BHIWAPUR MAHAVIDYALAYA BHIWAPUR
DIST. NAGPUR

Project Report
on

Water Analysis Assessment for Degree Students

Submitted to
Department of Chemistry
Bhiwapur Mahavidyalaya, Bhiwapur

Submitted by Student from B.SC-III

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UNDER THE GUIDANCE OF
ASST. PROF. DR. ASHWINI KADU

DECLARATION

We, **Rutuja Khawas, Kajal Dongarwar, Deepali Ivnate, Prajakta Fendar, Dhanshree Akhare, Poonam Selokar, Apurwa Borkute**, hereby declare that the project entitled **"Water Analysis Assessment for Degree Students"** is submitted to Department of Chemistry, Bhiwapur Mahavidyalaya is our own work which has not been submitted in any form to any organization for award degree.

Rm. khawas

(Name)

Place: Bhiwapur.

Date: 04/05/2023

Signature of the Student

Iwnate

DAkhare

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CERTIFICATE

This is to certify that the project work entitled **"Water Analysis Assessment for Degree Students"** is the work done by student and submitted to Department of Chemistry, Bhiwapur Mahavidyalaya, Bhiwapur, Dist. Nagpur for the partial fulfilment of the requirements for the degree of Bachelor of Science in Chemistry.

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ABSTRACT

The purpose of this **Water Analysis Assessment for Degree Students** is to find out, how the water sample can test. The report starts with introduction and ends with conclusion with experiment report. The report defines the detailed information about water testing with various examples. The report also explains about the quantity of the samples and types of the samples. The Sampling Methods consists of Manual sampling, which explain the details of water testing.

The physical and chemical properties of drinking water vary. It is therefore difficult to obtain a truly representative sample. We need water for different purposes; we need water for drinking, agriculture, irrigation, swimming, fishing, etc. Water for various purposes requirements for the composition and purity, and each body of water must be tested regularly to confirm the suitability.

The types of analysis could change from simple field testing for a single analytic to laboratory. The analytical process demands sampling and sample storage since changes in composition of water do not stop once the sampling has been taken. Screeningis done to ensure that water reaches the laboratory, the same composition as it has occurred during sampling.

LIST OF CONTENTS

INTRODUCTION

Sampling:

The physical and chemical characteristics of drinking water vary from top to bottom of depth of land, as well as with time as from morning to evening. It therefore becomes difficult to obtain a truly representative sample.

Source of sample:

Sample collected from, River water, Water, Lake Wate,r Tube well and testing conducted 13th April, 2023

Fig.No.1 River water

Fig. No. 2 Lake water

Fig. No.3 Tube well Water

Sample containers:

Containers typically are made of plastic or glass, but one material may be preferred over the others. For example, silica, sodium, and boran may be leached from soft glass but not plastic, and trace levels of some pesticides and metals may absorb onto the walls of glass containers. Thus, hard glass container is preferred. For samples, containing organic compounds, do not use plastic containers expect those made of fluorinated polymers such as polytetrafluoroethylene (PTFE).

Sample Volumes:

Collect a 1 litre sample for most physical and chemical analyses. Do not use sample from the same container for multiple testing requirements (e.g., organic, inorganic, bacteriological, and microscopic examinations) because methods of collecting and handling are different for each type of test. Always collect enough sample volume in the appropriate container in order to compile with the sample handling, storage and preservation requirements.

Preservation Techniques:

To minimize the potential for volatilization or bio degradation between sampling and analysis, keep samples as cool as possible without freezing. Preferably pack samples in crushed or cubed ice or commercial ice substituent before shipment. Avoid using dry to break. Dry ice also may effect a pH change in samples. Keep composite samples cool with ice or a refrigeration system set at 4˚C during compositing. Analyse samples as quickly as possible on arrival at the laboratory. If immediate analysis is not possible, preferably store at 4˚C.

Experiments:

Aim: To assess the following Physico-chemical properties of water samples nearby Bhiwapur.

Objectives:

Physical Test & Chemical Test

- Colour
- Odour
- Suspended solids
- Turbidity
- pH parameters
- Total Hardness.
- Chloride

Chemical required

- Distilled water
- Buffer tablets pH values of 4.0,7.0,9.2
- EDTA,
- Ammonium chloride,
- Ammonium hydroxide,
- EBT
- Sodium chloride,
- Ethanol
- Acetic acid
- Potassium Iodide
- Sodium thiosulphate
- Starch.

