Reg. No..... Name.....

M. Sc. DEGREE END SEMESTER EXAMINATION NOVEMBER 2016

SEMESTER **– 1: CHEMISTRY / PHARMACEUTICAL CHEMSITRY**

COURSE: **16P1CHET03 - 16P1CPHT03: PHYSICAL CHEMISTRY- 1**

Time: Three Hours Max. Marks: 75

SECTION A

(Answer ***any 10*** questions. Each question carries **2** marks)

1. Derive a relation for entropy change of an ideal gas in terms of pressure and temperature.
2. What is residual entropy? Why does H_2 have residual entropy?
3. Derive a relation for entropy of mixing of ideal gases.
4. How is temperature coefficient of emf related to entropy change?
5. State Trouton's Rule.
6. What happens to the entropy of the universe during an isothermal irreversible process?
7. Explain coupled reactions?
8. How is Helmholtz Free Energy related to Partition function?
9. Show that rotational heat capacity is independent of temperature.
10. What is Bose – Einstein condensation?
11. Define Collision diameter and collision cross-section.
12. What is effusion? Can this be used in the enrichment of isotopes?
13. Write a short note about super-cooled liquids.

(2 × 10 = 20)

SECTION B

(Answer any **5** questions by attempting not more than **3** questions from each bunch.

Each question carries **5** marks.)

BUNCH 1

14. Particles with low mass show marked degeneracy. Explain?
15. Explain the exergonic nature of ATP hydrolysis.
16. Comment on the degeneracy of Bose – Einstein gases?
17. Show that Entropy $S = NK \ln f + NKT (\delta \ln f / \delta T)_v$

BUNCH 2

18. An argon atom is confined to a cubical box of side 1 cm. What is the translational,partition function at 100K and at 298K.
19. Calculate K_p at 25˚C and 325˚C for the reaction $NO_{(g)} + ½ O_{2\,(g)} \rightarrow NO_{2\,(g)}$ if at 25˚C, $\Delta H^\circ = -56.48$ kJmol $^{-1}$ and $\Delta G^\circ = -34.85$ kJmol $^{-1}$.

20. Calculate the rotational partition function of HBr gas if the moment of inertia is

3.31×10^{-40} g cm^2 (R and h are given).

21. The partial molar volume of water and ethanol in a solution containing 5 mol of water and 1.05 mol of ethanol are 17.839 ml and 55.10 ml respectively. Calculate excess volume if density of ethanol is 0.7893 kg mol^{-1}.

(5 × 5 = 25)

SECTION C

*(Answer any **2** questions. Each question carries **15** marks)*

22. Using thr Principle of Microscopic Reversibility show that the cross co-efficients are equal.

23. Derive Boltzmann distribution Law. Explain the significance and application.

24. Derive a relation for the entropy of a monoatomic gas?

25. Derive a relation for the transport phenomena Viscosity.

(15 × 2 = 30)

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