

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?

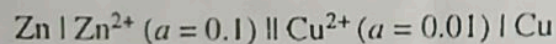
- i. q and w are state functions ~~F~~ X
- ii. All the intensive properties are state functions X
- iii. Density is an extensive property T
- iv. An isothermal process is one in which temperature remains constant F ✓
- v. All the natural processes are irreversible T ✓
- vi. State functions are perfect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

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 . = 0

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

- (i) $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l})$ $\Delta H^\circ(298\text{K}) = -890.35 \text{ kJ}$
- (ii) $\text{H}_2(\text{g}) + \frac{1}{2} \text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l})$ $\Delta H^\circ(298\text{K}) = -285.84 \text{ kJ}$
- (iii) $\text{C}(\text{graphite}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g})$ $\Delta H^\circ(298\text{K}) = -393.51 \text{ kJ}$

Q 4: Calculate the potential of the following cell at 298 K



$$E_{\text{Zn}^{2+} | \text{Zn}}^0 = -0.762 \text{ V}$$

$$E_{\text{Cu}^{2+} | \text{Cu}}^0 = +0.337 \text{ V}$$

and compare the free energy change for this cell with the free energy of the cell in the standard state.

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