FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2023

(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. Give the Gibbs-Helmholtz equation.

2. Define fugacity.

3. Write Glansdorf-Pregogine equation.

4. What is meant by chain retardation? Explain using an example.

5. How does pressure affect the rate of a branching chain reaction?

6. Explain the term 'steric factor'. What is its significance in collision theory?

7. Differentiate between an energized molecule and an activated molecule according to RRK treatment of unimolecular reactions.

8. Draw the Lineweaver-Burk plot. What is its significance?

9. Explain flame hydrolysis.

10. Suggest a theoretical model for a type of autocatalytic reaction.

11. What is thermo-osmosis?

12. Write two example for phase transfer catalysis?

(8 × 1 = 8 Weightage)

Section B

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

13. Provide a molecular interpretation for the positive and negative deviations in the boiling point curves and the formation of azeotropes.

14. Explain entropy production due to heat flow.

15. State the Onsager reciprocity relation and discuss its significance.

16. Explain the shock tube method and stopped flow method used for the study of fast reactions.

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

18. Write a note on the determination of heat of adsorption.

19. Discuss the features of homogeneous catalysis.

(4 × 3 = 12 Weightage)

Section C

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

20. Explain how fugacity is measured experimentally.

21. How is collision theory applied to reactions in solution? Discuss ART in solution.

22. Derive and verify the BET equation.

23. Discuss the mechanisms for heterogeneous catalysis.

(2 × 5 = 10 Weightage)

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