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Experiment-2.

Title: Estimation of hardness of water by EDTA method

Aim: To find the amount of hardness present in water sample by EDTA titration.

Procedure: Take 10ml of hard water into a conical flask. Now, add 5 ml of buffer solution and add calamagite indicator. Now titrate with 0.01M EDTA solution taken in the burette, till the wine red color changes into blue which is the end point. Let the burette reading of EDTA be V_1 ml. Titrate the solution until the last trace of solution red color dissapears upon addition of just a fraction of a drop of EDTA. The final color change should be from violet color to a pale blue The change should be fairly sharp.

Observation table:-

S/No	Volume of hard water sample. (in ml)	Burette reading.		Volume of 0.01M EDTA (in ml)
		Initial	final	
1	10	0	11.5	11.5
2	10	0	11.7	11.7
3	10	0	11.4	11.4

Avg volume = $\frac{11.5 + 11.7 + 11.4}{3} = 11.53$

Calculation:-

1ml of 0.01M EDTA = 1mg of $CaCO_3$

V_1ml of EDTA = V_1mg of $CaCO_3$

Volume of EDTA Solution Consumed = 11.53ml

Volume of hard water taken = 10ml

$$\text{Sample hardness of water} = \frac{11.53 \times 100}{10}$$

$$= 1153 \text{ ppm.}$$

Result:

Hardness of Sample water = 1153ppm or mg/L.

Answers for questions:-

1) A) As the Stronger Ligand EDTA is added, the $CaIn^+(aq)$ Complex is replaced by the $CaY_2(aq)$ Complex which is blue. The end point of titration is indicated by a sharp colour change from wine red to blue

2) A) As in the Calculation of hardness of water indicator Γ is used which requires pH of around 8-10 for decider colour change.

So buffer Solution is used to maintain the pH of Solution

3) A) Hardness of water is determined by titrating with a standard Solution of ethylenediaminetetraacetic acid(EDTA) which is Complexing agent. Since EDTA is insolube in water, the disodium salt of EDTA is taken for this Experiment. EDTA can form four or six coordination bonds with metal ion.