Department of Zoology

Dr.BRR Government College Jadcherla

Student Study Project

On

"Estimation of AlkalinityOf water of some Selected Areas of Jadcherla Town, MahabubnagarDistrict, Telangana State"

Academic Year 2021-22

Dr. BRR GOVERNMENT DEGREE COLLEGE

JADCHERLA – 509 301
(Accredited with B^{++} by NAAC)

Dr. CH.AppiyaChinnamma, M.Sc., Ph.D.
Principal

The department of Zoology has conducted student study projects during the academic year 2021-22

Title: A student project on "Estimation of Alkalinity of water of Some Selected Areas of Jadcherla Town, Mahabubnagar District, Telangana State"

Place of Work: Dr.BRR Goverrnment Degree College Jadcherla T.S

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By

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Student Study Project Certificate

CERTIFICATE

This to certify that,the project work entitled A student project on "Estimation of Alkalinity of water of Some Selected Areas of Jadcherla Town, Mahabubnagar District, Telangana State"is a bonafide work done by D.Sai Kumar, R.Naresh, N.Arjun, V.Vijay Kumar, A.Srikanth, N.Naresh and A.Anil Yadav the students of B.Sc (BZC) IV semester under my supervision in Zoology at the Department of Zoology Dr.BRR Government Degree College Jadcherla during the academic year 2021-22 and the work has not been submitted to any other college or university either par or full for the award of any degree.

Place Jadcherla 31/5/2022

Date:

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Department of Zoology

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A student project on "Estimation of Alkalinity of water of Some Selected Areas of Jadcherla Town, Mahabubnagar District, Telangana State"

Abstract:

Water is one of the abundantly available substances in nature and also called 'eliexir of life'. Quality of water is an important criterion for evaluating the suitability of water for drinking and domestic purpose. otal alkalinity, water samples for drinking purpose have been carried out from 7 sampling locations of Jadcherla town during winter and summer seasons from Nov.2021 to May 2022 in order to assess water quality. The results were compared with standards prescribed by BIS. In the present investigation, 65% of the samples were found to be very hard and Alkalinity levels of some sampling locations were approaching maximum limits except all other parameters.

Keywords: Physico-Chemical parameters, Municipal tap water, Tiptur town,domestic purpose and elixir of life

Acknowledgements:

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Finally thanks are also due to Sri B.Ravinder Rao,HOD for guiding the team to during period the project.

Objectives:

To promote interest in research aptitude among students

To promote the use of good and safety drinking water

To preserve the natural composition of Water resources

To bring awareness on water borne diseases

INTRODUCTION

Water is indispensable and one of the precious natural resources of our planet. It is used in irrigation, industries and house hold. Water resources include rivers, ground water, lakes and reservoirs etc. The geology of a particular area has greater influence on the occurrence and quality of water. The water quality varies due to change in chemical composition (Raj Mohan,2003). The pollution of water may be due to heavy metals (Sharma and Dubey,2005). Poor quality of water effects badly the plant growth and human health (Subba Rao,2005, WHO 1992, Karanth 1997). Further water quality studies with respect to drinking and irrigation purposes have been carried out in different parts of the world (Majumdar and Gupta, 2000). The quality of water is vital concern for mankind since it is directly linked with human welfare. The present investigations involve the analysis of Physico- Chemical parameters of drinking water supply to the residents of Tiptur town and evaluate its suitability for drinking with respect to BIS guidelines. Supply of safe water is univocally a basic requirement for human consumption. It is one of the most important compounds that profoundly influence life. Unsafe drinking water contributes to numerous health problems associated mainly with water borne diseases. According to WHO, 80% of all the diseases in human beings are caused by contaminated water. It is therefore important to check the water quality at regular interval of time. Quality and quantity of water at a place plays a vital role in health, wealth and prosperity of the region. So, the present study deals with Physico-Chemical parameters of water of Jadcherla town for drinking and domestic purpose.

MATERIALS AND METHODS:

1) Study area:

Jadcherla Town is located 80KMs away from Hyderabad, the capital city of Telangana State. It is located on National Highway 44 south to Hyderabad. The topographical details are Longitude: 78.1442814,Latitude: 16.7629646,Elevation: 548m / 1798feet and Barometric Pressure: 95KPa.Population of Jadcherla in 2021 is 127,430. Dr.BRR Government Degree ollege is located at Signalgadda landmark with an area of around 15Acres of land. this college has good greenery with gardens covering 7 Acres of land.

