

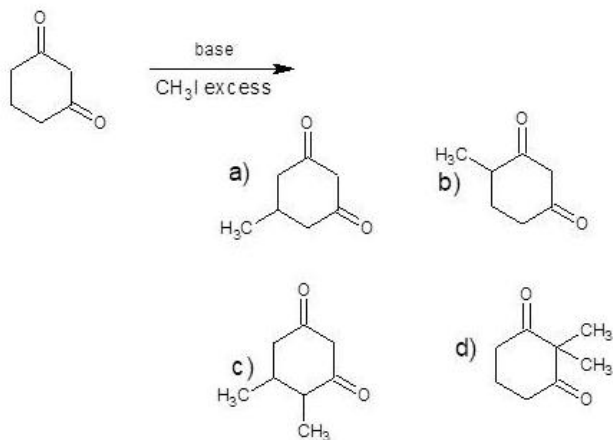
M.Sc.Part I-

**SEMESTER-II-**

**Paper-III Organic Chemistry Course Code: PSCH 203**

**SAMPLE QUESTIONS SET**

1. More substituted enolate formed by removal of tertiary hydrogen from unsymmetrical cyclohexanone are known as.....
  - a) Thermodynamic enolate
  - b) Regioselective enolate
  - c) Steriospecific enolate
  - d) Kinetic enolate
2. Kinetic enolate is favored in presence of.....
  - a) polar protic solvent
  - b) Polar aprotic solvent
  - c) Nonpolar solvent
  - d) Aqueous solvents
3. The major product formed in the reaction, given below is

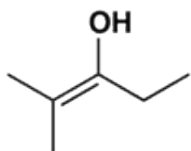


- a) a
- b) b
- c) c
- d) d

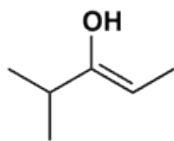
4. The base catalyzed addition of compound having active methylene group to an activated olefin bond is known as-----
  - a) Michael addition
  - b) Mannich reaction
  - c) Robinson annulation
  - d) Knoevenagel condensation

5. Which of the following is most stable enol form of 2-methylpentan-3-one?

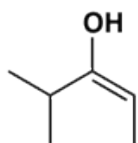
a)



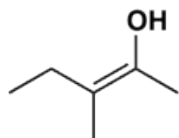
b)



c)



d)



6. Higher C/O alkylation ratio of enolates are obtained when enolates are treated with which of the following substrate in presence of solvent HMPA?

a)  $C_2H_5OTs$

b)  $C_2H_5Cl$

c)  $C_2H_5Br$

d)  $C_2H_5I$

7. Which of the following is an example of Intramolecular Aldol Condensation? -----

a) Michael reaction

b) Robinson Annulation

c) Mannich reaction

d) Stork enamine reaction

8. Cyclohexanone reacts with pyrrolidine in presence of p-toluene sulphonic acid is an example of-----

a) Enamine formation

b) Ylides formation

c) amide formation

d) dianion formation

9. Organic reaction used to convert an aldehyde or ketone and an active methylene compound to substituted olefin in presence of amine base as catalyst is known as

