BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: IMSC **SEMESTER: II**
BRANCH: CHEMISTRY **SESSION: SP/22**

SUBJECT: CH115 GREEN METHODS IN CHEMISTRY

TIME: 2 Hrs. **FULL MARKS: 50**

Part A: Answer any two questions: (2 X 5) = 10

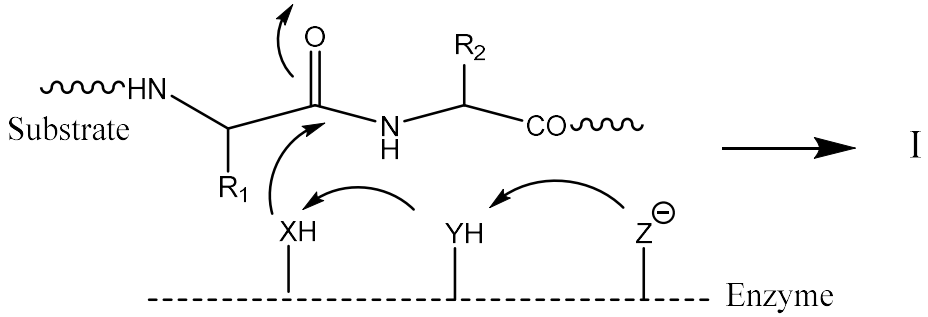
1. What is the role of solvent in a chemical reaction? How is the role fulfilled in solvent free reaction? What are the advantages of solvent free synthesis? Explain with suitable reactions. (2.5+2.5)
2. Which gas was responsible for the Bhopal Gas Tragedy? Give the conventional and green method for the synthesis of carbaryl. (2.5+2.5)
3. Give the green of synthesis of the following (any two) (i) Adipic acid (ii) Catechol (iii) Disodium diiminodiacetate (2.5+2.5)
4. Plastic waste imposes a great problem in today's world. Discuss the approach of an environmentalist and a green chemist in combating this problem. (5)

Part B: Answer any two questions: (2 X 5)= 10

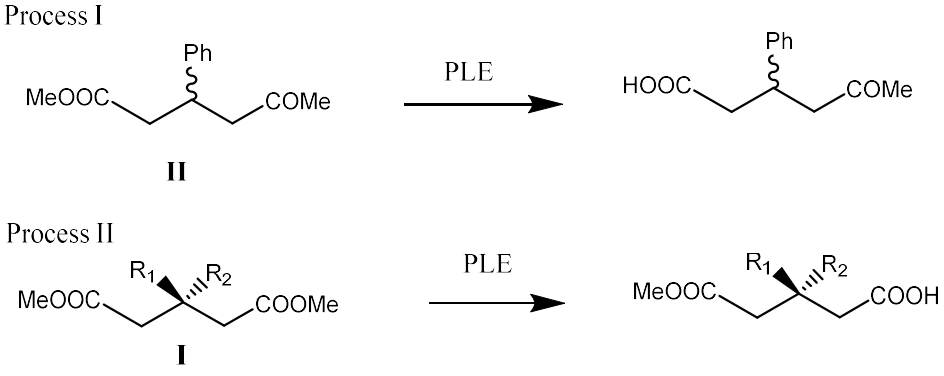
5. What is 'Carbon Neutral Balance'? How human activities are disturbing this balance? Why the use of bio-solvents/ biofuels helps in the maintenance of this balance? (1+2+2)
6. Justify the following statements (i) Economic sustainability through green chemistry (ii) Environmental sustainability through green chemistry (2.5+2.5)
7. (a) Discuss two advantages of microwave assisted organic synthesis. Write the reaction of saponification of ester and Diels Alder reaction under microwave irradiation. (2.5+2.5)
8. An act was set up in 1990 to reduce or eliminate the toxicity of wastes. Name and elaborate it. (5)

Part C: Answer all these questions (2+2+3+3=10)

9. Mention three green attributes and two limitations of bio catalysis. 2
10. The following scheme shows the first step in chymotrypsin catalyzed hydrolysis of a peptide bond. Identify the residues XH, YH, Z^- and write the structure of I. 2