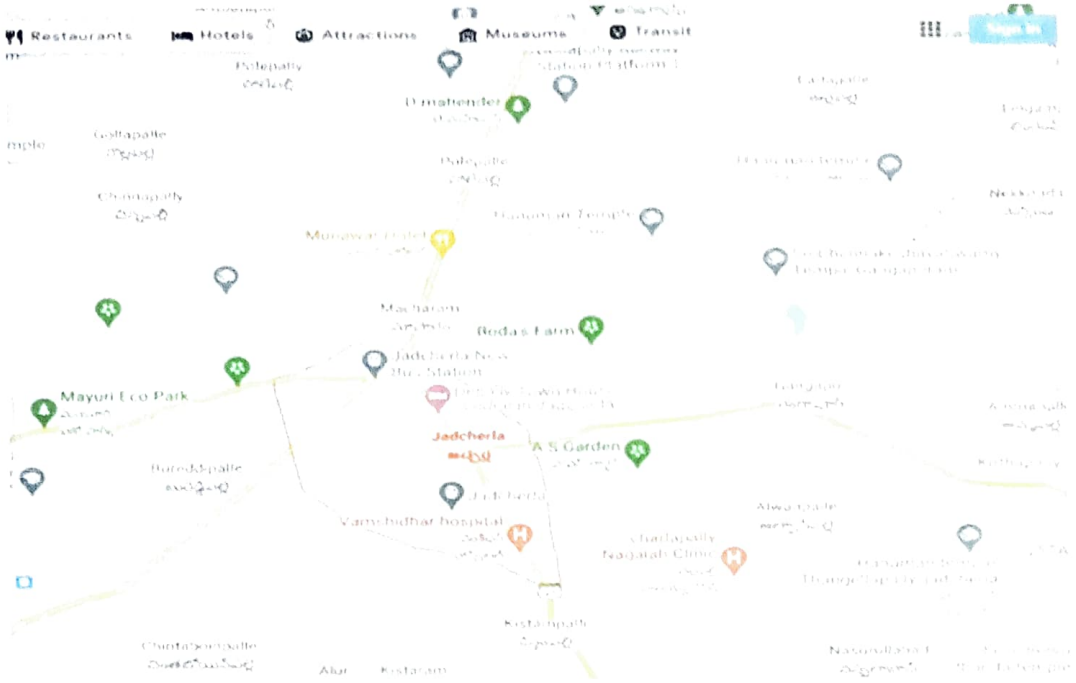

Fig.1: Map of Study area - Jadcherla

2.Collection of Water Samples from selected areas of Jadcherla Town:

The team members assigned themselves to the selected areas of water sample collection. Seven Sampling stations i.e., 1 Signal gaddaa, 2.Padmavathi colony, 3. Saraswathi Nagar colony, 4. New bus stand, 5. Kaverammapet, 6. Indranagar colony, 7.Nimmabavi gadda were selected and water samples from these stations are collected in cleaned and dried polythene bottles with necessary precautions. The water samples from sampling stations are given specific codes as S1, S2…..S7.After collecting the samples these are kept in the zoology laboratory of Dr.BRR Government Degree College Jadccherla for Chemical analysis.

3. Estimation of Alkalinity of Water Samples:

Chemical parameters were analyzed within 24hrs using standard methods The present study was carried out from Nov.2021 to May 2022 for seasonal studies.The alkalinity of water can be measured by titrating the sample with Sulfuric acid of 0.02N. Test procedure is in accordance to IS: 3025 (Part 23) - Reaffirmed 2003. In addition to our Indian Standard, we also discuss in brief regarding theprocedure stated in APHA Standard Methods for the Examination of Water and Wastewater - 20thEdition. Method 2320.Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020,USEPA, Method 310.1.

MATERIALS REQUIRED

APPARATUS REQUIRED

1. Burette with Burette stand and porcelain title
2. Pipettes with elongated tips
3. Pipette bulb
4. Conical flask (Erlenmeyer Flask)
5. 250 mL Measuring cylinders
6. Standard flask
7. Wash Bottle
8. Beakers

CHEMICALS REQUIRED

1. Standard sulphuric acid
2. Phenolphthalein
3. Mixed Indicator
4. Bromocresol Green
5. Methyl Red
6. Ethyl alcohol
7. Distilled Water

SAMPLE HANDLING AND PRESERVATION

Preservation of sample is not practical. Because biological activity will continue after a sample has been taken, changes may occur during handling and storage.

To reduce the change in samples, keep all samples at 4°C. Do not allow samplesto freeze. Analysis should begin as soon as possible.Do not open sample bottle before analysis.

PRECAUTIONS

The following precautions should be observed while performing theexperiment:

9. Do not keep the indicator solution open since it contains the alcohol whichtends to evaporate.

10. The mixed indicator solution is containing dye in it; care should be takenso that it is not spilled to your skin.
11. If it spills on your skin, the scar will remain at least for two to three days.

PROCEDURE

PREPARATION OF REAGENTS

For testing the given sample, first the reagents are required to be prepared.

Sulphuric Acid Solution (0.02N):

- Take approximately 500 mL of distilled water in a 1000 mL standard flask.
- Pipette 20 mL of concentrated 0.1 Normality Sulphuric acid and add slowlyalong the sides of the standard flask.
- Then make up the volume up to 1000 mL mark. Now the strength of thissolution is 0.02 N.

Phenolphthalein Indicator Preparation:

- Weigh 1g of phenolphthalein and add to 100 mL of 95% ethyl alcohol or to 100 mL of distilled water. Use the readymade Phenolphthalein indicator available in the market.

