

Subject: : **CHEMISTRY**  
Paper name: **Organic Chemistry -III**  
Paper No : **X**  
Semester: **Sixth (VI)**

**A. Multiple choice questions [25 (5 from each unit)]**

- Which of the statements is incorrect?
  - Photochemical reactions are caused by ultraviolet light only.
  - First step in photochemistry is photoexcitation.
  - It is possible for the first excited state  $S_1$  to undergo spin inversion.
  - When a molecule or an atom in the ground state ( $S_0$ ) absorbs light, one electron is excited to a higher orbital level.
- Which region of light radiation of the visible ultraviolet lying between wavelength are chiefly concerned in bringing about photochemical reactions?
  - 1000A<sup>0</sup> and 2000 A<sup>0</sup>
  - 1500A<sup>0</sup> and 1000 A<sup>0</sup>
  - 8000A<sup>0</sup> and 2000 A<sup>0</sup>
  - 19000A<sup>0</sup> and 12000 A<sup>0</sup>
- The quantum efficiency of a photochemical reaction is defined as -
  - the ratio of the molecules decomposed in a given time to the number of quanta absorbed in the same time.
  - the number of molecules decomposed in a given time.
  - the ratio of the molecules decomposed in a given time to the number of quanta emitted in the same time.
  - the number of quanta absorbed per unit time.
- Which of the following are the reactions in which molecules absorbing light do not themselves react but induce other molecules to react?
  - Chain reactions.
  - Free radical reactions.
  - Photosensitized reactions.
  - Reversible reactions.
- A substance absorbs  $2.0 \times 10^{16}$  quanta of radiations per second and 0.002 mole of it reacts in 1200 seconds. What is the quantum yield of the reaction ( $N = 6.02 \times 10^{23}$ )?
  - 40

- b) 50
  - c) 60
  - d) 100
6. Which of the following statements about Pericyclic reactions is true?
- a) Pericyclic reactions involve multiple steps.
  - b) Pericyclic reactions occur by way of ionic intermediates.
  - c) Pericyclic reactions do not involve any reactive intermediate.
  - d) Pericyclic reactions occur by way of radical intermediates.
7. How many  $\pi$  molecular orbitals are present in 1,3 butadiene?
- a) 2
  - b) 4
  - c) 6
  - d) None of the above.
8. How many bonding molecular orbitals are present in 1,3,5 – hexatriene?
- a) 3
  - b) 4
  - c) 5
  - d) 6
9. What are the two modes of bond formation in a cycloaddition reaction?
- a) Suprafacial and antarafacial bond formation.
  - b) Suprafacial and antifacial bond formation.
  - c) Suprafacial and synfacial bond formation.
  - d) Synfacial and antifacial bond formation.
10. Diels-Alder reaction is an example of
- a) Polar elimination reaction.
  - b) Pericyclic cycloaddition reaction.
  - c) Pericyclic electrocyclic reaction.
  - d) Polar addition reaction.
11. Grignard's reagents are?
- a) alkyl magnesium halide
  - b) good sources of carbon nucleophile
  - c) generally prepared in anhydrous diethyl ether
  - d) all the above

12. The product of the reaction of a Grignard's reagent with an aldehyde with proper hydrolysis is?
- 1<sup>o</sup> alcohol
  - 2<sup>o</sup> alcohol
  - 3<sup>o</sup> alcohol
  - ketone
13. Thiols are the alcohol analogs in which the oxygen has been replaced by Sulphur. Given the fact that the 'S-H' bond is less polar than the 'O-H' bond, which of the following statements comparing thiols and alcohols is correct?
- Hydrogen-bonding forces are stronger in thiols.
  - Hydrogen-bonding forces are weaker in thiols.
  - Hydrogen-bonding would be the same.
  - No comparison can be made without additional informations.
14. Good solvents for preparing organometallic reagents includes all but.....?
- THF (Tetrahydrofuran)
  - diethyl ether
  - water
  - hexane
15. Organomagnesium compounds are?
- acids
  - bases
  - oxidizing agents
  - solvents
16. Which of the following could also be involved in Green chemistry synthesis?
- Dichloromethane
  - fossil fuels
  - Microwave
  - High temperature
17. Which of the following is often referred to as the universal solvent and is a preferred green solvent?
- water
  - Methanol
  - Ethyl acetate
  - Benzene

