W 002/158

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Winter, 2024

B. Pharm 2nd Semester Examination

PHARMACEUTICAL ORGANIC CHEMISTRY-I

Course Code: BP202T

Full Marks – 75 **Time – 3 hours**

The figure in the margin indicates full marks for the questions.

I. Multiple choice questions (MCQ) : answer all questions: **(20×1 = 20)**

1. An atom or group of atoms which determines the chemical behaviour of an organic molecule is designated as.....
   A. Substituent.
   B. Functional group.
   C. Radical.
   D. All of the above.
2. What is the priority of the following functional groups according to IUPAC?
   A. $-SO_3H$ > -COOR > $-CONH_2$ > -CN > -CHO > -NC >-COOH.
   B. –COOR > $-SO_3H$ > $-CONH_2$ > -CN > -CHO > -NC >-COOH.
   C. –COOH –COOR > $-SO_3H$ > $-CONH_2$ > -CN > -CHO > -NC.
   D. –CHO > –COOH –COOR > $-SO_3H$ > $-CONH_2$ > -CN > -NC.
3. Lithium dialkyl cuprate is called as.....reagent
   A. Frank land reagent.
   B. Lucas reagent.
   C. Lindlar's catalyst.
   D. None of the above
4. Who is the Father of Organic Chemistry?
   A. Erich Huckel.
   B. J. Jacob Berzelius.
   C. August Kekule.
   D. Friedrich Wohler.
5. The mechanistic pathway of S_N2 reaction proceeds through intervention of.....
   A. Free radical.

B. Reactive intermediate.

C. Double dagger.

D. Both B and C

6. Vapour phase nitration of alkanes proceed at temperature ranges from 400 -500 ^{0}C in the presence of .....and give.....

A. Fuming HNO_3 and haloalkane.

B. Fuming H_2SO_4 and nitroalkane.

C. Fuming HNO_3 and nitroalkene.

D. None of the above.

7. Which of the following statement is common for both $E_1$and E_2 reactions?

A. In both cases, we form a new C-C π bond, and break a C-H bond and a C–(leaving group) bond.

B. In both reactions, a species acts as a base to remove a proton, forming the new π bond.

C. Both reactions follow Zaitsev's rule.

D. All of the above.

8. Acetylene is distinguished from ethylene by .....reagent.

A. Bayer's reagent.

B. Ammonical solution of cuprous chloride.

C. Ammonical solution of silver nitrate.

D. Both B and C.

9. When 1, 3-butadiene is readily reduced to 1. 4-dihydro derivative (bute-2-ene) in the presence of sodium in liquid ammonia, the reaction is known as.....

A. Clemmensen's reduction.

B. Rosenmund reduction.

C. Birch reduction.

D. None of the above.

10. .....test distinguish the alcoholic hydroxyl group from phenolic hydroxyl group.

A. Azo-dye test.

B. Ferric Chloride Test.

C. Liebermann's Test

D. All of the above.

11. The following solvents are polar aprotic in nature except.....

A. Dimethyl sulfoxide (DMSO).

B. N, N-dimethylformamide (DMF).

C. Tetrahydrofuran (THF).

D. Hydrogen fluoride (HF).

12. Taxol is a potential anticancer drug used to treat metastatic breast carcinoma which is synthesized by .....reaction

A. Benzoin condensation.

B. Parkin condensation.

C. Claisen-Schmidt condensation.

D. Pinacol pinacolone rearrangement reaction.

13. During an organic synthetic reaction an aromatic aldehyde reacts with formaldehyde in the presence of strong base to give 'X' and 'Y'. What are 'X' and 'Y'?

A. C_6H_5-CH_2-OH and HCOOH.

B. C_6H_5-COOH and HCOONa.

C. C_6H_5-COONa and HCOONa.

D. C_6H_5-CH_2-OH and HCOONa.

14. In which of the following reaction aromatic aldehyde undergoes condensation in presence of inorganic nitrile (used as a catalyst as well as good leaving group) and base and to form α-hydroxy ketone via formation of cyanohydrins.

