 50 \text{ ml}$

Molarity of sample-4 = $M_2 = ?$

Nb. of moles of $\text{Ca}^{2+} = n_2 = 1$

Formula

$$\frac{M_1 V_1}{n_1} = \frac{M_2 V_2}{n_2}$$

$$\Rightarrow M_2 = \frac{M_1 V_1 \times n_2}{n_1 \times V_2}$$

SN	Vol. of the sample-4 (ml)	Burette readings		Volume of HCl consumed (ml)
		Initial	Final	
1	50	0.0	1.0	1 ml
2	50	1.0	2.0	1 ml

\therefore Volume of HCl (V_1) = 1.0 ml

$$\begin{aligned}\therefore M_2 &= \frac{0.1 \times 1.0 \times 1}{2 \times 50} \\ &= 0.001 \text{ M}\end{aligned}$$

$$\begin{aligned}\therefore \text{Ca}^{2+} \text{ present in the sample} &= M_2 \times 100.0869 \\ &= 0.001 \times 100.0869 \\ &\approx 0.19 \text{ [4.67]} \text{ 100 ppm}\end{aligned}$$

Rashtriya Avishkar Varotsav - 2018

TEST FOR ALKALINITY OF WATER

Standardization of HCl

1. Weigh about 10.6 gm of Na_2CO_3 and make it to a litre solution using distilled water.
2. Pipette out 20 ml of Na_2CO_3 solution against the HCl solution taken in the burette. Methyl orange is used as an indicator.
3. When pale pink colour replaces the yellow colour stop the titration and note the burette reading as the volume of HCl consumed.
4. Repeat the process for concordant values.

Now,

using the formula

$$\frac{M_1 V_1}{n_1} = \frac{M_2 V_2}{n_2}$$

against the equation,



$$M_1 = \text{molarity of } \text{Na}_2\text{CO}_3 = 1 \text{ mole}$$

$$V_1 = \text{Volume of } \text{Na}_2\text{CO}_3 = 20 \text{ ml}$$

$$n_1 = \text{no. of moles of } \text{Na}_2\text{CO}_3 = 1 \quad \text{and}$$

$$M_2 = \text{Molarity of HCl} = x$$

$$V_2 = \text{Volume of HCl} = \text{'burette reading'}$$

$$n_2 = \text{no. of moles of HCl} = 2$$

the given HCl is standardised. It should be around