

C 22015

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Name.....

Reg. No.....

**FOURTH SEMESTER M.Sc. DEGREE EXAMINATION
JUNE 2017**

Chemistry

CH 4E 05—INDUSTRIAL CATALYSIS

(2015 Admissions)

Time : Three Hours

Maximum : 36 Weightage

Section A

Answer all questions.

Each question carries a weightage of 1.

1. Enthalpy of adsorption is a function of surface coverage. Why ?
2. Explain the term "surface heterogeneity".
3. Explain the term 'transition state selectivity'.
4. The enthalpy of adsorption should not be too large or too small for effective heterogeneous catalysis. Why ?
5. Name two commonly used supports in catalysis. Justify your answer.
6. Explain the term 'catalyst fouling'.
7. Write *one* example each for macrocyclic and macrobicyclic ligands.
8. Explain the term dual phase transfer catalysis.
9. Explain Michaelis Menton constant. What is its significance ?
10. Name the methods of enzyme immobilization.
11. Explain the mechanism of sintering.
12. What is NO_x ? How does it function as a pollutant ?

(12 × 1 = 12 weightage)

Turn over

Section B

Answer **eight** questions.

Each question carries a weightage of 2.

13. Draw potential energy surface for physisorption and chemisorption. Discuss.
14. Define isosteric heat of adsorption. How is it measured ?
15. Briefly discuss boundary layer theory of chemisorption by semiconducting oxides.
16. Briefly discuss electronic factors in catalysis by metals.
17. Briefly discuss kinetics of regeneration of a catalyst.
18. Discuss briefly the mechanism of enzyme action.
19. What are the mechanisms for the deactivation of catalysts ? Discuss.
20. Discuss catalytic conversion of methanol to acetic acid.
21. Discuss the importance of quaternary ammonium salts in phase-transfer catalysis.
22. Discuss any *one* method of determining porosity of a catalyst.
23. Name any *two* environmental catalysts. Discuss the function of one of them.
24. List the steps involved in diffusion controlled reactions. Discuss.

(8 × 2 = 16 weightage)

Section C

Answer **two** questions.

Each question carries a weightage of 4.

25. Derive BET adsorption isotherm. How would you determine surface area of a solid using BET adsorption isotherm.
26. Compare Langmuir Hinshel wood mechanism and Rideal mechanism for bimolecular surface catalysed reactions.
27. Discuss Mobil process for the conversion to methanol to gasoline.
28. What is Ziegler Natta Catalyst ? Discuss its function.

(2 × 4 = 8 weightage)