

D 6813

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Name.....

Reg. No.....

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, DECEMBER 2016

(CUCSS)

Chemistry

CH 3C 07—PHYSICAL CHEMISTRY—II

(2010 Admissions)

Time : Three Hours

Maximum : 36 Weightage

Part A

Answer all questions.

Each question carries a weightage of 1.

1. What do you mean by most probable distribution ?
2. Distinguish between microstate and macrostate.
3. Define characteristic temperature. Explain its significance.
4. State and explain Dulong Petit's law.
5. Electrons never follow Maxwell Boltzmann statistics. Why ?
6. Explain the term "communal entropy".
7. Explain terms forces and fluxes with reference to irreversible process.
8. State and explain Glansdorf-Pregogine equation.
9. State and explain steady-state approximation.
10. Define relaxation time. Explain its significance.
11. Distinguish between Vant Hoff complex and Arrhenius complex.
12. Enthalpy of adsorption is a function of surface coverage. Why ?
13. Distinguish between diffusion controlled and activation controlled reactions.
14. What is secondary salt effect ?

(14 × 1 = 14 weightage)

Part B

Answer any seven questions.

Each question carries a weightage of 2.

15. Calculate residual entropy of CO if 50 % molecules are oriented as $\overrightarrow{\text{CO}}$ and 50 % molecules are oriented as $\overleftarrow{\text{OC}}$.
16. Account for the anomalous heat capacity of H₂.

Turn over

17. What is configurational partition function ? How is it evaluated ?
18. What are the advantages of a linear relationship between force and flux ? Illustrate the conditions for a linear relationship between force and flux.
19. Briefly discuss rice Harzfeld mechanism of organic decomposition reaction.
20. What are the drawbacks of Lindmann's theory of unimolecular reaction ? How are they overcome ? Discuss.
21. 130 ml. of N_2 was required to form a monolayer on one gram of a solid (corrected to $0^\circ C$. and 1 atm. pressure). Calculate the surface area of the solid. cross-sectional area of N_2 is 16.2 \AA^2 .
22. Discuss briefly Langmuir-Hinshelwood model of surface catalysed reaction.
23. What is Brusselator model of oscillating chemical reactions ?
24. Calculate the temperature at which 10 % of the molecules would be in the first excited state of this state is 400 nm above the ground state. The ground state is non-degenerate and excited state is triply degenerate.

(7 × 2 = 14 weightage)

Part C

Answer any **two** questions.

Each question carries a weightage of 4.

25. Discuss briefly Debye's theory of heat capacity of solids.
26. What are the methods of studying fast reactions ? Discuss any *two* of them.
27. Briefly discuss molecular beam method of studying reaction cross-section.
28. Briefly discuss Bose Einstein condensation.

(2 × 4 = 8 weightage)