a) Mannich reaction

b) Aldol condensation

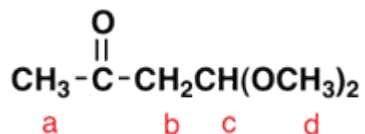
c) Knoevenagel condensation

d) Robinson Annulation

10. Which of the following is polar aprotic solvent?
- toluene
  - Carbon tetrachloride
  - N,N*-dimethyl formamide
  - acetic acid
11. In \_\_\_\_\_ rearrangement, amide treated with Br<sub>2</sub> in presence of strong base followed by hydrolysis gives amines.
- Hofmann
  - Curtius
  - Wolf
  - Boulton-Katritzky
12. Thermal decomposition of Benzoic acid in presence of NaN<sub>3</sub> gives \_\_\_\_\_ as product
- Benzamide
  - Aniline
  - Benzene
  - Cyclohexane
13. Lossen rearrangement occurs with \_\_\_\_\_
- Amides
  - Acyl azide
  - Hydroxamic acid
  - Carboxylic acid
14. Nitronate salt which formed by deprotonation of nitroalkane, followed by strong acid hydrolysis gives \_\_\_\_\_ as major product.
- Azo compound
  - Hydrazo compound
  - Carbonyl compound
  - Nitro compound
15. In Mc Murry coupling \_\_\_\_\_ is formed as an intermediate.
- Radical anion
  - Carbocation
  - Isocyanate
  - Ketene
16. In which rearrangement transformation of a quinonoid structure to benzene ring formation takes place?
- Wagner-Meerwein
  - Rupe
  - Pummerer
  - Dienone-phenol
17. In Rupe rearrangement, \_\_\_\_\_ undergoes acid catalysed rearrangement to give  $\alpha,\beta$ -unsaturated ketones
- primary  $\alpha$ -acetylenic alcohol
  - primary  $\beta$ -acetylenic alcohol
  - Tertiary  $\alpha$ -acetylenic alcohol
  - Tertiary  $\beta$ -acetylenic alcohol

18. Which intermediate is formed in Wolff rearrangement ?
- Carbene
  - Ketene
  - Carbocation
  - carbanion
19. The basic mechanism of Payne rearrangement involves \_\_\_\_\_
- Deprotonation of epoxide carbon
  - Deprotonation of hydroxyl group
  - Bond breaking of epoxide ring
  - Deprotonation of  $\alpha$  carbon
20. \_\_\_\_\_ is an organic reaction in which a ketoxime is converted into an  $\alpha$ -aminoketone via rearrangement reaction.
- Von Richter
  - Neber
  - Brook
  - Wittig
21. Which of the following statements is not true for Bonding Molecular Orbital
- Two atomic orbitals of same phase interact with each other
  - Having lower energy than isolated Atomic orbitals
  - Contribute in bond formation
  - Does not contribute in bond formation
22. The number of pi ( $\pi$ ) electrons involved in  $\pi$  molecular orbital of ethylene are \_\_\_\_\_
- zero
  - two
  - four
  - six
23. The number of nodes for lowest energy level of pi ( $\pi$ ) Molecular orbital diagram is/are \_\_\_\_\_
- Zero
  - One
  - Two
  - Three
24. The best interaction is always between \_\_\_\_\_
- LUMO of both nucleophile & electrophile
  - Highest energy HOMO of nucleophile & Lowest energy LUMO of electrophile
  - HOMO of electrophile & LUMO of nucleophile
  - HOMO of nucleophile & electrophile
25. Which of the following is NOT TRUE about Absorption Spectroscopy?
- It involves transmission
  - Scattering is kept minimum
  - Reflection is kept minimum
  - Intensity of radiation leaving the substance is an indication of concentration

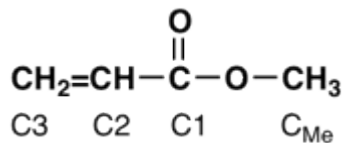
26. On which factors the vibrational stretching frequency of diatomic molecule depend?
- Force constant
  - Atomic population
  - Temperature
  - Magnetic field
27. Which compound having molecular formula  $C_5H_{10}$  shows absorption at  $1380\text{cm}^{-1}$ ?
- 2-Methyl-1-butene
  - Cyclopentane
  - Pentyne
  - Methylcyclobutane
28. According to Woodward-Fieser rules, the base value for the Acetophenone will be \_\_\_\_\_
- 213
  - 246
  - 230
  - 250
29. The base value of Heteroannular diene is \_\_\_\_\_
- 217nm
  - 214nm
  - 208nm
  - 253nm
30. In IR spectroscopy, the vibration between atoms is caused by which of the following?
- The number of protons in a nucleus
  - Dipole moments between atoms
  - The movement of electrons to higher energy levels
  - The overall molecular weight of the molecule
31. How many signals does the aldehyde  $(CH_3)_3CCH_2CHO$  have in  $^1H$  NMR and  $^{13}C$  NMR spectra?
- Five  $^1H$  signals and six  $^{13}C$  signals
  - Three  $^1H$  signals and four  $^{13}C$  signals
  - five  $^1H$  signals and four  $^{13}C$  signals
  - three  $^1H$  signals and six  $^{13}C$  signals
32. Which of hydrogens a-d in the following molecule gives a triplet signal in a normal  $^1H$  NMR spectrum?



