Q1 - 25 June - Shift 2

$$\Delta T = i\ k_f \times m$$

$$0.2 = i \times 1.86 \times \frac{0.7}{93} \times \frac{1000}{42}$$

$$i = \frac{0.2 \times 93 \times 6}{1.86 \times 100}$$

$$i = 0.60$$

$$2A \rightleftharpoons A_2$$

$$1 - \alpha \qquad \frac{\alpha}{2}$$

$$i = 1 - \alpha + \frac{\alpha}{2}$$

$$i = 1 - \frac{\alpha}{2}$$

$$1 - \frac{\alpha}{2} = 0.60$$

$$1 - 0.60 = \frac{\alpha}{2}$$

Space for your notes:

$$\alpha = 0.80$$

Q2 - 25 June - Shift 2

Given below are two statements one is labelled as **Assertion A** and the other is labelled as **Reason R:**

Assertion A : The amphoteric nature of water is explained by using Lewis acid/base concept.

Reason R : Water acts as an acid with NH_3 and as a base with H_2S.

In the light of the above statements choose the correct answer from the options given below :

(A) Both A and R are true and R is the correct explanation of A.

(B) Both A and R are true but R is NOT the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

Space for your notes:

Q3 - 26 June - Shift 1

50 mL of 0.1 M CH_3COOH is being titrated against 0.1 M NaOH. When 25 mL of NaOH has been added, the pH of the solution will be _____ $\times 10^{-2}$. (Nearest integer)

(Given : pK_a (CH_3COOH) = 4.76)

log 2 = 0.30

Space for your notes:

Q4 - 27 June - Shift 2

pH value of 0.001 M NaOH solution is_____.

Space for your notes:

Q5 - 28 June - Shift 2

A student needs to prepare a buffer solution of propanoic acid and its sodium salt with pH 4. The ratio of $\frac{[CH_3CH_2COO^-]}{[CH_3CH_2COOH]}$ required to make buffer is .....

Given : $K_a(CH_3CH_2COOH) = 1.3 \times 10^{-5}$

(A) 0.03 (B) 0.13

(C) 0.23 (D) 0.33

Space for your notes:

Q6 - 29 June - Shift 1

The solubility of AgCl will be maximum in which of the following ?

(A) 0.01 M KCl

(B) 0.01 M HCl

(C) 0.01 M $AgNO_3$

(D) Deionised water

Space for your notes:

Answer Key

Q1 (A) **Q2** (D) **Q3** (476) **Q4** (11)

Q5 (B) **Q6** (D)

Q1 (A)

$$Bi_2S_3 \rightleftharpoons 2Bi^{3+} + 3S^{2-}$$

$$2s \quad 3s$$

$$k_{sp} = (2s)^2 (3s)^3$$

$$= 4s^2 \times 27 (s)^3$$

$$= 108 (s)^5$$

$$(s)^5 = \frac{1.08 \times 10^{-73}}{108}$$

$$\Rightarrow s = 10^{-15}$$

Q2 (D)

$$\underset{\text{Acid}}{H_2S} + \underset{\text{Base}}{H_2O} \rightleftharpoons H_3O^+ + HS^-$$

$$\underset{\text{Acid}}{H_2O} + \underset{\text{Base}}{NH_3} \rightleftharpoons NH_4OH$$

Q3 (476)

Moles of $CH_3COOH = 5$ m mole

moles of NaOH = 2.5 m mole

$NaOH + CH_3COOH \longrightarrow CH_3COONa + H_2O$

2.5 m mole 2.5 m mole

0 2.5 m mole 2.5 m mole

so buffer is formed

$$pH = pKa + \log\left(\frac{2.5/75}{2.5/75}\right) = pKa$$

pH = 4.76

$= 476 \times 10^{-2}$

Q4 (11)

$0.001\ M\ NaOH$

$[OH^-] = 10^{-3}$

$pOH = 3$

$pH = 11$

Q5 (B)

$$pH = pK_a + \log\frac{[Salt]}{[Acid]}$$

$$4 = 5 - \log 1.3 + \log\frac{[CH_3CH_2COO^-]}{[CH_3CH_2COOH]}$$

$$\log\frac{[CH_3CH_2COO^-]}{[CH_3CH_2COOH]} = \log 1.3 - 1 = \log\frac{1.3}{10}$$

$$\frac{[CH_3CH_2COO^-]}{[CH_3CH_2COOH]} = 0.13$$

Q6 (D)

In deionized water no common ion effect will take place so maximum solubility