

QP Code : P24A033

Reg. No :

Name :

ST MARY'S COLLEGE (AUTONOMOUS), THRISSUR-20

I SEMESTER M.Sc. (CBCSS-PG) DEGREE EXAMINATION, November 2024

M.Sc Chemistry

CHE1C04 : THERMODYNAMICS, KINETICS AND CATALYSIS

2024 Admission Onwards

Time : 3 Hours

Maximum Weightage : 30

Part A

*Short answer type questions: Answer **any four** questions. Weightage 2 for each question*

1. What is meant by activity coefficient? [BTL1]
2. Compare and contrast Langmuir's adsorption isotherm with Freundlich isotherm. [BTL4]
3. Outline the principle of irreversible thermodynamics. [BTL4]
4. Explain the terms with examples: [BTL2]
(a) acid catalysis.
(b) base catalysis.
5. Describe the principle of crossed molecular beams. [BTL2]
6. What is the difference in mechanism proposed for the decomposition of acetaldehyde obeying $3/2$ order kinetics and $1/2$ order kinetics? [BTL3]
7. Discuss surface acidity. [BTL2]

(4x2 = 8 Weightage)

PART B

*Short essay-type questions: Answer **any four** questions. Weightage 3 for each question*

8. What are the mathematical expressions for the variation of chemical potential with
a) Temperature [BTL1]
b) Pressure
9. Derive the formula for entropy production due to heat transfer between two systems and different temperatures. [BTL1]
10. Analyze the X-ray method for determining the surface structure of materials. [BTL4]
11. Discuss the kinetics of diffusion-controlled reactions. [BTL2]
12. Analyze the deviations from Raoult's Law in binary liquid mixtures. [BTL4]
13. Sketch the potential energy surface for an exothermic reaction and identify the reactants, products, and transition state. [BTL3]
14. Discuss the method of determining heat of adsorption. [BTL3]

(4x3 = 12 Weightage)

Turn Over

PART C

*Essay-type questions: Answer **any two** questions. Weightage 5 for each question*

15. State and explain the third law of thermodynamics. [BTL1]
16. Discuss the modifications by Hinshelwood and RRK to Lindemann's theory for unimolecular reactions. [BTL2]
17. Inspect the influence of ionic strength on rate constant of reactions involving charged species? Explain the salt effects. [BTL4]
18. Examine the theoretical model for Brusselator type of autocatalytic reaction. [BTL3]
- (2x5 = 10 Weightage)**

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