

Question Paper

Exam Date & Time: 21-Jun-2024 (10:00 AM - 01:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

SECOND SEMESTER BSc HEALTH SCIENCES DEGREE EXAMINATION - JUNE 2024

SUBJECT: BHS-104 - CHEMISTRY II

(OLD SCHEME)

Marks: 75

Duration: 180 mins.

Answer all the questions.

2. Answer the following in 2 or 3 sentences

- 2A) Define the following terms in terms of phase changes: (i) Deposition (ii) Fusion (2)
- 2B) How many moles of solute particles are present in 1L of 10^{-4} M K_2SO_4 ? (2)
- 2C) Define Arrhenius acid and base and mention its limitation. (2)
- 2D) Define the following terms
i) Anode ii) cathode iii) oxidising agent iv) reducing agent (2)
- 2E) Define the following
i) spontaneous reaction ii) entropy (2)
- 2F) At 1200 K, the reaction of hydrogen and chlorine to form hydrogen chloride is
 $H_2(g) + Cl_2(g) \rightleftharpoons 2HCl(g)$ $K_c = 7.6 \times 10^8$
Calculate K_c for the reaction: $4/3 HCl \rightarrow 2/3 H_2(g) + 2/3 Cl_2(g)$ (2)
- 2G) Explain the effect of temperature and pressure on the equilibrium position of reversible reactions. (2)
- 2H) The combustion of 5.00 grams of $C_2H_6(g)$, at constant pressure releases 259 kJ of heat.
What is ΔH for the reaction: $2C_2H_6(g) + 7O_2(g) \rightarrow 4CO_2(g) + 6H_2O(l)$? (2)
- 2I) Give reason: Anions are more polarizable than their parent atoms. (2)
- 2J) Define autoionization of water. Write an expression for the same. (2)
- 2K) Ethanol is miscible in water. Give reason. (2)
- 2L) At $1000^\circ C$, cyclobutane (C_4H_8) decomposes in a first-order reaction, with the very high rate constant of $100 s^{-1}$, to two molecules of ethylene (C_2H_4). If the concentration of C_4H_8 after 0.050 seconds is 0.1 M what was the initial concentration? (2)
- 2M) What are the key factors that decides the spontaneity of a reaction? (2)
- 2N) Consider the reaction: $CH_3Cl(aq) + OH^-(aq) \leftrightarrow CH_3OH(aq) + Cl^-(aq)$
When the reaction is started in a 1L vessel with 0.10 moles of CH_3Cl and 0.20 moles of OH^- , 0.030 moles of CH_3OH are obtained at equilibrium. Calculate the equilibrium constant. (2)

3. Write a short note on the following questions

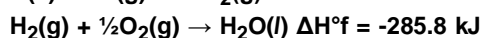
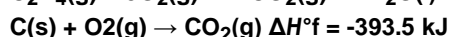
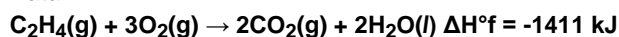
- 3A) CH_3NH_2 has higher boiling point than CH_3F . Justify the statement with proper reasoning. (3)

i) The reaction $2\text{NOCl}(\text{g}) \rightarrow 2\text{NO}(\text{g}) + \text{Cl}_2(\text{g})$ has an E_a of 1.00×10^2 KJ/mol and a rate constant of 0.286 L/mol/s at 500 K. what is the rate constant at 490 K?

3B) (i) Define enthalpy of formation of a compound. (3)

ii) Use the data given below to find the standard enthalpy of formation of ethylene, $\text{C}_2\text{H}_4(\text{g})$.

Data:



3C) Explain phase diagram for water. (3)

3D) Describe construction and working of Zn-Cu voltaic cell with reactions (Note: Zn is anode and Cu is cathode). (3)

Answer the following questions

4A) i) Calculate the vapor pressure lowering, ΔP , when 10.0 mL of glycerol ($\text{C}_3\text{H}_8\text{O}_3$) is added to 500. mL of water at 50°C . At this temperature, the vapor pressure of pure water is 92.5 torr and its density is 0.988 g/mL. The density of glycerol is 1.26 g/mL. (5)

ii) Salts from strong bases and weak acids give basic solutions. Give reason.

4B) Draw the graph (pH vs volume of titrant) depicting the titration of 40mL of 0.01 M strong acid with 0.01M (5)

i) strong base.

ii) Define equivalence point of a titration. How is it different from end point of the titration?

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