Determination of total handness of water by EDTA Method. time! I've exerciment:

To determine the total handness of the water by EDTA method.

Businements:

Chemicals: Water sample: standard sodium EDIA solution, butter solution, Emiochrome Black-I indicatore.

Alpanatus: Bunetle(son), Pipetle (25ml), Conical Flask (25ml), measuring flask (25ml). Test tube (10ml)

The property of water, which restricts or checks the Lather Formation with soap, is called hardness scaling of hot water pipes, boilers & other house hold appliances is due to hard water. Nater True From Soluble salts of calcium & magnesium is called soft water.

Hard water may have moderate health benefits, but can pose servious Problems in Endustrial settings, where water hardness is monitored to avoid costly broak downs in boilers, cooling towers & other equipments that shandles water. In charestic settings, hard water is often indicated by a lack of suds tormation when soap is agitated in water & by the formation when soap is agitated in water & by the formation of time scale in Kettles & water heaters. Whenever water hardness is a concern, water saftening is commonly used to requestly hardwater is adverse. effects.

The water which contains large amount of inferests (common calcium containing inferents are calcite & gypsum,

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Page No. 2

& magnessum containing minerals & dobmite, which also contains Calvium) is called hand water. Hard watere contains bicardonate (HCoz), cardonate (Coz), halide (X=F,CI&BT), sulphate (Soz) of Calvium (Ca2+) & magnesium (Mg2+) as well as trace amount of Proon (Fe2+, Fe3+), aluminium (Al3+), heavy metals (Pb2+,Cd+, Bi3+, As3+, Hg2+) etc. Basically the hardness of water is due to the Soluble saft of Ca2+& Mg2+ tons. The Following equilibrium reaction describes the dissolving & formation of Calcium Carbonate.

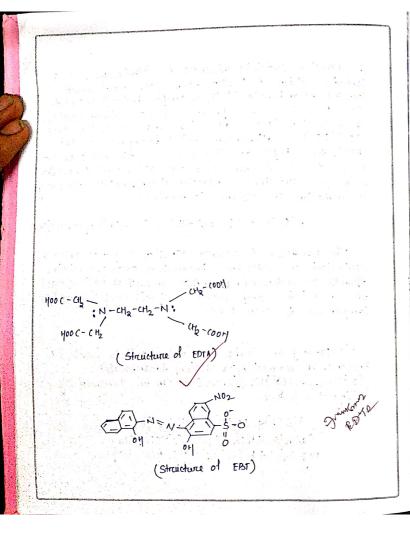
Ca(03(5) + (02 (aq) + 40 (1) - (a2+caq) + 241cosaq)

The hardness is usually expressed in parts of Caloz equivalent or calcium & magnessium salts per million sports of water i.e. ppm. Also amount of ca2+ & mg2+ ion present in hard waters is significally higher in Comparison to other ions.

Temporary or Carbonate hardness: It is due to the Preserve of magnesium & carcium bicarchonates
[Ca(t(02), & [Mg (t(02),], which can be removed by boiling the water.

 $+40(1)+(0_{2}(9) \rightarrow +60_{3}(a_{9})$ $+40(1)+(0_{2}(1)) \rightarrow +60_{3}(a_{9}) \rightarrow (a_{1}(1)) \rightarrow (a_{1}($

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Expt. No.	Date
T- 1	Page No. 3
Temporary handness can be tremoved by adding time waters (ca(bH)2) to the Ca(HCO2) (aq) + Ca(OH)(5) > Mg (HCO2) (aq) + Ca(OH)(5) > As the magnesium carrhonate & carring car in water it roud be settled down. Permanent on noncontente handness: 41 ic	y clareke's method
Ca (HCO2) (ag) + Co(OH)(5) ->	harred waters.
Mg (H(O2) (Q4) + (Q(OH)(S) -)	Maco + Caco + 240
In water it could be settled to calcium car	ibonate cure incoluble
Permanent ou noncarbonate inadoces: - 11 is	
of soluble salts of magnesium & carriers	of the Form Lobert
Permanent ou roncarbenate hardness: - It is of soluble salts of magnesium & carring &	& Maso,), which
of wing.	
Kriocinia :-	
The hardness of water can be accurate	ely determined by
Complexometric titration using a chelating	agent, ethyland
The handness of water can be accurate Complexometric titration using a chelating diamnine tetra acetic acid (FDTA) usually disodium salt (the yet). FDTA in the Form Forms Complex with ca ²¹ & Ma ²¹ ions of w	in the Foom of
Frams Complex with calt a west some	of its disodium salt
water at PH around 9-10, it gives a wir unstable complex with ca2t & Mg21 ions To maintain the PH of the solution at 9-10 (NH4Cl + NH40H) is cased. When this was	ne and relationed
unstable complex with ca2t & Mg2t ions	of water sample.
To maintain the PH of the solution at 9-10	, buffer solution
(NHqCl + NHqOH) is used. When this To	of coloured complex
Corn & colon of the mi	2tal complex with
the ca2+ & mgth fons from stable me EDTA & colour changes from wine red to free IBT Endicator) at the end point title	blue (Colour of
The state of the s	ation.
	4.13

	overesting to the state of the
	$\langle i, p \rangle$
	NM-
	11:0
) 6-
	O structure of metal (M=(a2+ and Mg2+)-EDTA-
	Complex.
	일본 그 나는 이번 사람들이 아이 경인 이 있다.
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	[[일 등 기를 보는 사람이 되었다면 하다 하다 하다. 그 기를 다 [
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Traste in the	사용·생 명과 있는 그를 하는 하는 사람이 있는 그 것도 없는 것이 없다.

