Q1 - 24 June - Shift 1

A 0.166 g sample of an organic compound was digested with cone. H_2SO_4 and then distilled with NaOH. The ammonia gas evolved was passed through 50.0 mL of 0.5 N H_2SO_4. The used acid required 30.0 mL of 0.25 N NaOH for complete neutralization. The mass percentage of nitrogen in the organic compound is____.

Space for your notes:

Q2 - 25 June - Shift 1

Number of grams of bromine that will completely react with 5.0g of pent-1-ene is _____ $\times 10^{-2}$g. (Atomic mass of Br = 80 g/mol) [Nearest Integer)

Space for your notes:

Q3 - 25 June - Shift 2

The neutralization occurs when 10 mL of 0.1 M acid 'A' is allowed to react with 30 mL of 0.05 M base $M(OH)_2$. The basicity of the acid 'A' is_____. [M is a metal]

Space for your notes:

Q4 - 26 June - Shift 2

Which one of the following is an example of disproportionation reaction?

Space for your notes:

(1) $3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$

(2) $MnO_4^{2-} + 4H^+ + 4e^- \rightarrow MnO_2 + 2H_2O$

(3) $10I^- + 2MnO_4^- + 16H^+ \rightarrow 2Mn^{2+} + 8H_2O + 5I_2$

(4) $8MnO_4^- + 3S_2O_3^{2-} + H_2O \rightarrow 8MnO_2 + 6SO_4^{2-} + 2OH^-$

Q5 - 28 June - Shift 1

A 2.0 g sample containing MnO_2 is treated with HCl liberating Cl_2. The Cl_2 gas is passed into a solution of KI and 60.0 mL of 0.1 M $Na_2S_2O_3$ is required to titrate the liberated iodine. The percentage of MnO_2 in the sample is _____. (Nearest integer)

[Atomic masses (in u) Mn = 55; Cl = 35.5; O = 16, I = 127, Na = 23, K = 39, S = 32]

Space for your notes:

Q6 - 28 June - Shift 2

0.01 M $KMnO_4$ solution was added to 20.0 mL of 0.05 M Mohr's salt solution through a burette. The initial reading of 50 mL burette is zero. The volume of $KMnO_4$ solution left in the burette after the end point is _____ mL. (nearest integer)

Space for your notes:

Q7 - 29 June - Shift 2

For the reaction given below:

$CoCl_3 \,.\, xNH_3 + AgNO_3\,(aq) \rightarrow$

If two equivalents of AgCl precipitate out, then the value of x will be _____.

Space for your notes:

Answer Key

Q1 (63) **Q2** (1136) **Q3** (3) **Q4** (A)

Q5 (13) **Q6** (30) **Q7** (5)

Q1 (63)

m_{eq} of NaOH used = 30 ×0.25

m_{eq} of H_2SO_4 taken = 50 × 0.5

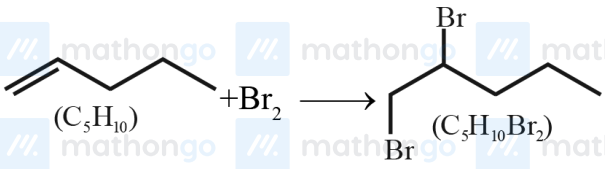
$\therefore$ m_{eq} of H_2SO_4 used

= 50 × 0.25 ×30 ×0.25 = 17.5 m mol of NH_3

$$\therefore \% N = \frac{17.5 \times 10^{-3} \times 14}{0.166} \times 100 = 147.59\%$$

(Not possible)

Q2 (1136)



moles of Br_2 = moles of C_5H_{10}

$$\Rightarrow \frac{w}{160} = \frac{5}{70}$$

$$\Rightarrow w = \frac{5 \times 160}{70} g$$

$$= 11.428\ g$$

$$= 1142.8 \times 10^{-2} g \approx 1143 \times 10^{-2} g$$

Q3 (3)

Acid + Base $\longrightarrow$ Salt + H_2O

0.1 M $M(OH)_2$

10ml 0.05 M

30 ml

at equivalence point

equivalent of acid = equivalent of base

0.1 × 10 × n = 30 × 0.05 × 2

n = 3

Q4 (A)

$3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$

$+6 \qquad +7 \qquad +4$

So, it is disproportionation reaction.

Q5 (13)

$MnO_2 + HCl \longrightarrow Cl_2 + Mn^{+2}$

6 meq 6 meq

$= 3\,m\,mol$

$Cl_2 + KI \longrightarrow Cl^- + I_2$

6 meq 6 meq

$I_2 + Na_2S_2O_3 \longrightarrow I^- + Na_2S_4O_6$

6 meq 6 m mol

$= 6\,meq$

$\%MnO_2 = \frac{3\times10^{-3}\times87}{2}\times100$

$= 13.05\%$

Ans. 13

Q6 (30)

Sol. $N_1V_1 = N_2V_2$

$0.01 \times 5 \times V_1 = 0.05 \times 1 \times 20$

$V_1 = 20$ ml used

$\therefore$ Volume left $= 50 - 20 = 30$ ml

Q7 (5)

$CoCl_3.xNH_3 + AgNO_3 \rightarrow AgCl\downarrow$

2 mol

$[Co(NH_3)_5Cl]Cl_2 + AgNO_3 \rightarrow AgCl\downarrow$

2 mol

$x = 5$