GOVERNMENT DEGREE COLLEGE,SHADNAGR
DEPARTMENT OF CHEMISTRY

A PROJECT WORK ON

WATER ANALYSIS

Submitted By

1)BEGARI REVANTH BABU(18033067445501)
2)JITTA LATHA(18033067445513)
3)JAMBULA MOUNIKA(18033067445512)
4)GANDRATHI MANASA(18033067445510)

GUIDED BY
Dr.M.Srilatha
Department of chemistry
Palamuru university,Mahabubnagar

CERTIFICATE

This is to certify that

1) BEGARI REVANTH BABU(18033067445501)
2) JITTA LATHA(18033067445513)
3) JAMBULA MOUNIKA(18033067445512)
4) GANDRATHI MANASA(18033067445510)

Have completed there project work on **WATER ANALYSIS .**

They have successfully prepare this project report in the chemistry laboratory

Of Government Degree College ,shadnagar.

Signature of the supervisor

signature of principal

PRINCIPAL
Govt. Degree College
Shadnagar.
Ranga Reddy Dist.

DECLARATION

We the following students studying B.Sc III year at Govt Degree College ,Shadnagar during the academic year 2020-21 here by declared that is our original project work On **Water Analysis** submitted under the guidance of DrM.Srilatha.

S.No	H.T.No	Student Name	signature
1	18033067445501	Begari Revanth babu	Revanth
2	18033067445513	Jitta Latha	Latha
3	18033067445512	Ambula Mounika	Mounika.
4	18033067445510	Gandrathi Manasa	manasa.g

Induction

Hardness of water :-

Water hardness is the traditional measure of the capacity water to precipitate soap. Hard water requiring considerable amount of soap to produce lea-ther. scaling of pipes, Boilers and house hold applia-nces is due to hard water. acuerally Hardness is caused by ca and mg ions. Hardness is commonly expressed as $CaCO_3$ in mg/Ltr. The degree of Hardness of drinking water hasbeen classified in terms of equivalent $CaCO_3$ consentration as follows

Soft	:	0 - 60 mg/Ltr
Medium	:	60 - 120 mg/Ltr
Hard	:	120 - 180 mg/Ltr
Very Hard	:	> 180 mg/Ltr

Hardness

Temporary	permanent
→ It is caused due to CO_3^{2-} and HCO_3^-	→ It is caused by SO_4^{2-} and Cl^-
→ scaling of pipes is due to this Hardness	→ It [coua n] can not be removed by boiling
→ It is can removed by boiling	

II

Alkalinity of Water :=

→ Alkalinlity of water is the measure of its capacity to neutralise the Acids.

→ Alknlity of natural water is due to the salts of carbonates, Bicarbonates, Borates, silicones. and phosphates along with Hydroxide ions. in the free state.

→ But in natural water Alkalinity is caused by Hydroxide, carbonates. and Bicarbonates.

→ The Bicarbonates of Ca and Mg results from the reaction of the Acidic water with Ca and Mg minerals such as calcite ($CaCO_3$), Dolomite ($Mg/CaCO_3$) and Gypsum ($CaSO_4, 2H_2O$)

$$H_3O^+ + CaCO_3 \longrightarrow Ca^{2+} + HCO^- + HO$$

→ Total Alkalinity is the total consentration of Bases in water expressed as ppm or mg/Lto of $CaCO_3$

→ The pH range of 6-8 is found to be the best for the most of fishes and insects in stream.

→ Bacteria began to die off bellow pH 5.5

→ The most common method of increasing the Alkalirity of water by adding Agricultural Lione stone [$CaCO_3$]

III conductivity :

→ Generally the water consist of many ions. like Ca^{2+}, Mg^{2+}, Sr^{2+}, Borates, sulphats, carbonates, Bicarbonates and chlorides.

→ The to these ions generally water has conductivity.

I Determination of Hardness :-

used chemicals

* Standard EDTA solution
* Ammonical Buffer solution
* Eriochrome Black-T Indicator

used Apparatus :-

→ conical flask
→ Beaker
→ Burette
→ stand
→ Glass rod

Total Hardness :-

1) Take 25ml of water sample in conical flask.
2) Add 1ml of buffer solution followed by Indicator.
3) Add a pinch of Eriochrome black-T and titrate against with standard EDTA 0.01N till wine red colour changes to blue.

