



Answer the following Questions

Assume any missing data

Total Marks 50

(N=14, C=12, H=1 and O=16)

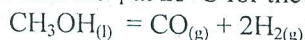
Question No. (1): (10 Marks)

- (a) Explain the concept of the pure component volume of a component gas in a mixture of gases? State the law relates the total volume with the partial volume of each component? (3 Marks)
- (b) List two conditions under which deviations from ideal behaviour are observed. Give two reasons for such deviations.? (3 Marks)
- (c) Calculate the percent CO in a mixture of CO plus CO₂ if 1.80 gm of the mixture occupies 8618.4 cc.at 42 °C and pressure of 114 mmHg.? (4Marks)

Question No. (2): (14 Marks)

- (a) Explain what is meant by enthalpy? Show how it is related to the heat exchanged in a process carried out at constant pressure (QP)? (3 Marks)
- (b) State the three laws of thermodynamic? (3 Marks)
- (c) Referring to the information in the table at 25°C: (6 Marks)

- (1) Calculate ΔS°_r at 25°C for the reaction:



- (2) Calculate ΔS° for CO_(g) at 25°C.
- (3) Discuss the effect of temperature on the spontaneity of the above reaction
- (4) Calculate K_p and then the equilibrium pressure of CO_(g), above CH₃OH_(l) at 25°C.

Compound	ΔH°_f kcal/mole	ΔG°_f kcal/mole	S° cal/mole K
H _{2(g)}	0.00	0.00	31.212
CO _(g)	-26.415	-32.808	-----
CH ₃ OH _(l)	-57.036	-39.747	30.26

Question No. (3): (10 Marks)

- (a) explain the concept of ideal solutions? and show how deviation from ideally could occur? Confirm your answer with draw (3Marks)
- (b) Find the molecular weight and.the molecular formula of a compound whose composition is 95.05% by weight carbon and 4.95% by weight hydrogen. When 10 gm of the compound are dissolved in 100 gm of benzene (C₆H₆), the vapor pressure above the resulting solution is 91.64 torr. If the vapor pressure of pure benzene is 95.18 torr at 25°C.? (Assume the compound is nonvolatile and that benzene obeys Raoult's law in the solution.) (5Marks)
- (c) What would be the osmotic pressure, at 17°C of an aqueous solution containing 1.75 gm of sucrose, (C₁₂H₂₂O₁₁), per 150 cm³ of solution? (2Marks)

Question No. (4): (10Marks)

- (a) Explain the concept of chemical equilibrium on kinetic basis? (2Marks)
- (b) At 817°C, the equilibrium constant for reaction between pure CO₂ and excess hot graphite to form 2CO(g) is 10, (i) What is the analysis of the gases at equilibrium, at 817°C and at a total pressure of 4 atm?
(ii) What is the total pressure when the gas mixture analyzes 94% CO by volume? (4Marks)
- (c) Calculate the percent ionization in 0.4 molar HCN solution and Calculate also the pH of the solution? (K_a for HCN = 6x10⁻¹⁰) (4Marks)

Question No. (5): (10 Marks)

- (a) Mention the main constituents of Portland cement and express them in clinker chemistry notation? (2Marks)
- (b) Explain the main features of the kiln used for burning the raw mix to produce Portland cement? and explain the main reactions occurring inside it? (4Marks)
- (c) Explain the main stages of setting and hardening of Portland cement according to the modern theory? (2Marks)
- (d) Explain (graphically) the development of compressive strength on the hydration of the main constituents of Portland cement? (2Marks)

انتهت الأسئلة - مع أطيب التمنيات بالتوفيق والنجاح

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