

Model Question



Dumkal College
Basantapur Dumkal

Course Code: CHEMHTDSE-2C

Semester: V (Hons)

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Name of the Department: Chemistry

CHEMHTDSE-2C (Green Chemistry)

A. Answer the questions (2 marks)

- 1) What do you mean by the term ISD? Discuss the term.
- 2) Ionic liquid is called a 'designer solvent-why?
- 3) Name one green solvent used for bleaching clothes and explain how it works.
- 4) How does risk of a chemical relate to its hazard and exposure?
- 5) What do you mean by the term 'Environmental Quotient'?
- 6) Why 'green chemistry' is known as 'sustainable chemistry'?
- 7) What is the role of susceptors in the microwave assisted reactions?
- 8) Explain the term "Cradle to cradle" and "Cradle to gate".
- 9) Between H₂O and D₂O which has higher cohesive energy density and why?
- 10) "Microwave radiation is a non- ionizing radiation" - Explain this statement.
- 11) In ultrasound equipment which material converts electrical energy into rapid mechanical vibrations?
- 12) "Direct interaction between wave and reactants to induce a chemical reaction is not possible"- Explain this statement.
- 13) Calculate the atom economy of the following reaction:



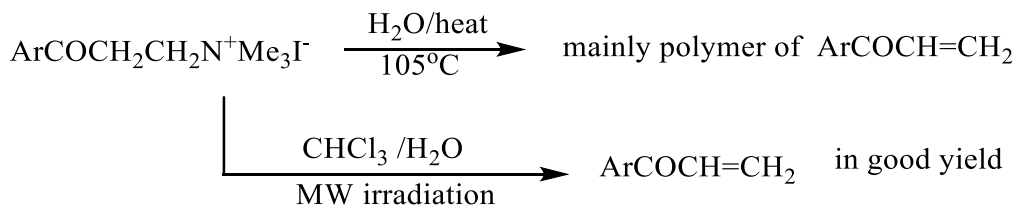
14. What are the basic differences between atom economy and E-factor ?
15. Unlike 'atom economy', E-factor' can be calculated only after performing proper experiment - Explain.
16. Give an example of c0-crystallisation controlled solid-state synthesis.
17. In the life cycle assessment of a product 'cradle to cradle' is always much more acceptable than 'cradle to grave'- explain.
18. How does the internal temperature of ethanol reach higher than its boiling point when irradiated by microwave (MW)?
19. Give examples of green catalyst and green reagent.
20. Sonication is very useful for the reactions involving free metals like Mg, Zn - explain.
21. In a large-scale exothermic reaction if water can be used as solvent, it is highly beneficial - Justify mentioning the particular property of water.
22. What are the basic differences between microwave heating and conventional heating?
What are 'On water' and 'In water' reactions? Give example of each process.

B.1. Outline the greener synthesis of Ibuprofen and calculate the percentage of atom utilization. 3+2

2. How can you explain the rate enhancement of unimolecular and multimolecular reactions in micellar medium compared to aqueous medium? 5

3. i. "Nature of dienophile shows a considerable solvent effect in Diels-Alder reaction" - Explain with example.
ii. What is cohesive energy density? 3+2

4. What is called super critical fluid? Give an example of surfactant which can form micelle in supercritical carbon dioxide. Describe its function. 1+2+2
- 5.i) Addition of LiCl in water in a Diels Alder reaction increases the rate of the reaction but addition of guanidinium chloride decreases compared to the rate of the reaction in water only - explain. 3
- ii. E-factor and Environmental quotient may not run parallelly - justify. 2
6. What is biofuel? How can you synthesize bio diesel? Give an example of bio-degradable polymer with chemical structure. $1+1\frac{1}{2}+2\frac{1}{2} = 5$
7. What are the differences between a dye and a pigment? Write any three characteristics of a 'rightfit pigment'. 2+3= 5
8. Outline a green synthesis of catechol from glucose. 5
9. Write one green synthesis of adipic acid. 5
10. Give one example of biodegradable polymer. How can it be synthesized? 1+4
11. What is the fundamental advantage of sonochemistry in organic synthesis without solvent? Explain the role of microfluid reactor and oxidation catalyst in green synthesis. 2+3
12. What is marine antifoulant? Give an example of green marine antifoulant.
13. Enzyme Inter Esterification' is= advantageous. to 'Chemical Inter Esterification'— explain.
1. i) What is working definition of Green Chemistry? Why is it necessary? 1+2
- ii) What are the basic goals of Green Chemistry? 3
- iii) Explain limitations/obstacles in the pursuit of the goals of Green Chemistry. 4
2. i) Give example of microwave assisted oxidation and decarboxylation reaction. 2+2
- ii) Give brief account of Flixborough accident and Bhopal gas tragedy. 3+3
- 3.i) What is ionic liquid? For what reasons, ionic liquid can replace the conventional solvents for chemical reaction? 2+3
- ii) Why specific conductivity of ionic liquid is low? 2
- iii) What is environmental quotient and life cycle assessment? 3
4. i) What are the advantages of PEG over water, ionic liquid etc.? 3
- ii) Give two examples of heterocyclic ring synthesis using PEG as reaction medium. 2+2
- iii) What is fluoros biphasic solvent(FBS)? "FBS is ideal for reactions involving non- polar reactants and polar products"- Explain. 1+2
- 5.i) What do you mean by marine antifoulant? Give an example each of green and non-green marine antifoulant agent. 1+2
- ii) In a catalytic hydrogenation reaction in super critical CO₂, (scCO₂), use of ionic liquid helps make the catalyst immobilized- explain how the catalyst is used repeatedly in the above reaction system. 3
- iii) Explain the following observations : 4



- 6.i) What are in water and 'on water reactions? What are the conditions for 'on water reaction'? 2+2=4
- ii) Comment on the endo/exo selectivities of the Diels-Alder adducts obtained from the reaction between cyclopentadiene and methyl vinyl ketone in different media like neat, ethanol and water. Give explanation. 6
7. Give one example each of cationic surfactant, anionic surfactant, non-ionic surfactant and ionic liquid. of cationic surfactant. 4
- ii) What is environmental quotient and life cycle assessment? 3
- iii) What is the structural requirement of healthier fats and oils? Why inter esterification procedure is useful for synthesis of healthier fats and oils? $1\frac{1}{2} + 1\frac{1}{2} = 3$
- 8.i) Explain limitations in the pursuit of the goals of Green Chemistry. 4
- ii) What are the characteristics of 'hot spot' in a MW-induced chemical reaction? Give one example. 3+1=4
- iii) Compare two physical characteristics of molten ionic compounds like NaCl, LiCl with that of ionic liquids. 2
9. i) Why overheating of solvent was observed when irradiated by MW?
- ii) What is acoustic cavitation?
- iii) Explain with example that mechanochemistry is not only an outcome of heat developed by rubbing. 4+3+3=10
10. i) Write the principles of sustainability of green chemistry.
- ii) Write short notes on cohesive energy density.
- iii) Convert benzene to catechol by greener approach.
- iv) Why polylactic acid is considered as green polymer? 4+2+3+1=10
11. i) In the reaction between cyclopentadiene and methyl vinyl ketone, the relative rates of reaction in different solvents are as follows: Isooctane: 1; MeOH: 12.7; water: 740. On addition of LiCl in aqueous solution of the reaction mixture, the rate becomes 1818, whereas detrimental effect was observed by the addition of guanidinium chloride- Explain.
- ii) What do you mean by 'Liquid Assisted Grinding'? Explain with an example.
- iii) What is 'Sonoluminescence'? 5+3+2=10