Apparatus requirement

- Ph meter with electrode
- Beakers
- 100 ml standard flasks

- Funnels
- Filter papers
- Wash bottle

Methods:

1. Turbidity:

Three pin plug of the instrument was introduced into the appropriate main socket. The instrument was switched on and it was allowed to warm up for 10 to 15 minutes. The appropriate range is selected and standardize control was kept maximum. The test tube with distilled water was inserted into the cell holder and it is covered with light shield. Now set zero control was adjusted to indicate zero in the meter. The test tube containing distilled water is removed and was replaced with the test tube containing standard solution. The test tube containing the sample solution was inserted into the cell holder and the corresponding reading was noted in NTU units.

Preparation of stock standards

The particles of formation are uniform in size and shape. The stock standards prepared from the formations are accurate within 1% and stable for 6-8 weeks. The stock standard of 4000NTU is prepared as per the following procedure.

1) Take 5g of reagent grade Hydrazine Sulphate and dissolve in 400 of distilled water. This is solution A.
2) Next dissolve 50g of pure HexamethyleneTetramine in 400 ml of distilled water. This is solution B.
3) Mix solution A and B and make it upto one litre by adding distilled waterand allow this mixture to settle for 48 hours at normal room temperature.

This is a stock standard of 4000 NTU and can be used for 6-8 months to prepare working standards as per following table. Shake this solution well before making dilution.

NTU Standard	Amount of stock std.Required to make 1 lit sol.
500	125.0 ml
100	25.0 ml
50	12.5 ml
10	2.5 ml
5	1.25 ml
1	0.25 ml

Result:

The turbidity in sample water=**5.3NTU**

Determination of pH

Preparation of reagent

Standard Buffer Solutions:

They can be prepared easily by dissolving the pH powder or tablets completely in 100ml of distilled water.

pH unit of measure which describes the degree of acidity or alkalinity of a solution. It is measured on a scale of 0to 14. The term pH is derived from P the mathematical symbol of the negative logarithm, and H the chemical symbol of the Hydrogen. The formal definition of pH is the negative logarithm of the hydrogen ion activity.

$pH= -\log10[H+]$

pH provides the needed quantitative information by expressing the degree of the activity of an acid or base in terms of hydrogen ion activity.

Fresh distilled water has a pH of 7. Acidic waters have a pH of 0to 7, whereas alkaline waters have a pH of 7 to 14. Ammonia and Lime solution have pH of about 12 where as many cool drinks, lime juice, battery, etc. have pH of less than 4. As pH is measured on a logarithmic scale, a water having a pH of 6to 10 times more acidic than the natural water, a water having a pH of 4 is 1000 times more acidic than water with pH 7 and a pH of 2 is 100000 times more acidic than apH of 7.

pH of a solution can be found easily by using pH strips (paper) or a pH meter gives very accurate values whereas pH strips gives approximate values. pH is determinedby the measurement of electromotive force of a cell comprising an indicator electrode responsive to hydrogen ions (such as glass electrode) immersed in the test solution and a reference electrode is usually achieved by means of a liquid junction, which forms a part of the reference electrode. The 'emf' of this cell is immersed with pH meter. This is high impedance electrometer calibrated in terms of pH

Procedure:

Connect the pH electrode to the input socket at the front. Clean the electrodewith distilled water and dry it. Dip the electrode in the 4.00 pH buffer solution which is provided. Measure the temperature of the buffer solution. Keep the TEMP. Knob at temperature of the solution. Push the pH switch. Adjust the display to 4.00 pH with the CAL knob. Now the instrument is calibrated. Wash theelectrode, dry it and put it in the solution whose pH is to be measured.

Result:

pH of the given samples=**7.27**

3.Determination of Hardness of water

Reagent preparation:

1. EDTA solution 0.01N:

Dissolve 3.723g of disodium salt of EDTA in distilled water to prepare 1literof solution. Store in polyethylene or Pyrex bottle.

2. Buffer solution:

Dissolve 16.9g of ammonium chloride in 143ml of concentrated ammonium hydroxide. Add 1.25g of magnesium salt of EDTA to obtain sharp change in color of indicator and dilute to 1 liter with distilled water.