- hydrogen a
- hydrogen b
- hydrogen c
- hydrogen d

33. Which of the following statements regarding NMR spectroscopy is wrong?
- NMR signals towards the left of the spectral chart correspond to larger chemical shifts.
  - Chemical shifts are larger when the frequencies of the radiation which induces the nuclear transitions are higher.
  - Chemical shifts are larger when shielding effects are greater.
  - A hydrogen signal splits into  $n+1$  peaks by spin-spin coupling when the number of equivalent hydrogen atoms on adjacent atom(s) is  $n$ , and no other neighbouring atoms are involved.
34. Which of the following statements regarding mass spectrometry is wrong?
- In a normal mass spectrometer, electron impact causes a molecule to lose an electron and become a molecular radical cation which decomposes into fragment cations and radicals.
  - Only cations can be detected by a normal mass spectrometer.
  - A compound whose molecules contain just one bromine atom shows two molecular ion peaks of similar intensity, one at  $+1$  and one at  $-1$  of the average  $m/z$  value.
  - Molecular ion peaks always have even-numbered values of  $m/z$ .
35. How many signals does the unsaturated ketone  $(\text{CH}_3)_2\text{CHCH}_2\text{C}(\text{O})\text{CH}=\text{CH}_2$  have in  $^1\text{H}$  NMR and  $^{13}\text{C}$  NMR spectra?
- five  $^1\text{H}$  signals and six  $^{13}\text{C}$  signals
  - Six  $^1\text{H}$  signals and six  $^{13}\text{C}$  signals
  - Six  $^1\text{H}$  signals and seven  $^{13}\text{C}$  signals
  - five  $^1\text{H}$  signals and seven  $^{13}\text{C}$  signals
36. Which of the following statements in the context of  $^1\text{H}$  NMR spectroscopy is true?
- Arene C-H chemical shift ( $\delta$ ) values are greater than simple alkenes C-H chemical shift values because of the aromatic ring current
  - Arene C-H chemical shift ( $\delta$ ) values are smaller than simple alkenes C-H chemical shift values because of the aromatic ring current.
  - Arene C-H signals are always multiplets
  - Arene C-H signals are always singlets
37. Which carbon of (a)-(d) of hex-3-en-2-one has the smallest (most upfield) chemical shift in the NMR spectrum?
- C1
  - C2
  - C4
  - C6

38. Which of (a)-(d) indicates the correct order of carbon chemical shifts of the four carbons of the following compound.



- a)  $\text{C}_{\text{Me}} < \text{C}_2 < \text{C}_3 < \text{C}_1$   
b)  $\text{C}_{\text{Me}} < \text{C}_3 < \text{C}_2 < \text{C}_1$   
c)  $\text{C}_{\text{Me}} < \text{C}_2 < \text{C}_1 < \text{C}_3$   
d)  $\text{C}_{\text{Me}} < \text{C}_1 < \text{C}_2 < \text{C}_3$
39. Which of the following statements regarding mass spectrometry is false?
- a) The base peak of a simple ketone is usually attributable to an acylium ion.  
b) The molecular ion of carbonyl compounds with a  $\beta$ -C-H readily undergoes elimination of an alkene to give a relatively stable enol radical cation.  
c) The molecular ion peak of some alcohols is very weak because it readily loses an alkyl radical to give a relatively stable oxonium (hydroxycarbenium) ion.  
d) Structurally isomeric alkanes cannot be distinguished by low resolution mass spectrometry.
40. What signals do you expect to see in the  $^1\text{H}$  NMR spectrum of 1,1-dichloroethane  $\text{CH}_3\text{CHCl}_2$ ?
- a) A doublet and a triplet.  
b) A singlet and a quartet.  
c) A doublet and a quartet.  
d) A singlet and a doublet.
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