Mixed Indicator Preparation:

- Dissolve 100 mg Bromocresol green and 20 mg of methyl red in 100 mL of95% ethyl alcohol or use 100 mL of distilled water. Mixed indicator also readily available in the market. So it can be used as indicator in this experiment.

TESTING OF WATER SAMPLE

- Rinse the burette with 0.02N Sulphuric acid and discard the solution.
- Fill the burette with 0.02N sulphuric acid and adjust it to zero.
- Fix the burette in the stand.
- Using a measuring cylinder exactly measure 100 mL of sample and pour itinto a 250 mL of conical flask.
- Add few drops of phenolphthalein indicator to the contents of conical flask.The colour of the solution will turn to pink. This colour change is due to alkalinity of hydroxyl ions in the

water sample.

- Titrate it against 0.02N sulphuric acid till the pink color disappears. This indicates that all the hydroxyl ions are removed from the water sample. Note down the titter value (V1). The value of titration is 0.5mL .This value is used in calculating the phenolphthalein alkalinity.
- To the same solution in the conical flask add few drops of mixed indicator. The colour of the solution turns to blue. This colour change is due to CO_3^{2-} & HCO^- ions in water sample.
- Continue the titration from the point where stopped for the phenolphthalein alkalinity. Titrate till the solution becomes red. The entire volume (V2) of sulphuric acid is noted down and it is accountable in calculating the total alkalinity.
- The value of titration is 8.3mL.
- Repeat the titration for concordant values.

CALCULATION

Table'1: Sample S1 : Signal gadda bore water

Sample. No.	Volume of Sample (mL)	Burette Reading (mL)		Volume of Sulphuric acid (mL)
		Initial	Final	
4.	50	0	0.6	0.6
5.	50	0	0.5	0.5
6.	50	0	0.5	0.5

Specimen Calculation:

Volume of Sulphuric Acid= 0.5 mL

Normality of Sulphuric Acid = 0.02 N

Volume of Sample= 50 mL

Equivalent weight of $CaCO_3$= 1000

$$\text{Phenolphthalein Alkalinity} = \frac{(\text{volume of } H_2SO_4(v1) * \text{Normality} * 50 * 1000)}{\text{Volume of sample taken}}$$

To convert the sample size from mL to L, multiply the result by 1,000 mL/L to convert the sample sizefrom mL to L

Alkalinity as $CaCO_3$ equivalent (mg/L)= 0.5 x 0.02 x 50 x 1000/50

= 10 mg/L as $CaCO_3$ equivalent

Table.2: alkalinity of water samples from selected areas of jadcherla town

Sample no.	Area	Sample volume	Volume of H_2SO_4	Alkalinity
S1	Signal gadda	50 ML	0.5ML	10 mg/L
S2	Padmavathi Colony	50 ML	0.2ML	4 mg/L
S3	Saraswathi nagar colony	50 ML	0.5ML	10 mg/L
S4	New Bus stand	50 ML	0.6ML	12 mg/L
S5	Kaverammapet	50 ML	0.5ML	10 mg/L
S6	Indranagar colony	50 ML	0.3ML	6 mg/L
S7	Nimmabavi gadda	50 ML	0.4ML	8 mg/L

4. RESULTS AND DISCUSSION:

Water quality data of water samples collected are tabulated in table 2. Temperature is an important factor which controls the chemical reactions and also plays an important role in the metabolic activities of the organism. In the present study, temperature ranged from a minimum of 23^0 C to a maximum of 28^0 C. P H The PH is an important index of acidity or alkalinity and the concentration of hydrogen ion in water sample. In the present study, the water samples are slightly acidic. The PH values of water samples were varied from a minimum of 6.24 to a maximum of 7.87 and were found within the prescribed limits of BIS. The drinking water quality especially taste depends on the dissolved minerals and also inorganic substances (Trivedy and Goel; 2006). In the present study, Total Alkalinity of water is its capacity to neutralize a strong acid and it is normally due to the presence of bicarbonate, carbonate and hydroxide compound of Calcium, Sodium and Potassium. In the present study, the total alkalinity content ranged between

a minimum of 4 mg/L to a maximum of 12 mg/L. Alkalinity in itself is not harmful to human being, but imparts an unpleasant taste. Total Hardness of water is mainly depends upon the amount of Calcium or Magnesium salts or both. Water having hardness below 300mg/L is considered potable, but beyond this limits cause gastro-intestinal irritation. Normal water hardness does not pose any direct health problems, but higher concentration of hardness (above 600mg/L) may cause kidney problems.

Team mrmbers estimating the Alkalinity of water

CONCLUSION:

The water quality analysis reveals that The water in the study area is moderate.. Alkalinity is within the permissible limits of BIS standards. Water must be softening before drinking to avoid chronical diseases. The water can be used for domestic and small scale industries. Municipal authorities are advised to treat the water by filtration, reverse osmosis and electro-dialysis, before use.

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