24P113 (Pages: 2) Name: .....

Reg.No: .....

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2024

(CBCSS - PG)

(Regular/Supplementary/Improvement)

CC19P CHE1 C04 - THERMODYNAMICS, KINETICS AND CATALYSIS

(Chemistry)

(2019 Admission onwards)

Time : 3 Hours Maximum : 30 Weightage

Section A

Answer any ***eight*** questions. Each question carries 1 weightage.

1. How is Gibbs energy related to temperature and entropy ?
2. Write a note on thermal diffusion
3. Write Glansdorf-Pregogine equation
4. What is meant by a chain carrier?
5. What is secondary salt effect?
6. Explain the term 'steric factor'. What is its significance in collision theory?
7. What is Hinshelwood's modification to Lindemann's theory of of unimolecular reactions.
8. Write BET equation and explain the terms.
9. What happens to rate of formation when concentration of substrate is equal to Michaelis constant?
10. Suggest a mechanism for the heterogeneous catalysed reaction $2CO + O_2$ -- -› $2CO_2$.
11. Explain Onsager's reciprocal relations.
12. Enzymes are homogeneous biological catalysts. Justify the statement.

(8 × 1 = 8 Weightage)

Section B

Answer any ***four*** questions. Each question carries 3 weightage.

13. Derive the Gibbs-Duhem equation.
14. Calculate the molal boiling-point elevation constant (Kb) for water. The molar enthalpy of vapourisation of water is 40.79 kJmol-1 at 100 C.
15. What is the expression for the entropy production for the diffusion of one component in a system at constant temperature?
16. Discuss the general kinetic scheme for branched chain reactions. How does the pressure affect explosion limits?

17. Explain the concepts of attractive and repulsive potential energy surfaces.

18. Derive Langmuir's adsorption isotherm,

19. Write a note on polymer supported catalysis.

(4 × 3 = 12 Weightage)

Section C

Answer any ***two*** questions. Each question carries 5 weightage.

20. State ansd explain the third law of thermodynamics. How can it be verified experimentally.

21. Explain the various methods commonly used for the study of fast reactions.

22. Suggest a method for the determination of surface acidity.

23. Explain the mechanisms of oscillating reactions.

(2 × 5 = 10 Weightage)

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