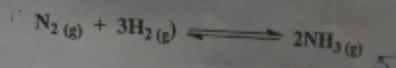


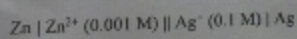
- d. At a total pressure of 2 atm. and 673 K the equilibrium constant, for the reaction is $1.64 \times 10^{-4} \text{ atm}^2$.



- Calculate K_c (2 marks)
 - If this mixture is transferred from a 5L flask to a 1.5L flask, in which direction does a net change occur to return the equilibrium? Explain. (3 marks)
- e. Define the term 'Lewis acid' (1 mark)
- f. Write a chemical reaction showing the auto ionization of water and derive the equilibrium constant K_w . (2 marks)
- g. If the K_b for $0.1 \text{ M NH}_3(\text{aq})$ is $1.8 \times 10^{-5} \text{ M}$. Calculate the pH of this solution. (4 marks)
- h. A buffer effect was made by mixing sodium hypochlorite (NaOCl) and hypochlorous acid (HOCl). If the pH of the resulting buffer was 6.20, determine the ratio of the salt to the acid that will bring about this pH if the pK_a of the acid is 7.53 (2 marks)

Question Three

- What is the difference between an active and an inactive electrode? Name two substances commonly used for inactive electrodes. (3 marks)
- Give any two applications of galvanic cells. (2 marks)
- Given the following cell notation:



The standard potential of $\text{Ag} | \text{Ag}^+$ half-cell is 0.80 V and $\text{Zn} | \text{Zn}^{2+}$ is -0.76 V.

- Write the half reaction for the anode and the cathode. (2 marks)
- Write the overall cell reaction. (1 mark)
- Calculate the emf of the cell. (4 marks)
- Calculate the emf of the cell. (2 marks)
- State Hess's law of heat of summation.
- The heat of combustion of methane (CH_4) is -890.65 kJ/mol and heats of formation of CO_2 and H_2O are -393.5 and -286.0 kJ/mol respectively. Calculate the heat of formation of methane. (4 marks)