

Answer the following questions

أجب عن الأسئلة التالية موضحاً رقم السؤال في وسط السطر

Question (1)

(23 Marks)

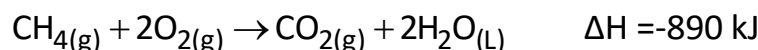
- (a) Which of the following aqueous solutions will boil at the highest temperature? And explain why? Note: all of the salts listed below are completely soluble in water.
- (i) A 0.50 m solution of NaCl.
(ii) A 0.50 m solution of Na₃PO₄.
(iii) A 0.50 m solution of Na₂SO₄.
- (b) Calculate the molarity of a solution that contains 9.65 g CaCl(OCl) in 500 ml of solution. (Molar mass of CaCl(OCl) = 126.85 g)
- (c) Which freezes at a LOWER temperature, Nile water or Sea water? Briefly explain your reasoning.
- (d) Calculate the freezing or boiling point of a solution made by dissolving 12.8 g of naphthalene (C₁₀ H₈) in 200 g of CCl₄. (Molar mass of C₁₀H₈ = 128 g/mol , K_f for CCl₄ = 29.8 °C/m ,, K_b for CCl₄ = 5.02 °C/m, Boiling point of CCl₄ = 76.8 °C, Freezing point of CCl₄ = -22.3 °C).

Best regards Ass.Prof. Dr.Mahmoud Elkomy

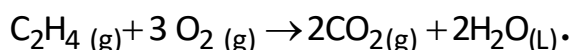
Question (2)

(22 Marks)

- (a) State the following:
- (i) The first law of thermodynamics
(ii) Hess's law
- (b) When 1 mole of methane CH₄ (gas) is burned at constant pressure, 890 kJ of energy is released as heat. Calculate ΔH for a process in which a 5.8 g sample of methane is burned at constant pressure.



- (c) How many joules are required to increase the temperature of 100 g of copper from 10°C to 100°C the specific heat of copper is 0.389 J/gC°.
- (d) The standard heat of formation ΔH_f⁰ of C₂H₄ (g), CO₂ (g) and H₂O(L) are, 52.3KJ/mole , -393.5 KJ/mole and -285.8 KJ/mole respectively. Determine the heat of combustion of one mole of C₂H₄ (g)



Best regards Dr. Shahera Shohyeb

Question (3)**(23 Marks)**

- (a) Discuss each of the following :-
- Boyle's law
 - Graham's law of diffusion
 - The law of mass action.
- (b) For the reversible reaction
 $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \leftrightarrow \text{NH}_3(\text{g})$ at 723°C , the value of $K_p = 1.45 \times 10^{-5}$.
Calculate K_c for this reaction.
- (c) Calculate the pressure exerted by one mole of carbon dioxide at 27°C in a flask whose volume is 4.00 liters.

Best regards Dr. Fadwa Hashem

Question (4)**(23 Marks)**

- (a) Define each of the following:

Equivalent conductance – Buffer solution – Faraday's first law.

- (b) Calculate the pH of 0.1 N NH_4OH ($K_b = 10^{-5}$).
- (c) For the Cell $\text{Zn}/\text{Zn}^{+2} (0.004\text{M}) // \text{Cd}^{+2} (0.2\text{M})/\text{Cd}$ The standard electrode pot. (Both as reduction) for Zn (-0.763V) and for Cd(-0.403V) calculate emf of the cell.
- (d) How many hours will be required to deposit 11.24gm of Cd metal from a solution of CdSO_4 using 1.75amp. current? [Atomic wt of Cd=112.4].

Good Luck Dr. Manal Elhefnawy
