GALGOTIAS UNIVERSITY

ADMISSION NUMBER													

School of Basic Sciences

Bachelor of Science Honours in Chemistry
Mid Term Examination - May 2024

Duration : 90 Minutes
Max Marks : 50

Sem II - C1UB204B - Chemical Thermodynamics and Equilibrium

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1)	Why the value of Cp is always greater than Cv and and write the relation between them.	K2	(2)
2)	Define the term work. Write the mathamatical formulas of work done for irreversible process during expansion and compression.	K1	(3)
3)	Explain the term internal energy. Calculate ΔE, q and w if 2 moles of hydrogen at 3 atm pressure expand isothermally at 50ºC and reversibly to a pressure of 1 atm.	K2	(4)
4)	Illustrate the concise statement of the first law of thermodynamics. Deduce its mathematical form and explain the terms involved.	K2	(6)
5)	Determine ΔH of the reaction $C(s) + 2H_2(g) \rightarrow CH_4(g)$ from the following data : $(i) C(s) + O_2(g) \rightarrow CO_2(g), \Delta H = -393.7\ kJ$ $(ii) H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O(l), \Delta H = -285.7\ kJ$ $(iii) CH_4(g) + 2O_2(g) \rightarrow CO - 2(g) + 2H_2O(l), \Delta H = -890.3\ kJ$	K3	(6)
6)	Explain the special forms of First Law of Thermodynamics and derive that ΔH=qp.	K3	(9)
7)	Discuss the term heat of combustion. The heat of combustion of carbon monoxide at constant volume and at 17ºC is – 283.3 kJ. Calculate its enthalpy of combustion at constant pressure $(R = 8.314\ J\ degree^{-1}\ mol^{-1})$.	K4	(8)
8)	Compare various factors on which bond energy depends and define the term bond energy. Given that energies for H–H, O=O and O–H bonds are 104, 118 and 111 kcal mol–1 respectively, calculate the heat of the reaction H2(g) + 1/2 O2(g) → H2O(g)	K4	(12)
	OR		
	Compare the differnce between bond energy and bond dissociation energy. The bond dissociation energy of H2, Cl2 and HCl are 110, 52 and 103 kcal/mol respectively. Find heat of formation for HCl: 1/2 H2 +1/2 Cl2 → HCl; Δ H =?	K4	(12)