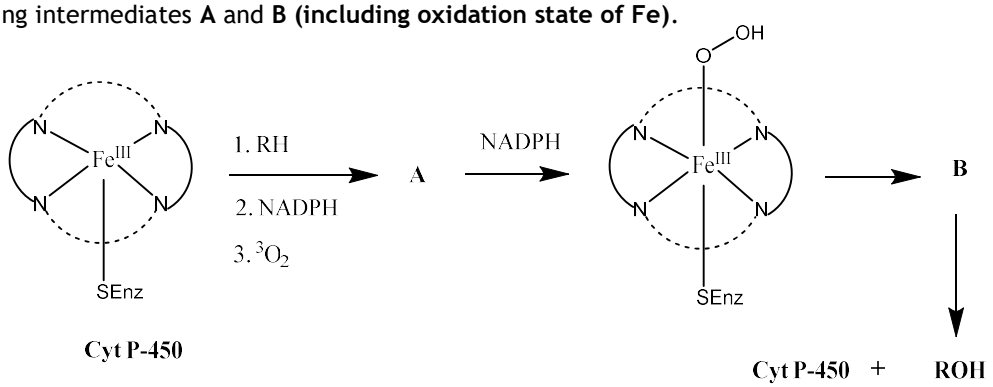
11. The selective hydrolysis of the diesters I and II by pig liver esterase is shown below: 3



PLE = Pig Liver Esterase

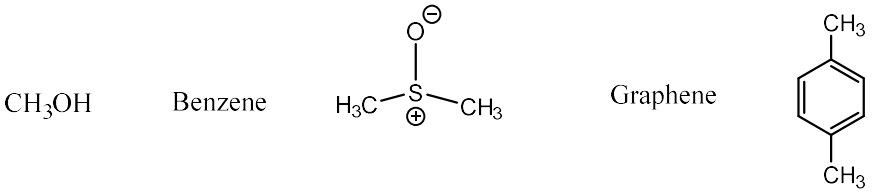
a) Which process involves dissymmetrization?
b) Which process involves kinetic resolution?
c) Which process gives higher yield of the chiral acid?

12. The mechanism of oxidation of a substrate RH to ROH by cytochrome P-450 is shown below. Write the structures of the missing intermediates **A** and **B (including oxidation state of Fe)**. 3

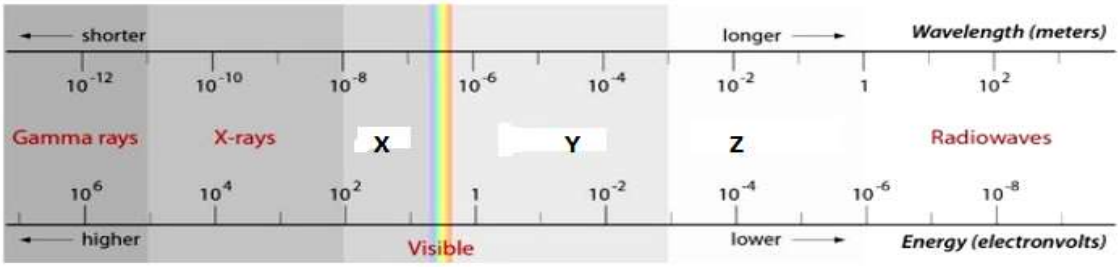


Part D: Answer all these questions: (2+2+2+4 = 10)

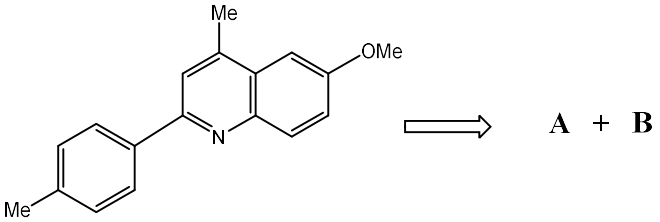
13. Which ones of the following molecules will efficiently absorb microwave radiation? 2



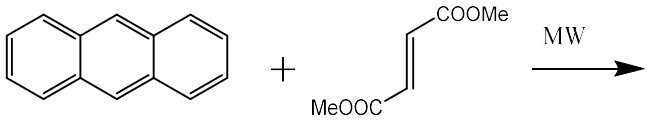
14. The following diagram shows partially the electromagnetic spectrum. Name the radiation in zones X, Y and Z

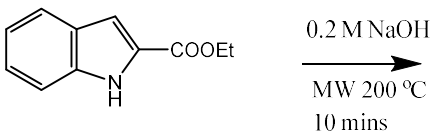


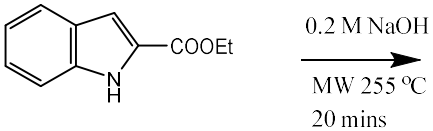
15. The following quinoline derivative can be obtained in a few minutes under MW irradiation in presence of 0.1 eq of diphenyl phosphate from the components A and B. Write the structures of A and B. 2



16. Write the structure of the major product in the following reactions carried under microwave conditions. 4







Part E: Answer all these questions: (2+3+5=10)

17. Briefly discuss on the recently emerged green methods in separation and purification of compounds.	2
18. Define and distinguish between gravity and flash chromatography.	3
19. Draw a schematic diagram for gravity and automated flash chromatography with proper labeling.	5

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