3. Eri chrome Black T:

Dissolve 0.25g of EBT in 500ml alcohol or 0.5g of EBT with 100g sodiumchloride (A.R) to prepare dry powder.

Hardness is generally caused by the calcium and magnesium ions present in water.

Polyvalent ions of some other metals like strontium, iron, aluminum, zinc and manganese etc. Are also capable of precipitating the soap and thus contributing to the hardness. However, the concentration of these ions is very low in natural waters, therefore, hardness is generally measured as concentration of only calcium and magnesium which are far higher in qualities over other hardness producing ions. Calcium, and magnesium form a complex of wine red color with Erichrome black t at pH of 10.0+0.1 the EDTA has g0t a stronger affinitytowards ca++ and mg++ and, therefore by addition of EDTA, the former complex ion broken down and a new complex of blue color is formed.

Procedure:

Titration:

EDTA vs Sample Water

To pipette out 20ml of sample water into a clean conical flask. To this 5ml of buffer solution and 2drops of Eri chrome Black T indicator was added. The solution was titrated against EDTA taken in the burette. The end point was changeof color from wine red to steel blue. The titration was repeated up to concordant values.

Sr. No	Volume of std. Water sample (ml)	Burette Reading (ml)		Volume of EDTA (ml)	End point
		Initial	Final		
1	20	0	11	11	Change from wine red to steel blue
2	20	0	11		

Where,

$V_1 = Volume\ of\ EDTA$

$N_1 = Normality\ of\ EDTA$

$V_2 = Volume\ of\ sample\ water$

$N_2 = Normality\ of\ sample\ water$

$$N_2 = \frac{V_1 N_1}{V_2}$$

$$N_2 = 5.57710^{-3}\ N$$

Amount of hardness present in the given sample water = Normality of sample Water X Equivalent wt. of $CaCO_3$ X 1000

$$=5.577 X\, 10^{-3} X 100 X 1000$$

=577.5 mg/l

Result:

The hardness of given sample of water 577.5 mg/l

Determination of Chlorides:

Reagent preparations:

1. Silver Nitrate 0.02N:

   Dissolve 3.4 g of dried silver nitrate in distilled water to make 1liter of the solution and keep in a dark bottle.

2. Potassium chromate 5%:

   Dissolve 5 g of potassium chromate in 100 ml distilled water.

3. Sodium chloride 0.0141N:

   Dissolve 4.121 g of anhydrous Sodium chloride in 250 mldistilled water

Silver nitrate reacts with chloride to form very slightly soluble white precipitate of $AgCl_2$. At the and point when all the chloride get precipitated, freesilver ions react with chromate to form silver chromate of reddish brown color.

Procedure:

Titration:

Sample Water Vs Silver Nitrate

20 ml of sample water pipette out into a clean conical flask. One drop of potassium dichromate was added as a indicator. The solution turns yellow in color.The solution was titrated against silver nitrate taken in the burette. The end point was the change of yellow color into reddish brown color. Titration was repeated up to its concordant values.

S.NO	Volume of samplewater (ml)	Burette reading (ml)		Volume of silver Nitrate (ml)	End point
		Initial	Final		
1	20	0	2.5	2.5	Yellow colorto reddish brown
2	20	0	2.5		

Where,

$V_1 = Volume\ of\ Silver\ Nitrate$

$N_1 = Normality\ of\ Silver\ Nitrate$

$V_2 = Volume\ of\ Sample\ Water$

$N_2 = Normality\ of\ sample\ water$

$$V_1 N_1 = V_2 N_2$$

$$N_2 = \frac{V_1 N_1}{V_2}$$

=0.00537 N

Amount of chloride present in the given sample of water =0.033 N Normality of sample water X Equivalent weight of silver nitrate X 1000

=0.00537X39.5X1000

=212.043 mg/l

Result:

The amount of chloride present in the given sample of water=**212.043 mg/l**

CONCLUSION

Sr.NO	PARAMETER	DESIRABLE LIMIT	MAXIMUM PERMISSIBLE LIMIT	OBSERVED VALUE
1	Color	5	25	-
2	Odour	Unobjectable	Unobjectable	-
3	Taste	Agreeable	Agreeable	Agreeable
4	Turbidity (NTU)	5	10	5.3
5	pH value	6.5 – 8.5	No relaxation	6.77
6	Total Hardness	300	600	577.5
7	Chlorides	250	1000	212.45

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