Q_{11}) A tablet of antacid was dissolved in 100.0 mL of 0.1006 M solution of HCl of aliquot25.0 mL was heated and titrated with 14.7 mL of 0.09913 M solution of NaOH
The weight (g) of $CaCO_3$ (100 g/mol) in the tablet is

A) 0.431 B) 0.861 C) 0.108 D) 0.215

Q_{12}) the solution should be heated before the titration because

A) One of the products is volatile B) The analyte is insoluble
C) Both acid and base are weak D) The titration is fast

$Q_{13\text{-}14}$:

A sample of 1.00 g of a mixture may contains carbonate, bicarbonate, or hydroxide is dissolved and diluted to 100 ml with distilled water, aliquot of 25.0 ml was titrated with 0.123 M HCl. The pH curve illustrates that the two end points are respectively at 11.9 and 20.1 ml

Q_{13}: The sample is

A) NaOH & $NaHCO_3$ B) Na_2CO_3 & $NaHCO_3$ C) NaOH & Na_2CO_3 D) Na_2CO_3 alone

Q_{14}: The mass percent of Na_2CO_3 (106 g/mol) in the sample is

A) 62.1 B) 15.5 C) 26.2 D) 42.8

Q_{15}: A sample of sodium carbonate was titrated with HCl. If the pH curve illustrates that the first end point is at 20.5 ml, the volume (ml) at the second end point should be at

A) 41.0 B) 30.8 C) 20.5 D) 10.3

Q_{16}: A sample containing oxalate weighing 2.124 g was dissolved in acid and diluted to 100 ml, aliquot of 25.0 ml was titrated with 16.3 ml of 0.0315 M $KMnO_4$

$$2\,MnO_4^-{}_{(aq)} + 5\,C_2O_4^{2-}{}_{(aq)} + 16\,H^+{}_{(aq)} \rightarrow 2Mn^{2+}{}_{(aq)} + 10\,CO_{2(g)} + 8\,H_2O$$

The mass percent of $Na_2C_2O_4$ (134 g/mol) is

A) 80.9 B) 13.0 C) 32.4 D) 63.5

$Q_{17\text{-}18}$

A sample of 50.0 ml of water was titrated with 6.60 ml of 0.0103 M $AgNO_3$ to reach the chromate end point. Another 100.0 ml of water was titrated with 5.60 ml of 0.0916 M HCl to reach methyl orange end point.

Q_{17}: The chloride content measured as part per million Cl^- (35.5 g/mol) is

A) 96.4 B) 115 C) 48.2 D) 513

Q_{18}: The total alkalinity of water measured as part per million $CaCO_3$ (100 g/mol) is

A) 513 B) 410 C) 229 D) 256

Q_{19}: The solution that used as standard solution and self-indicator is

A) $KMnO_4$ B) $AgNO_3$ C) K_2CrO_4 D) Na_2CO_3

$Q_{20\text{-}21}$:

A sample of 0.500 g of unknown containing NaCl and $CaCl_2$ was dissolved and the Ca^{2+} in the solution is precipitated as CaCO3 (100 g/mol) producing 0.215 g. the remaining solution was titrated with 0.0696 M $AgNO_3$ requiring 38.0 ml to reach the end point.

Q_{20}: The mass percent of $CaCl_2$ (111 g/mol) in the sample is

A) 19.5 B) 79.6 C) 47.7 D) 14.1

Q_{21}: The mass percent of NaCl (58.5 g/mol) in the sample is

A) 22.3 B) 32.3 C) 48.4 D) 33.8

18/ $M \times V = \text{mol}_{HCl} \times \frac{1}{2} \times \frac{1}{1} \times \text{F.wt}$

Ca^{2+} — CaCO₃

$$CaCO_{3\,ppt} = \frac{0.0116 \times 5.60 \times 10^{-3} \times \frac{1}{2} \times \frac{1}{1} \times 100}{50 \times 10^{-3}} =$$

$= 5.129 \simeq 5.13$ The Answer is [A]

19/ [A] $KMnO_4$

20/ $\frac{0.215\,g}{100\,g/mol} = \text{mol } CaCO_3 = 2.15 \times 10^{-3}$

$$\text{mol } CaCl_2 = \text{mol } CaCO_3$$
$$1 \quad : \quad 1$$

$$CaCl_2\% = \frac{2.15 \times 10^{-3} \times 111}{0.500\,g} \times 100$$

$= 47.7\%$

Q13/ $V_1 = 11.9$ ml $V_2 = 20.1$ ml

$\Delta V = V_2 - V_1 = 8.2$ ml

$V_1 > \Delta V \rightarrow$ The sample is

[C] NaOH and Na_2CO_3

Q14/

$OH^- + H^+ \rightarrow H_2O$ ... (1)] - E.P (1)

