

Name of the Student: _____

Max. Marks : 18 Marks

Time :18 Minutes

Q1.

(a) At 50°C, the ionic product of water, K_w , has the value $5.48 \times 10^{-14} \text{ mol}^2 \text{ dm}^{-6}$.

(i) Define the term K_w

(ii) Define the term pH

(iii) Calculate the pH of pure water at 50 °C. Explain why pure water at 50 °C is still neutral even though its pH is not 7.

Calculation _____

Explanation _____

(5)

(b) At 25°C, K_w has the value $1.00 \times 10^{-14} \text{ mol}^2 \text{ dm}^{-6}$. Calculate the pH at 25 °C of

(i) a $0.150 \text{ mol dm}^{-3}$ solution of sodium hydroxide,

(ii) the solution formed when 35.0 cm^3 of this solution of sodium hydroxide is mixed with 40.0 cm^3 of a $0.120 \text{ mol dm}^{-3}$ solution of hydrochloric acid.

(8)

(c) In a $0.150 \text{ mol dm}^{-3}$ solution of a weak acid HX at 25°C , 1.80% of the acid molecules are dissociated into ions.

(i) Write an expression for K_a for the acid HX.

(ii) Calculate the value of K_a for the acid HX at this temperature and state its units.

(5)

(Total 18 marks)