

SAVITRIBAI PHULE PUNE UNIVERSITY
Progressive Education Society's
Modern College of Arts, Science and Commerce, Ganeshkhind, Pune-411016
B.Sc. Blended Program
(A degree of Savitribai Phule Pune University equivalent to the degree of University of Melbourne)

End Semester Examination: October/November 2024

Program: B.Sc. Blended **Program (Specific):** B.Sc. Blended(Chemistry) **Set: A**

Class: T.Y. B.Sc. Blended

Semester: V

Course code: CHM-502

Course name: Catalysis and Industrial processes

Credits: 3

Time: 2½ hours

Maximum marks: 50

Instructions to the candidate:

- All questions are compulsory.
- Figures to the right indicate marks.
- Draw diagrams wherever necessary.
- Use of scientific calculator is allowed.
- Ask for graph paper if needed.

Q.1] Choose the correct option (Solve ANY 10 out of 12)

[1 x 10 =10M]

1. Catalyst are substances which
 - a. Decrease the rate of reaction
 - b. Increase the rate of reaction
 - c. Keeps the rate of reaction constant
 - d. Fluctuates the rate of the reaction
2. The coordination number of Rh in compound $\text{RhCl}(\text{PPh}_3)_3$ is
 - a. 2
 - b. 4
 - c. 7
 - d. 10
3. In gas phase homogeneous catalysis ,both catalyst and reactants are in
 - a. Liquid phase
 - b. Solid and liquid phase
 - c. gaseous phase
 - d. liquid and gas phase

4. The hydroformylation involves reaction of alkene with
- CO
 - CO and H_2
 - H_2
 - HCHO
5. The central atom in catalyst used for Monsanto acetic acid synthesis is
- Co
 - Rh
 - Pt
 - Ir
6. In the synthesis of the chemicals ,zeolites are useful as
- reactants
 - finished products
 - homogeneous catalysts
 - heterogeneous catalysts
7. Which of the following is the synthetic zeolite?
- Fluorite
 - Terranovaite
 - Chabazite
 - Alfarsenite
8. According to IUPAC microporous materials have diameters
- Smaller than 2 nm
 - Larger than 50 nm
 - between 2 and 50 nm
 - between 1 and 2 nm
9. When enzyme is saturated with substrate molecules ,it catalyses the reaction with maximum velocity. The kinetics observed here is
- first order
 - second order
 - zero order
 - mixture of first and zero order.

10. The parent of porphyrin is porphine which containsmodified pyrrole units
- 4
 - 5
 - 6
 - 8
11. The main products of photocatalytic splitting of water are.....
- Photons only
 - H_2 and O_2
 - H_2 and photons
 - O_2 and photons
12. Which of the following is not a desirable property of a good catalyst.....
- high lifetime
 - selective
 - low catalyst recovery
 - cheap

Q.2] Answer the following in short (ANY 10 out of 12)

[2 x 10 = 20M]

1. Explain any two characteristics properties of heterogeneous catalyst.
2. Write reactant, product and catalyst in Wacker's process.
3. What is homogeneous and heterogeneous catalysis?
4. Write general reaction for Shell process.
5. Explain Wilkinson's catalyst.
6. What is oxo process.
7. Explain oxidative addition.
8. Define the term zeolites.
9. What is role of enzyme in an enzyme catalysed reaction.
10. Explain concept of enzyme immobilization.
11. What is photocatalysis? Write one example.
12. What is catalyst poisoning?

Q.3. Answer in brief (ANY 4 out of 6)

[4 x 5 = 20M]

1. Explain catalysed and uncatalysed reaction with energetics diagram.
2. Draw catalytic cycle for Monsanto acetic acid synthesis.
3. Distinguish between hydrogenation and hydroformylation.
4. Explain hydroformylation catalytic cycle.
5. Explain zeolites as catalysts.
6. Describe photocatalysis with one example.

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