$CO_3^{2-} + H^+ \rightarrow HCO_3^-$ ... (2)]

$HCO_3^- + H^+ \rightarrow H_2CO_3$ ... (3) → E.P (2)

- $M_{HCl} \times V_1 = \text{mol } HCl = \text{mol } OH^- + \text{mol } CO_3^{-2}$

$0.123 \times 11.9 \times 10^{-3} = 1.4637 \times 10^{-3}$ mol

- $M_{HCl} \times \Delta V = \text{mol } HCl = \text{mol } H_2CO_3$

$0.123 \times 8.2 \times 10^{-3} = 1.0086 \times 10^{-3}$

$\text{mol } Na_2CO_3 = 1.4637 \times 10^{-3} + 1.0086 \times 10^{-3}$

$= 2.4723 \times 10^{-3}$

$Na_2CO_3\% = \frac{2.4723 \times 10^{-3} \text{ mol} \times 106 \text{ g/mol}}{1.00 \text{ g}} \times 100$

$= 26.2 \rightarrow$ The answer is

[C]

Q_{11}) A tablet of antacid was dissolved in 100.0 mL of 0.1006 M solution of HCl of aliquot25.0 [illegible] heate and titrated with 14.[illegible] mL of 0.09913 M solution of NaOH

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Q_{21}. The mass percent of NaCl (58.5 g/mol) in the sample is

A) 22.3 B) 32.3 C) 48.4 D) 33.8

Q15/ [A] 41.0

Answer ⟶ Na_2CO_3 ⟶ $V_1 = \Delta V$

$V_1 = 20.5$ ml

$V_2 = ?$ ⟶

أسهل طريقة انه نطرح كل الخيارات من V_1 والخيار

اللي يطلع ناتج الطرح 20.5ml هو الجواب الصح

✓ 41.0 - 20.5 = 20.5

Q16/ $MXV = \text{mol}_{KMnO_4} \times \frac{5}{2} \times \frac{100}{25} \times 134$

$\frac{5}{2}$ تحويل لمولات $Na_2C_2O_4$ — $\frac{100}{25}$ عدد عينات التكرير — 134 تحويل جرامات

$$Na_2C_2O_4\% = \frac{0.0315 \times 16.3\times10^{-3} \times \frac{5}{2} \times \frac{100}{25} \times 134}{2.124\ g} \times 100$$

$= 32.39 \simeq 32.4\%$ Answer [C]

Q17/ mol Cl^- = mo $AgNO_3$ = MXV

$0.0183 \times 6.60\times10^{-3}$

$= 6.798 \times 10^{-5}$ mol

$$ppm\,Cl^- = \frac{6.798\times10^{-5} \times 35.5\times10^{3}}{50\times10^{-3}}$$

$= 48.2$ Answer [C]

Q8 / [C] 2,3

Q9 / [C] 3, 4

Q10 / [a] acetic acid

Q11 / Total mol HCl = M x V

$0.1006 \times 10.00 \times 10^{-3}$

$= 0.01006$ mol

- mol HCl (unReacted) = mol NaOH

M x V

$0.0971 \times 14.71 \times 10^{-3}$

$= 1.4582 \times 10^{-3}$ mol

- mol HCl (Reacted) = $0.01006 - 1.4582 \times 10^{-3}$

$= 8.6018 \times 10^{-3}$

mol $CaCO_3 = \frac{1}{2}$ mol HCl Reacted

$= 4.3009 \times 10^{-3} \times \frac{25}{100} \times 100 =$ (F.wt)

wt $CaCO_3$ = 0.1075 ≃ 0.108

Answer is [C]

Q12 / [B] the analyte is Insoluble

Q1 [C] 2.3

Q2 :-
[D] $AgNO_3$ and $KMnO_4$

Q3 :- [B] spontaneous

Q4 :- [C] antiacid

Q5 :- [C] more, last

Q6 :- [C] acidic, high

Q7 : ① Total mol NaOH = MXV
$0.123 \times 50.0 \times 10^{-3} = 6.15 \times 10^{-3}$ mol

② mol (NaOH) (unReacted) : mol HCl = MXV
$0.116 \times 13.2 \times 10^{-3}$
$= 1.5312 \times 10^{-3}$

③ mol (NaOH) (Reacted) =
$6.15 \times 10^{-3} - 1.5312 \times 10^{-3} =$ 4.6188×10^{-3}

④ mol NaOH : mol NH_4Cl
1 : 1

$$NH_4Cl\ \% = \frac{4.6188 \times 10^{-3}\ mol \times 53.5\ g/mol}{0.500} \times 100$$

$= 49.4\ \%$ Answer is [D]