Note the volume of EDTA required [V]

Boil the water and repeat the experiment to get concurrent reaings.

II Determination of Alkalinity :-

used chemicals

→ standard H_2SO_4 solution (0.02N)

→ phenolpthalion Indicator

→ methyl orange Indicator.

Used Apparates

→ conical flask

→ Beaker

→ Burette

→ volumetric flask

→ Glass rod

procedure :=

* Take 25ml of sample in conical flask and add 2-3 drops of phenolpthaline indicator.
* pink colour develops and titrate against 0.02N H_2SO_4 till it disappears. Note the volume of H_2SO_4 ran down [A]
* Add 2-3 drops of methyl orange to the same flask and continue the titration till pH come to h.5 [or] orange colour change to pink. Note down the volume of H_2SO_4 run down (B)
* continue the titration till we get concurrent readings.

P- Alkalinity (mg/Lit as $CaCO_3$) = A×1000/volume of sample

T- Alkalinity (mg/Lit as $CaCO_3$) = B×1000/volume of sample

sample- I

(i) Hardness of water before boiling :-

S.No	Volume of water sample [ml]	Burette Readings		Volume of EDTA run down ml
		Intial	Final	
1.	25	0	16	16
2.	25	16	32	16
3.	25	0	17.2	17.2

Total hardness in mg/lit = $\frac{\text{volume of EDTA} \times 1000}{\text{Volume of water sample}}$

= 16×1000/25

= 640 mg/lit

(ii) Hardness of water After Boiling :

S.NO	Volume of water sample [ml]	Burette Readings		Volume of EDTA run down [ml]
		Intial	Final	
1.	25	0	8	8
2.	25	8	16.5	8.5
3	25	16.5	25	8.5

Perminent Hardness in mg/Lit = $\frac{\text{volume of EDTA consumed for boiled water} \times 1000}{\text{volume of boiled water sample}}$

$= 8.5 \times 1000/25$

$= 340$ mg/Lit

II Determination of Alkalinity water

S.NO	Volume of water sample [ml]	Burette Readings		Volume of H_2SO_4 run down [ml] (A)	Burette Reading		Volume of H_2SO_4 run down [ml] (B)
		intial	Final		Intial	Final	
1.	25	0	2.2	2.2	2.2	9.4	7.2
2.	25	0	2.2	2.2	2.2	9.4	7.2

a) The consentration of carbonate ion in sample = 2.2x0.02/25

= 0.00176M

The ammount of carbonate ion = molarity x molecular weight of CO_3^{2-}

= 0.00176 x 60

= 0.1056 gr/Lit

b) The consentrations of Bicarbonate ion in sample =

= 7.2x0.02/25

= 0.00576M

The amount of Bicarbonate ion = molarity x molecularity weight of HCO_3^-

= 0.00576 x 61

= 0.3516 gr/Lit

Alkalinity :=

CO_3^{2-} = 0.1056 gr/Lit

HCO_3^- = 0.3513 gr/Lit

III Conductivity of water :- 5.6 mv

Result of simple :=

1) Permenent Hardness of water = 340 mg/Lit

2) Total Hardness of water = 640 mg/Lit

3) Alkalinity of water carbonate $[CO_3^{2-}]$ = 0.1056 gr/Lit

Bi carbonate $[HCO_3^-]$

4) conductivity of water = 0.3513 gr/Lit

= 5.6 mv

The amount of Bicarbonate ion = Molarity x Molecular weight of carbonate

$= 0.00208 \times 61$

$= 0.12688$ gr/Lit

$= 0.0024$ gr/Lit

Alkalinity : $CO_3^{2-} = 0.0024$ gr/Lit

$HCO_3^- = 0.12688$ gr/Lit

ii) Hardness of water After Boiling :-

S.NO	Volume of water sample [ml]	Burette Readings		Volume of EDTA run down [ml]
		Intial	Final	
1	50	0	6	6
2.	50	6	12	6
3.	50	12	18.6	6.6