Expt. No.	Page No 4
Chemical Reactions!	A CONTRACTOR OF THE PROPERTY O
(Ca2+, mg2+ waters) EBT (PH 9-10), /	102t Ma 2t - FOT
Sample colourless)	Ca ^{2t} , mg ^{2t} - EBT Unstable complex wine red colong
	contains company with log colory
$\int (a^{2t}, mg^{2t}, EBT)$ FOTA (Co	a2+, mg2+ - EDTA / EBT
Unstable complex (PH= 9-10)	a ²⁺ , mg ²⁺ - FDTA FBT blue
wine red colours	colourless / colours/
å Military	
Procedure (calculation of total ha	redness)
1. Thoroughly wash burette, pipette & c	onical Flask with supplied
water bilowed by distilled water	to ensure that no contains
THUNT IS present.	
2. Rense & fill the burnette with given s	tardard EDTA solution Remo
and ct any inside the pottom of the	he burette & take the
Initial purette madina (TAR).	
3. Papette out exactly some of the sur a conical Flask & add Jo-15ml of	pplied water sample into
a conical Flask & add Jo-15ml of	buffer solution & also
1-2 CLOPS OF EID 1/01(0100)	
1. Petrate it with the EDTA solution to	aken in the burette with
Continues shaking / stirring till the c	pine ged coloure solution
Charges to Diae.	
Repeat the Procedure to get there ee	eading (FBR)
Repeat the Procedure to get three	concordant meadings
(three consecutive roadings are ha	vera equal moluce)
	()
Procedure (Carculation of Perema	nent hardness):-
Thoroughy wash burette ,-pepette & c	onical Flask with contie
water followed by distilled water	to ensure that no
Contaminant is required present.	or and the world of the
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	areas area cases
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40.01 volume of		the second secon	eading ml)	Difference (ml)	Romarcks	
abs. Samp	Dambrafus)	SOR	FBR	FBR -IBR(4)	(Williams	
1. ,	40	0.1	4.4	4.3	Rough	
٦.	40	4.4	8.6	4.2	/	
3.	40	8.6	12.8	4.2	unurdant	
4.	40	12.8	16:9	4.2		

No	10/ma	Burette re	ading (ml)	Difference eml)	Remark 4	
Ope.	(m) some	1BR	FOR	FBR-IBR(4)	No de	
1.	40	0.3.	3.5	3.2	Riugh	
٥.	40	3.5	6.6	3-1	r regaris	
3.	40	6.6	9.6	3.0	Walbridank	
4.	40	9.6	12.6	3.0		

Avg (v2) = 303 mL

Calculation:

Vi = Volume of EDTA needed to convert metal EBT complex to metal EDTA complex forc supplied water sample.

No = Volume of EDTA needed to convert metal EBT complex to metal EDTA complex for supplied boiled water sample.

Expt. No.	Page No5
3. Pipette out exactly 50m into a conical flash & c also add 1-2 drops of 4. Titrate it with the EDT continous shaxing/ stirr changes to blue. 5. Write down the Final	l of the supplied boiled water sample and 10-15ml of buffer solution&
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1918).	Dix GOOD REOF ADMY FROM IN AMERICA
1000 to opt of 2000 control	we ordered by mod to 12 grants be among
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 $-V_1 = 4.2 + 4.2 + 4.1 = 4.16 \text{ ml}$ $v_2 = 3.1 + 3.0 + 3.0 = 3.03 \text{ ml}$ hardness Fore total haridness 11. of 1M EDTA -> longer, of caso3 Int. of 1M EDTA = 100 gm. of (acog 1ml of 0.02M EDTA = 0.02 gm of CA CO3 4.16 ml of 0.02M ED7A = 0.00 x 4.16 = 8.32 x 10.3 gm of (aco) 40 ml. of sample of cold water. contains = 8.32 x10 gm of caus 1000 ml. of sample of cold water contains = 8:32 = 0.208 gm Forc Percmanet harrdness! IL of AM EDTA = loog of cacog Int of 0.02M EDTA = 100 x 0.02 x 10 3 g caces 3.03 ml of 0.02M EDTA = 3.03 x 0.02 x10-1 g.caco3 = 6.06 ×103 g. calos tome of sample of boilet water contains = 6.06 × 103 gm of caco3 IL of sample of boiled waters contains = 6.06 = 0.151 gm gotal hardness = 208 pm Perchanet hourdness = 151PPM remportary hardness = Total that gress - personanet hardness = (208 - 151) PPM

= 57 ppm.

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Expt. No.	Page No6
Conclusion:-	
The supplied water sample contains	evenue of detail 1. acidences
The supplied water sample contains 151 PPM of permanet harroners and	TI PPA AF TOMPOGRAGU 1. AGRICUL
To the solution of the solutio	g 1 17.41 DI TEMPED COS COS GIVES
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