

Experiment-3

Softening of water

NAME: M. JASWANTH
REG NO: 20BCDT111

Aim: To remove Ca^{+2} and Mg^{+2} ions from hard water using ion-exchange resin.

Procedure:

Pass distilled water 50 ml over Amberlite IR120 ion exchange column. Collect the effluent and discard it. Pipette out 20 ml of hard water into a beaker. Pass hard water over Amberlite IR120 ion exchange Column slowly and collect drops in Conical flask. Pass 100 ml of distilled water slowly over the Column and collect effluent in the same Conical flask. Titrate with 0.01 M EDTA solution by following the Procedure.

Observation:

Volume of hard water taken = 20 ml

S/No	Volume of hard water Sample (ml)	Burette reading		Volume of 0.01 M. EDTA (ml)
		initial	final	
1	20	0	0.9	0.9

Calculation:-

1 ml of 0.01M EDTA = 1 mg of CaCO_3

V_2 ml of EDTA = V_2 mg of CaCO_3

Volume of EDTA Solution Consumed (V_2) = 0.9 ml

Volume of hard water taken = 20 ml

Purified water hardness =

$$= \frac{\text{Volume of EDTA Solution Consumed} \times 1000}{\text{Volume of hard water taken}}$$

$$= \frac{0.9 \times 1000}{20}$$

$$= 0.90 \text{ ppm} \times 50$$

$$= 45 \text{ ppm}$$

$$\text{Water Purification \%} = \frac{\text{Hardness of Sample water} - \text{Hardness of Purified water}}{\text{Hardness of Sample water}} \times 100$$

$$= \frac{20 - 4.5}{20} \times 100$$

$$= 77.5$$

$$\text{Water Purification \%} = 77.5\%$$

Question and answer:-

- 1) A). $\text{Ca}^{+2}/\text{Mg}^{2+}$ ions are exchanged with Chloride and Sulphate ions are exchanged with anion exchange resin (RNH_2OH).
- 2) A) Sodium hydroxide
- 3) A) An insoluble material of high molecular weights that contains groups which can be exchanged with ions in a solution with which it is in contact