Permenent Hardness in mg/Lit = $\frac{\text{volume of EDTA consumed for boiled water} \times 1000}{\text{volume of Boiled water sample}}$

$= 6 \times 1000 / 50$

$= 120$ mg/Lit

III conductivity of water :-

Result of sample :- 2

1. Permenent hardness of water = 120 mg/lit
2. Total Hardness of water = 124 mg/lit
3. Alkalinity of water carbonate $[CO_3^{2-}]$ = 0.0024 gr/lit
   Bi carbonate $[HCO_3^-]$ = 0.12688 gr/lit
4. conductivity of water = 4.1 mv

Sample - 2

Manjeera water Vs EDTA

i) Hardness of water before boiling :-

S.NO	Volume of water sample [ml]	Burette Readings		Volume of EDTA run down [ml]
		intial	Final	
1.	50	0	6.2	6.2
2.	50	6.2	12.4	6.2
3.	50	12.4	19.0	6.6

Total Hardness in mg/lit = $\frac{\text{volume of EDTA} \times 1000}{\text{vol. of water sample}}$

= 6.2 × 1000/50

= 124 mg/lit

Determenation of Alkalinity of water

Hardness of water After boiling (fault)

S.NO	Volume of sample [ml]	Burette Readings		Vol of H_2SO_4 run down [A] ml	Burette Reding		Vol of H_2SO_4 rundown [B] ml
		Intial	Final		Intial	Final	
1.	50	0	0.9	0.9	0.9	6.1	5.2
2.	50	0	0.9	0.9	0.9	6.1	5.2

a) The concentration of carbonate ion in sample

$= 0.9 \times 0.021 / 50$

$= 0.00004M$

The amount of carbonate = molarity x molecular weight of carbonate

$= 0.00004 \times 60$

$= 0.0024 gr/Lit$

b) The concentration of Bi carbonate ion in sample

$= 5.2 \times 0.02 / 50$

$= 0.00208M$

sample

i) Hardness of water before boiling :-

S.NO	volume of water sample [ml]	Burette Reading		volume of EDTA run down [ml]
		Intial	Final	
1.	25	0	8	8
2.	25	0	6.6	6.6
3.	25	0	6.6	6.6

Total Hardness in mg/Lit = $\frac{\text{Vol of EDTA} \times 1000}{\text{vol of water sample}}$

= 6.6 x 1000/25

= 2.64 mg/Lit

ii) Hardness of water After boiling :-

S.NO	Val of water sample [ml]	Burette Readings		Volume of EDTA run doum [ml]
		intial	Final	
1.	25	0	0.5	0.5
2.	25	0.5	1.0	0.5

Permenent Hardness in mg/Lit = $\frac{\text{Vol. of EDTA consumed for} \times 1000 \text{ boiled water}}{\text{vol. of Boiled water sample}}$

= 0.5 x 1000/25

= 20mg/Lit

No	Vol of sample [ml]	Burette Readings		Bavol. of H_2SO_4 [ml] run down (A)	Burette Reading		Vol of H_2SO_4 run down [B] [ml]
		Intial	final		Intial	Final	
1.	25	0	1.2	1.2	1.2	7.7	6.5
2.	25	0	1.2	1.2	1.2	7.7	6.5

a) The concentration of carbonate in sample $= 1.2 \times 0.02/25$

$= 0.00096M$

The amount of carbonate ion = molarity x molecular weight of carbonate

$= 0.00096 \times 60$

b) The concentration of Bicarbonate ion sample $= 0.0576$ gr/lit

$= 6.5 \times 0.02$

$= 0.0052M$

The amount of Bicarbonate ion = molarity x molecular weight of carbonate

$= 0.0052 \times 61$

$= 0.3172$ gr/lit

Alkalinity :-

CO_3^{2-} :- 0.0576 gr/lit

HCO_3^- :- 0.3172 gr/lit

III

conductivity of water :-

Result of sample :- 3

1. permenent Hardness of water = 20mg/Lit
2. Total Hardness of water = 264 mg/Lit
3. Alkalinity of water carbonate $[CO_3^{2-}]$ = 0.0576 gr/Lit

   Bi carbonate $[HCO_3^-]$ = 0.6172 gr/Lit

4. conductivity of water = 4.6 mho