CENTRAL UNIVERSITY OF HARYANA
SCHOOL OF ENGINEERING & TECHNOLOGY
2nd Sessional Exam (June, 2023)

Paper Name: Chemistry B. Tech. (CSE) 1st Year/II Sem; Paper Code: BT CH 102A, 1 hr, 20 Marks

Note: Candidates are required to attempt all the questions.

Q: 1 which of the following statements are true and which are false? 5

i. q and w are state functions
ii. All the intensive properties are state functions
iii. Density is an extensive property
iv. An isothermal process is one in which temperature remains constant
v. All the natural processes are irreversible
vi. State functions are perfect differentials
vii. It is never possible to convert chemical energy into electrical energy
viii. For an ideal gas the unit of co-efficient of the thermal expansion is that of pressure
ix. The standard state of a gaseous species is ideal gas at 1 atm and 298 K
x. In an exothermic reaction the magnitude of ΔH is negative.

Q 2: Five moles of an ideal gas at 27°C are allowed to expand isothermally from an initial pressure of 10.0 atm to a final pressure of 4.0 atm against a constant external pressure of 1.0 atm. Calculate w, q. ΔE and ΔH. 5

Q 3: Compute the standard heat of the formation of methane using the following data: 5

(i) $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$ $\Delta H°(298K) = -890.35\ kJ$

(ii) $H_2(g) + \frac{1}{2} O_2(g) \rightarrow H_2O(l)$ $\Delta H°(298K) = -285.84\ kJ$

(iii) $C(graphite) + O_2(g) \rightarrow CO_2(g)$ $\Delta H°(298K) = -393.51\ kJ$

Q 4: Calculate the potential of the following cell at 298 K and compare the free energy change for this cell with the free energy of the cell in the standard state. 5

$Zn \mid Zn^{2+}\ (a = 0.1) \parallel Cu^{2+}\ (a = 0.01) \mid Cu$

$E^0_{Zn^{2+}|Zn} = -0.762$ V

$E^0_{Cu^{2+}|Cu} = +0.337$ V

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