18. Green chemistry aims to?
- Design chemical products and processes that maximize profits.
  - Design chemical products and processes that reduce or eliminate the use and generation of hazardous substances.
  - Design chemical products and processes that work most efficiently.
  - Utilize non-renewable energy.
19. According to the principles of Green chemistry, the chemicals involved in the synthesis must be?
- Non-toxic.
  - Toxic.
  - Highly toxic
  - None of the above.
20. Which of the following are among the 12 principles of Green chemistry?
- Design commercially viable products.
  - Use only new solvents.
  - Use catalysts, not stoichiometric reagents.
  - None of the above.
21. How many chemically equivalent sets of hydrogen are present in ethanol?
- 6
  - 3
  - 2
  - 5
22. The amount of energy available in radio frequency radiation is sufficient for which of the following?
- Excite an atom.
  - Vibrate a molecule.
  - Affect the nuclear spin of an atom.
  - Vibrate an atom.
23. Which of the following quantities is not changed at a different magnetic field strength?
- Chemical Shift (in hertz)
  - Nuclear spin population in an energy state.
  - J (coupling constant)
  - Energy difference between two energy states of nuclei with non-zero spin quantum number.

24. Separation of ions in Mass Spectrometer take place on the basis of which of the following?
- Mass.
  - Mass to charge ratio.
  - Charge.
  - Molecular weight.
25. In mass spectrometer, the sample that has to be analyzed is bombarded with which of the following?
- Electrons
  - Protons
  - Neutrons
  - Alpha particle

**B. Fill up the blanks [15 (3 from each unit)]**

- The wavelength of fluorescence is usually \_\_\_\_\_ than the irradiation wavelength (stokes shift).
- Norrish type-I reaction is \_\_\_\_\_ carbon bond cleavage.
- Norrish type-II reaction is \_\_\_\_\_ hydrogen bond cleavage.
- FMO in pericyclic reaction stands for \_\_\_\_\_.
- In electrocyclic reactions, orbitals rotate to form bonds. If both the orbitals are rotated in the same direction, ring closure is called -----.
- HOMO stands for \_\_\_\_\_.
- Strong oxidizing agents such as potassium permanganate or hydrogen peroxide converts thioethers into ----- at 100<sup>o</sup>C.
- Thiols react with Sodium metal to form salts known as \_\_\_\_\_.
- Organolithium compounds are \_\_\_\_\_ reactive than Grignard's reagent due to their high polarity or ionic character.
- According to Green chemistry principles, after the use of chemicals, we must \_\_\_\_\_ them properly.
- \_\_\_\_\_ is an excellent 'green' solvent as well as a greenhouse gas.
- The fundamental advantage of the sonication reaction is \_\_\_\_\_ yield.
- Usually, the highest value of m/z peak is the \_\_\_\_\_ ion peak.
- NMR is the study of absorption of \_\_\_\_\_ by the nuclei in a magnetic field.
- The difference between the field necessary for resonance in the sample and in some arbitrary chosen reference compound is known as \_\_\_\_\_.

**Key Answers**

A. Multiple choice questions [replace x]

- |        |        |       |       |        |       |       |
|--------|--------|-------|-------|--------|-------|-------|
| 1. a)  | 2. c)  | 3. a) | 4. c) | 5. b)  | 6. c) | 7. b) |
| 8. a)  | 9. a)  | 10.b) | 11.d) | 12. b) | 13.b) | 14.   |
| c)     |        |       |       |        |       |       |
| 15.b)  | 16 c)  | 17.a) | 18.b) | 19. a) | 20.c) |       |
| 21. b) |        |       |       |        |       |       |
| 22.c)  | 23. c) | 24.b) | 25.a) |        |       |       |

B. Fill up the blanks [replace x]

1. Longer.
2.  $\alpha$ (alpha).
3.  $\gamma$  (gamma).
4. frontier molecular orbital.
5. conrotatory.
6. highest occupied molecular orbital.
7. Sulphones.
8. Mercaptides.
9. More.
10. dispose/mitigate.
11. carbon dioxide.
12. High / good.
13. Molecular.
14. Radio frequency radiation.
15. Chemical shift.