Board of Studies: Chemistry

Class: TYBSc (Chemistry)

Subject Code: CHEM3503

Subject: Organic Chemistry

Semester: V

QUESTION BANK

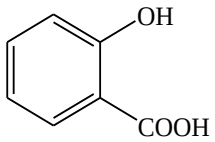
Que. 1 Short answer question **1 mk**

1. Salicylic acid is strong acid than m-hydroxy benzoic acid, why?
2. Aniline is a weaker base than cyclohexyl amine, explain.
3. Monochloro acetic acid is stronger acid than acetic acid, explain.
4. Why guanidine is extremely strong base?
5. Why amides are neutral?
6. Draw the resonating structures of p-nitro phenoxide ion.
7. Cis 1,2-dimethyl cyclohexane does not show any optical activity, why?
8. Cis 1,3-dimethyl cyclohexane is more stable than its trans isomer, why?
9. Trans 1,4 (e,e)-dimethyl cyclohexane is more stable than its cis isomer, why?
10. Trans 1,4 dimethyl cyclohexane is optically inactive, why?
11. As crowding increases rate of S_N2 reaction decreases, why?
12. Which is good nucleophile amongst $^{-}NH_2$ and ^{-}OH?
13. How will you convert bad leaving group ^{-}OH into good leaving group?
14. Benzoyl Chloride undergoes S_N1 mechanism and not S_N2 mechanism, explain.
15. Which is good nucleophile amongst I^- and Br^-?
16. (+) 2-bromo butane when mixed with NaBrlooses its optical activity, explain.
17. State Saytzeff rule.
18. 1- Iodo propane undergoes E2 elimination faster than 1-chloro propane, why?
19. As the size of attacking base increases proportion of Hofmann product increases, why?
20. The factors which favor S_N1 reaction also favor E1 reaction to a greater extent, explain.
21. As the size of leaving group increases proportion of Hofmann product increases, why?
22. Iodine is very good leaving group as well as very good nucleophile, explain.
23. Nitrobenzene on nitration gives m-dinitro benzene, why?
24. Nitrobenzene does not undergo F.C. acylation reaction, explain.
25. Define diazo coupling reaction.
26. What is Friedel-Craft acylation?
27. N,N-dimethyl aniline undergoes diazo coupling reaction at para position, why?
28. Phenol on nitration gives p-nitro phenol, justify.
29. List the factors affecting stability of carbanion
30. What is aldol condensation?
31. What do you meant by reactive methylene group?
32. What is betaine intermediate?
33. Cyclopentadiene forms carbanion readily, explain.
34. Give the stability order of carbanion.

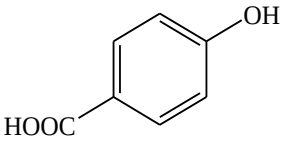
35. What is ylide?

Que. 2 Long answer question 3-5mk

1. What is hydrogen bonding? Why o- hydroxy benzoic acid is stronger acid than p-hydroxy benzoic acid?
2. Explain steric effect with suitable example.
3. P-nitrophenol is more acidic than phenol, explain.
4. Explain pKa values of the following compounds.