A. Cannizzaro reaction.

B. Dakin reaction.

C. Parkin condensation.

D. Justus von Liebig addition reaction.

15. Sodium nitroprusside test is used to distinguish between.....

A. Alcohols and carboxylic acids.

B. Alcohols and aldehydes.

C. Ketones and aldehydes.

D. Amines and alcohols.

16. Which of the following carboxylic acid undergoes Hell Volhard Zelinsky Reaction to give α-halo acid?

A. CH_3COOH.

B. HCOOH.

C. CH_3-CH_2-COOH.

D. Both A and C.

17. Hydroxylamine is a reagent which is used for the identification of.....

A. Esters.

B. Amides.

C. Imines.

D. All of the above.

18. Esterification of salicylic acid with methanol give.....

A. Oil of wintergreen.

B. Hoffman mustard oil.

C. Oil of mirbane.

D. None of the above.

19. The imaginary straight line that passes through the apex of the orbit and the center of the opening of the orbit is stated as.....

A. Internuclear distance..

B. Axis of orbital.

C. Nuclear axis.

D. None of the above.

20. Tischenko reaction is a modification of.....reaction where aluminium alkoxide is used as a catalyst.

A. Aldol condensation.

B. Claisen condensation.

C. Cannizzaro reaction.

D. Pinacol- pinacolone reaction.

II. Long answers [Answer 2 out of 3 (Words limit not more than 500): **(2×10=20)**

1. (i) Differentiate between amine and imine with suitable examples.

   (ii) Write the principle involved in Hofmann degradation and Gabriel phthalimide synthesis.

   (iii) Deduce the role of Hinsberg reaction, Liebermann nitrosamine reaction and carbylamine reaction in alkylamines and arylamines. **[2+2+6=10]**

2. (i) What do you mean by condensation and esterification reaction?

   (ii) During an organic reaction 18 ml of benzaldehyde (D=1.04 g/ml) react with 2.5 gm of KCN in presence of 40 ml of rectified spirit to give 35.4 gm of benzoin after 30 minutes reflux condensation.

   (a) Enumerate the principle and reaction mechanism involved in the synthesis of benzoin. What is the role of this synthetic reaction in the discovery of drugs?

   (b) Determine the percentage practical yield of synthesized benzoin. **[2+6+2=10]**

3. (i) What are the difference between radicals and free radicals? Explain the intervention of free radical addition in alkenes.

(ii) HBr gives anti-Markovnikov's product where as HCl and HI does not give in presence of organic peroxide: Justify your answer.

(iii) Deduce the principle and synthetic application of pericyclic reaction. **[5+2+3=10]**

III. Short answer [Answer 7 out of 9 [Words limit not more than 250): (7×5 =35)

1. (i) What is Blue Book? How does Trivial name differ from systematic name?

   (ii) Deduce the systematic name of following compounds:

   (a) Tartaric acid. (b) Citric acid. (c) Benzene. (d) Aniline. (e) Phenyl cyanide **(2.5+2.5=5]**

2. Justify the following statements:

   (i) Acetic acid is an organic weak acid.

   (ii) Alkyl halide undergoes S_N reaction rather than Elimination reaction.

   (iii) Alkenes are relatively stable in common reagents like acid, alkalis, oxidising and reducing agents at room temperature.

   (iv) Alcohols having high boiling and melting points. **(1.5+1+1.5+1=5)**

3. (i) Define molozonide and ozonide.

   (ii) Explain the principle and synthetic importance of Harries reaction. **(1+4=5)**

4. (i) What is threshold energy? Explain the potential energy profile of S_N^2 reaction.

   (ii) What do you mean by Walden inversion? **(1+3+1=5)**

5. Enumerate the structure and application of following compounds in pharmaceutical formulations:

   (i) DDT.

   (ii) Cetosteryl alcohol.

   (iii) Vanillin.

   (iv) Aspirin.

   (v) Benzyl benzoite **(5)**

6. During an organic chemical reaction 10 ml of benzaldehyde (D=1.04 g/ml) undergoes condensations in presence of acetic anhydride and sodium acetate and to give 13.9 gm of α, β-unsaturated aromatic acid.

   (i) Write the name of the reaction and name of α, β-unsaturated aromatic acid.

   (ii) Deduce the mechanism and application of the name reaction.

   (iii) Determine the percentage practical yield of synthesized α, β-unsaturated aromatic acid.

   (1+3+1=5)

7. Write a short note on following:
   (i) Polarisation of carbonyl compounds
   (ii) Resonance of carboxylic acid. (3+2=5)
8. (i) How will you distinguish 1^0, 2^0 and 3^0 alcohols?
   (ii) Deduce the Saytzeff's rule and explain its orientation in E_2 reaction (2+3=5)
9. (i) Differentiate between carbocyclic and heterocyclic compounds.
   (ii) Distinguish between electrophile and nucleophile with examples. (2+3=5)