LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – CHEMISTRY

SECOND SEMESTER – APRIL 2017

16PCH2ES02- SURFACE CHEMISTRY AND CATALYSIS

Date: 28-04-2017   Dept. No.   Max. : 100 Marks
Time: 01:00-04:00

Part-A

Answer ALL questions.   **(10 x 2= 20)**

1. What are the differences between physisorption and chemisorption?
2. Write Harkins Jura equation. Mention its significances.
3. How does surface tension of a liquid change on adding i) a miscible liquid ii) an electrolyte?
4. Define Kraft temperature.
5. Mention the role of support catalyst in heterogeneous catalytic reaction.
6. Compare the catalytic efficiency of metal oxides with polymers.
7. How is mono oxygenation of indene carried out using a biocatalyst?
8. Mention any two differences between the hot and cold wall chemical vapour deposition method.
9. How is antibacterial assay carried out by Kirby-Bauer Method?
10. Write any two conditions to be followed to prepare the catalysts by sonochemical method.

Part-B

Answer any EIGHT questions.   **(8 x 5= 40)**

11. Discuss the various factors which affect the adsorption of a gas on a solid adsorbent.
12. Derive the Langmuir adsorption isotherm for two substances competitively adsorbed on a surface.
13. Explain Eley-Rideal mechanism of bimolecular surface reaction.
14. What are emulsions? Describe the methods used in finding the type of emulsion.
15. What are surfactants? Explain its classification.
16. How is heterogeneous catalyst prepared by impregenation method?
17. What are endocrine disrupting chemicals? Explain the general mechanism of photocatalytic degradation in industrial waste water.
18. Discuss the covalent mechanism involved in the decarboxylation of acetoacetate in the presence of a catalyst and biocatalyst.
19. Explain steps involved in the L-B deposition process for the preparation of catalysts.
20. Apply the BET equation to type III isotherm and discuss the process in brief.
21. Explain the working of cylindrical mirror analyzer in XPS.
22. Discuss the role and significance of the membrane reactor for the partial oxidation of n-butane into maleic anhydride.

Part-C

Answer any FOUR questions.   **(4 x 10= 40)**

23 a. Derive thermodynamically Gibb's adsorption isotherm for the adsorption of a solute on the surface of a liquid.

  b. The experimental data for the adsorption of CO on charcoal surface at 273K confirm that they fit the Langmuir isotherm. The slope and intercept of the graph between P/V and P are $0.009cm^3$ and $9\ mmHgcm^{-3}$ respectively. Calculate V_m and K.

24. What is CMC? Decribe the factors affecting CMC of surfactants. Mention its use for the synthesis of Zeolites.   (2+5+3)

25a. Wrie a short note on Fischer Tropsch process.

  b. What do you mean by catalytic cracking? Explain

26. Discuss the effect of any four parameters affecting the degradation of pollutants in industrial wastewater.

27. Explain any five types of enzyme immobilization techniques with suitable examples.

28. Write a short note on the following:

    a. Kinetics of addition polymerization of vinyl chloride

    b. Photodegradation pathways of malachite green dye.

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