pKa= 2.98



pKa=4.58

5. Pyridine is weaker base than aliphatic amines, explain.
6. Pyrrolidine is a strong base than pyrrole, explain.
7. Draw the chair conformation of trans 1,3-dimethyl cyclohexane and comment on their stability and optical activity.
8. Draw the chair conformation of trans 1,2-dimethyl cyclohexane and comment on their stability and optical activity.
9. Draw the chair conformation of trans 1,4-dimethyl cyclohexane and comment on their stability and optical activity.
10. What is S_N1 reaction? Discuss the mechanism of S_N1 with suitable example and energy profile diagram.
11. Explain stereo chemical aspects of S_N1 and S_N2 reactions with suitable examples.
12. Explain effect of solvent on S_N1 and S_N2 reactions.
13. What is S_N2 reaction? Discuss the mechanism of S_N2 with suitable example and energy profile diagram.
14. What is S_Ni reaction? Explain the mechanism of S_Ni with suitable example.
15. What is S_N2 reaction? Discuss the effect of following on S_N2 reaction a) Nature of substrate b) Nature of nucleophile c) Nature of leaving group.
16. What is E2 mechanism? Discuss the evidences of E2 mechanism.
17. What is E1 mechanism? Discuss the evidences of E1 mechanism.
18. What is β-elimination reaction? Discuss the mechanism of E2 reaction with suitable example. Give one evidence supporting E2 reaction.
19. What is elimination reaction? Compare the S_N2 and E2 reaction on the basis of following points- 1. Structure of substrate 2. Stability of alkene formed 3. Solvent polarity 4. Nature of leaving group
20. 2- Phenyl ethyl bromide on heating with NaOMe gives 95% styrene, explain.
21. Write a note on Hofmann elimination.
22. Write a note on Saytzeff elimination.
23. Explain orientation effect of electron donating and withdrawing groups in aromatic electrophilic substitution reaction.
24. What is Friedel-Craft acylation? Discuss mechanism of alkylation of benzene.
25. Explain the diazo coupling reaction for N-methyl aniline.
26. Discuss the mechanism of sulphonation of benzene with following points-
    1. Generation of electrophile 2. Attack of electrophile 3. Abstraction of proton

27. What is meant by arynes? Give one example of its existence.
28. What are limitations of F.C. alkylation reaction? Explain each with one example.
29. Explain use of ylides for synthesis of alkene with one suitable example.
30. Write a note on wittig reaction.
31. Write a note on Perkin's reaction.
32. What is Claisen ester condensation? Explain its example with suitable example.
33. Write a note on intermolecular aldol condensation.
34. Explain any three principles of green chemistry.
35. Explain the use of ionic liquids in organic synthesis.

Que. 3 Multiple choice questions 1mk

1. Salicylic acid is more acidic than benzoic acid because-----
   a) Hydrogen bonding b) Inductive effect c) Resonance effect d) Steric effect
2. Which of the following is most acidic?
   a) Ethane b) Ethene c) Ethyne d) Ammonia
3. Which of the following is strongest base?
   a) Pyrrole b) Methyl amine c) Ammonia d) Aniline
4. According to Lowery-Bronsted concept, acids are----
   a) Proton acceptor b) Proton donor c) Electron pair acceptor d) Electron pair donor
5. Which of the following is an acid?
   a) $AlCl_3$ b) Aniline c) Pyrrole d) Ammonia
6. Relative energy of cis 1,2-dimethyl cyclohexane is----
   a) 1.8 Kcal b) 3.6 Kcal c) 2.7 Kcal d) 0.9 Kcal
7. Trans 1,3-dimethyl cyclohexane is optically active because----
   a) There is no plane of symmetry c) It has centre of symmetry
   b) The enantiomers have equal stability d) There are no butane guache interactions
8. The order of stability of 1,4-dimethyl cyclohexane is----
   a) Trans 1,4 (e,e) >cis 1,4 (a, e) > trans 1,4 (a, a)
   b) Trans 1,4 (a, a) > trans 1,4 (e, e) >cis 1,4 (a, e)
   c) Cis 1,4 (a, e) > trans 1,4 (a, a) > trans 1,4 (e, e)
   d) Cis 1,3 (e, a) = trans 1,4 (a, a) = trans 1,4 (e, e)
9. 1,1-dimethyl cyclohexane is optically inactive because-----
   a) Presence of centre of symmetry
   b) Presence of plane of symmetry
   c) Presence of identical substituents on the same carbon atom.
   d) None of these
10. Methyl bromide undergoes hydrolysis with aq. NaOH by S_N2 route because----
    a) Tertiary carbocation is well stabilized b) steric reactions are more
    c) Back side attack is more favorable d) None of these
11. t-Butyl bromide undergoes hydrolysis with aq. NaOH by S_N1 route because----
    b) Tertiary carbocation is well stabilized b) Repulsion between Br^- and ^-OH is less
    c) Back side attack is more favorable d) None of these
12. 2-Phenyl-butanol looses its optical activity in presence of dil. H_2SO_4, because----
    a) It forms racemic mixtures b) Inversion of configuration occurs
    c) Locking of conformation takes place d) None of these
13. When pyridine is used in S_Ni mechanism, ------ takes place.

