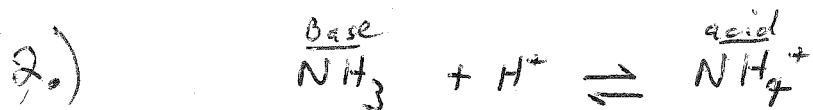
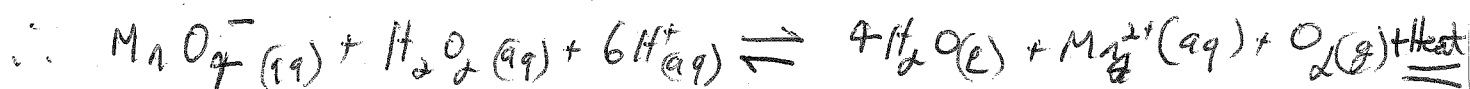


①

## YR II Acid & Base Revision

1)  $MnO_4^-$  is a pink/purple species. At 273K the solution is only slightly pink meaning there is only a low concentration of  $MnO_4^-$  however as the temperature increases the colour intensifies signifying an increase in  $[MnO_4^-]$ , favouring the reverse reaction. This indicates that the reaction is exothermic as adding heat favours the reverse reaction.



$$pOH = pK_b + \log\left(\frac{\text{acid}}{\text{base}}\right)$$

$$pK_b = -\log(1.8 \times 10^{-5})$$

$$= 4.74$$

$$[NH_3] = 0.01M \quad [NH_4^+] = 0.05$$

$$\therefore pOH = 4.74 + \log\left(\frac{0.05}{0.01}\right)$$

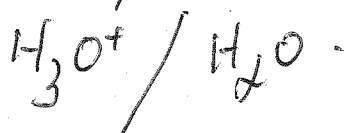
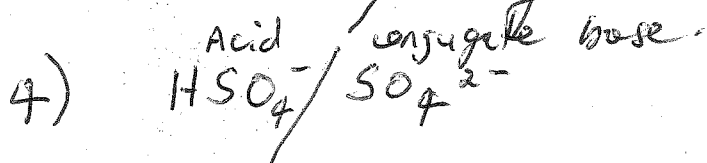
$$= 5.44$$

$$pH = 14 - pOH$$

$$\therefore pH = 14 - 5.44$$

$$pH = \underline{\underline{8.56}}$$

3) A Bronsted/Lowry acid is a proton donor. ( $H^+$ )



$$5) \text{ pH} = -\log(3.2 \times 10^{-4}) \\ = 3.9$$

$$6) \text{ pOH} = -\log(5.6 \times 10^{-3}) \\ = 2.25$$

$$\text{pH} = 14 - \text{pOH} \\ = 14 - 2.25 \\ = 11.75$$

7.) Molarity = moles/Litres.

$$\text{moles } \text{H}^+ = 3.2 \times 10^{-4} \\ \text{Vol} = 0.1 \text{ L.}$$

$$\therefore M = \frac{3.2 \times 10^{-4}}{0.1} \\ = 3.2 \times 10^{-3} \text{ M.}$$

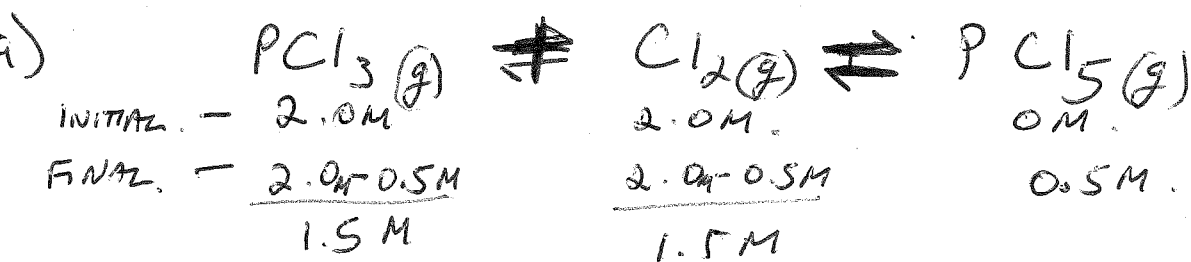
$$\text{pH} = -\log[\text{H}^+] \\ = -\log(3.2 \times 10^{-3} \text{ M}) \\ = 2.5$$

$$8) [\text{OH}^-] = \frac{1.0 \times 10^{-9}}{0.5} \\ = 2.0 \times 10^{-9} \\ \text{pOH} = -\log(2.0 \times 10^{-9}) \\ = 8.7$$

3) cont.  $pH = 14 - pOH$ .

$$\therefore pH = 14 - 8.7$$

$$= \underline{\underline{5.3}}$$



$$K_{eq} = \frac{[PCl_5]}{[PCl_3][Cl_2]}$$

$$= \frac{0.5}{(1.5)(1.5)}$$

$$= 2.22 \times 10^{-1}$$

b) The reverse reaction will be favoured as according to Le Chatelier's Principle when a stress is applied to a dynamic equilibrium the position of equilibrium shifts to counteract the change and reestablish equilibrium. If volume is increased, pressure will be reduced so the side which would increase pressure will be favoured i.e. the side with more gas molecules.

c)  $K_{eq}$  will ~~remain~~ <sup>of reaction</sup> change as concentration on one side will increase and the other will decrease.

d) The reverse reaction will be favoured as this will counteract the change caused by adding  $PCl_5$ . i.e. some of the added  $PCl_5$  will decompose to form  $PCl_3$  and  $Cl_2$  and reestablish equilibrium.

e)  $K_{eq}$  will remain unchanged as, though  $PCl_5$  is added ~~it~~<sup>some</sup> will decompose and more  $PCl_3$  and  $Cl_2$  will form and  $\therefore K_{eq}$  will remain unchanged.

f) This is an endothermic reaction ( $\Delta H = +ve$ )  $\therefore$  the forward reaction would be favoured & more  $PCl_5$  would be produced.

10) a) approx 10min

b)  $F_2(g)$  was added. This caused the  $COF_2$  to be produced as the extra  $F_2$  reacted with the remaining  $CO(g)$ . This caused the  $[CO(g)]$  ~~to~~  
~~to~~ drop.

c) Since the product was favoured when temp was decreased this reaction is seen to be exothermic as the ~~reverse~~ position of equilibrium moves to favour an increase in temp.