



# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

## M.Sc. DEGREE EXAMINATION – CHEMISTRY

SECOND SEMESTER – APRIL 2014

### CH 2957 - CATALYSIS

Date : 05/04/2014

Dept. No.

Max. : 100 Marks

Time : 09:00-12:00

#### Part-A

Answer *all* the questions. Each carries *two* marks.

1. What are the advantages of employing adsorption method for the treatment of wastewater?
2. Why is ZnO considered as an alternative to TiO<sub>2</sub> in photocatalysis?
3. Define back scattered electrons.
4. Mention any two differences between physisorption and chemisorption.
5. How is propylene converted to acrolein?
6. What is the purpose of adding amphiphilic reagents in phase transfer catalysis?
7. Give the equation for oxo process.
8. How is *n*-butane converted to maleic anhydride?
9. Write Stern-Volmer equation and mention the terms involved.
10. Why platinum is preferred in electrocatalysis?

#### Part-B

Answer any *eight* questions. Each carries *five* marks.

11. Write a short note on Ni, Co, and Ag based catalysts in electrocatalysis.
12. Discuss the various reaction steps involved in hydrogen evolution reaction with a schematic diagram.
13. How is syngas converted into methanol by autothermal reforming method? Explain.
14. Explain the mechanism of polymerization of olefins by Ziegler Natta catalysts.
15. What are the types of adsorption isotherms? Draw and explain.
16. Write a short note on DR theory.
17. Explain how the conductivity of *p*-type oxides decreases and *n*-type oxides increases in CO chemisorption mechanism.
18. Discuss the role of oxidoreductase in oxidation process with an example.
19. Draw the schematic diagram and explain the working principle of solid oxide fuel cell.
20. Discuss the free radical mechanism for the conversion of benzene to phenol using TiO<sub>2</sub> catalyst.
21. Draw the block diagram for temperature programmed measurements (TPX) and explain the information obtained from TPD and TPR.
22. Explain the types of shape selective catalysis with examples.

#### Part-C

Answer any *four* questions. Each carries *ten* marks.

23. Explain the degradation mechanism of endocrine disruptors using TiO<sub>2</sub> photocatalyst.
24. Briefly explain the steps involved in the catalytic cracking of hydrocarbons.
25. Discuss the mechanism of base catalyzed reaction with an example
26. Draw the flow chart and explain the preparation of ethyl benzene from ethylene using liquid phase alkylation.
27. Explain the free radical and non-free radical mechanism of conversion of alkane to alcohol using TiO<sub>2</sub>.
28. Discuss the working principle and electrode reactions of proton exchange membrane fuel cells with a neat diagram.

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