

Calculation:

From Titration 1, we have the following relation:

\therefore 1 mL of EDTA requires = $20/V_1$ mg CaCO_3 for complexation

From this relation, it can be seen that

20 mL of water sample after softening through the column consumes = V_3 mL of EDTA.

$$= V_3 \times 20/V_1 \text{ mg of } \text{CaCO}_3 \text{ eq.}$$

\therefore 1000 mL of water sample after softening through the column consumes =

$$= V_3 \times 20/V_1 \times 1000/20$$

$$= V_3/V_1 \times 1000 \text{ ppm}$$

\therefore Residual hardness of the water sample = "Y" ppm

S. No.	Volume of sample hard water (mL)	Burette reading (mL)		Volume of EDTA (V_3 , mL)
		Initial	Final	
1	100 mL	0 mL	0.7 mL	0.7 mL
2	100 mL	0 mL	0.7 mL	0.7 mL
3				
Concordant titer value				0.7 mL

Result:

- Total hardness of the water sample = "X" ppm = 842.89 ppm
- Residual hardness in the water sample = "Y" ppm = 34.91 ppm
- Hardness removed through the column = X - Y ppm = 807.98 ppm

Evaluation of Result:

Sample number	Experimental value	Actual Value	Percentage of error	Marks awarded
9				