a) Retention b) Inversion c) Racemiasation d) None of these

14. Intimate ion pair formed in the ---- following mechanism

a) S_N1 b) S_N2 c) S_Ni d) S_NAr

15. Rate of S_N1 reaction increases in polar solvent because-----

a) Dissociation of C-X bond decreases b) Backside attack becomes fast

c) Stability of carbocation increases by solvation d) None of these

16. 2- Bromo butane on heating with NaOMe2- butane as major product, according to-----

a) Saytzeff's rule b) Hofmann's rule c) Morkovnikov's rule d) Huckel's rule

17. During elimination reaction, rearrangement may be takes place in -----

a) E1 mechanism b) E2 mechanism c) E1cb mechanism d) E1 and E2 mechanism

18. As the crowding in substrate increases, rate of ----- reaction increases.

a) E1 b) E2 c) E1cb d) E1 and E2

19. As the crowding in attacking base increases, rate of ----- elimination reaction increases.

a) Saytzeff b) Hofmann c) Morkonikov d) Huckel

20. Kinetic isotopic effect is observed in ----- mechanism

a) E1 b) E2 c) E1cb d) E1 and E2

21. Acetanilide on nitration with nitrating mixture gives ---- major product.

a) m-Nitro acetanilide b) p-Nitro acetanilidec) o-Nitro acetanilide d) o,m-Dintro acetanilide

22. For conversion of Toluene to p-nitro benzoic acid, ----- sequence is carried out.

a) Nitration followed by oxidation b) Oxidation followed by nitration c) Reduction followed by nitration d) Nitration followed by reduction

23. Benzene reacts with propene in presence of H_2SO_4 catalyst to give----

a) n- Propyl benzene b) Benzophenone c) Cumene d) No reaction

24. Which of the following is o/p-director?

a) –COOH b) – Br c) –CN d) –CHO

25. Which of the following is least reactive towards electrophilic aromatic substitution?

a) Nitro benzene b) Phenol c) Ethyl benzene d)Benzene

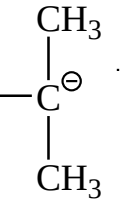
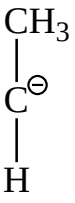
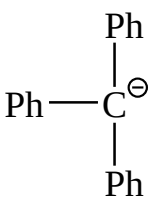
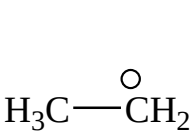
26. Which of the following compound undergoes aldol condensation----

a) Acetaldehyde b) 2, 2-dimethyl propanaldehyde c) Benzophenone d) None of these

27. The strongest acid among the following is------

a) Ethane b) Ethene c) Ethyne d) 2-Butyne

28. Which of the following carbanion is most stable?

a)  b)  c)  d) 

29.The reagent used to convert –C=O to –C=CR_2-----

a) Clemmenson's reagent b) Ylide c) Grignard reagent d) Lucas reagent

30. The most stable carbanion formed from the following is ------

a) CH_3-CH_3 b) CH_2=CH_2 c) $CH_2(NO_2)_2$ d)

31. Green chemistry also called -----

a) Life chemistry b) Environmental chemistry c) Organic chemistry d) Sustainable chemistry

32. Green chemistry is the process to design chemical reaction in------

a) Eco-friendly manner b) Hazardous manner c) Industrial manner d) None of these

33. Which of the following is the greenest solvent ----

a) Benzene b) Water c) Chloroform d) Pet ether

34. Green chemistry reduces the use of-----

a) Liquid fuel b) Solid fuel c) Gaseous fuel d) Energy

35. The atom economy obtained by green synthesis is in the range of -----

a) 72-80% b) 62-70% c) 40-50% d) 90-100%

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