Experiment-8

Aim:- To determine the alkalinity of given water solution.

Readings	V_1				V_2			
	I	II	III	CBR (V_1)	I	II	III	CBR (V_2)
W.S A	1.2	1.3	1.2	1.2	5.3	5.5	5.3	53
W.S B	0	0	0	0	4.2	4.4	4.4	4.4

$$P = \frac{V_1 \times Z \times 50 \times 1000}{V}$$

$$M = \frac{V_2 \times Z \times 50 \times 1000}{V}$$

P for water A :

$$P = \frac{1.2 \times 0.02 \times 50 \times 1000}{10}$$

$$P = 120 \text{ ppm (Phenophthalene)}$$

M for water A

$$M = \frac{5.3 \times 0.02 \times 50 \times 1000}{10}$$

$$M = 530 \text{ ppm (Methyl orange)}$$

P for water B

$P = 0$ ppm

M for water B

$$M = \frac{4.4 \times 0.02 \times 50 \times 100}{10}$$

$M = 440$ ppm.

Case 1 :-

$V_1 = 1.2$ $V_2 = 5.3$

$V_1 < V_2$ $V_1 < \frac{1}{2} V_2$

$P = 120$ $M = 530$ $P < \frac{1}{2} M$

$CO_3^{2-} \Rightarrow 2P = 240.$

$HCO_3^- \Rightarrow M - 2P = 530 - (2 \times 120)$

$= 530 - 240 =$

Case 2: $V_1 = 0$ $V_2 = 4.4$

$P = 0$, $M = 440$

$HCO_3^- \Rightarrow M = 440$

water sample	OH^-	CO_3^{2-}	HCO_3^-
	alk		

	water sample	OH^- alkalinity in ppm	CO_3^{2-} alkalinity in ppm	HCO_3^- alkalinity in ppm
①	A ($V_1 < \frac{1}{2} V_2$)	–	240	90
②	B ($V_1 = 0$)	–	–	440

Experiment-8

Aim :-

To determine the alkalinity of the given water sample.

Apparatus :-

Conical flask, burette, burette stand, beaker, measuring cylinder, dropper / pipette.

Chemicals :-

Water sample A, water sample B, 0.02 N HCl, methyl orange indicator, phenophthalene indicator.

Procedure :-

1. Pipette out 10 ml of water sample A into the conical flask.
2. Add 1 drop of phenophthalene indicator and ~~solution~~ in the flask and fill the burette with 0.02 N HCl solution.
3. Titrate this against 0.02 N HCl solution until it becomes colorless [from pink].
4. After it becomes colorless, note down the readings [V_1], add methyl orange indicator in the flask and titrate again against 0.02 N HCl solution until it turns pinkish orange [from yellow].
5. Note down this reading [V_2]. perform this three times [+ pilot rough reading] with same water sample to get constant burette

reading.

6. Perform the same for water sample 'B'.
7. Calculate P, M & quantities of ions in respective water samples.

Calculations :-

$$P = \frac{V_1 \times Z \times 50 \times 1000}{V} \qquad M = \frac{V_2 \times Z \times 50 \times 1000}{V}$$

For water sample 'A'

$V_1 = 1.2$ ml $\qquad V_2 = 5.3$ ml

$$V_1 < \frac{1}{2} V_2$$

$P = V_1 \times 100 = 120$ ml $\qquad P < \frac{1}{2} M$

$M = V_2 \times 100 = 530$ ml

CO_3^{2-} alkalinity $= 2P = 2 \times 120 = 240$ ppm

HCO_3^- alkalinity $= M - 2P = 530 - 2(120) = 190$ ppm

For water sample 'B'

$V_1 = 0$ ml $\qquad V_2 = 3.6$ ml

$P = V_1 \times 100 = 0$ ppm

$M = V_2 \times 100 = 440$ ppm

HCO_3^- alkanitity $= M = 360$ ppm

Standard Refuence Table :-

Sr. No.	Relationship between V_1 & V_2	Relationship between P & M	Alkalinity (ppm)		
			OH^-	CO_3^{2-}	HCO_3^-
1.	$V_1 = 0$	$P = 0$	-	-	M
2.	$V_1 = V_2$	$P = M$	P	-	-
3.	$V_1 = 1/2 V_2$	$P = 1/2 M$	-	2P	-
4.	$V_1 < 1/2 V_2$	$P < 1/2 M$	-	2P	(M-2P)
5.	$V_1 > 1/2 V_2$	$P > 1/2 M$	(2P-M)	2(M-P)	-

Results :-

Water Sample	OH^- alkalinity in ppm	CO_3^{2-} alkalinity in ppm	HCO_3^- alkalinity in ppm
A	-	240	190
B	-	-	440