KATHMANDU UNIVERSITY
End Semester Examination [C]
November/December, 2023

Marks Scored:

Level : B.Sc.
Year : II
Course : CHEM 207
Semester : I
Exam Roll No. :
Time: 30 mins.
F. M. : 20
Registration No.:
Date 29 NOV 2023

SECTION "A"
[20 Q. × 1 = 20 marks]

Choose and mark [X] the most appropriate option.

1. Which is an example of secondary alcohol?
[ ] 2-methylpropan-1-ol [ ] 3,3-dimethylpentanol
[ ] 2-methylpropan-2-ol [ ] 3-methylbutan-2-ol

2. What is the *IUPAC* name for $CH_3CON(CH_3)_2$?
[ ] N,N,-Dimethylethanamine [ ] N,N,-Dimethylmethanamine
[ ] N,N,-Dimethylethanamide [ ] N,N,-Dimethylmethanamide

3. Which of the following compounds would you expect to be most soluble in water?
[ ] CH_2Cl_2 [ ] CH_3CH_2OH
[ ] C_6H_{12} (cyclohexane) [ ] $C_2H_5OC_2H_5$

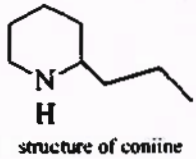
4. 2,3-Dimethyl-2-butene undergoes catalytic hydrogenation to give
[ ] 2,3-Dimethylbutane [ ] 2-Methylpentane
[ ] 2,2-Dimethylbutane [ ] 3-Methylpentane

5. Which carbocation is most stable?
[ ] $CH_3\overset{\oplus}{C}H_2$ [ ] $(CH_3)_2\overset{\oplus}{C}H$ [ ] $(CH_3)_3\overset{\oplus}{C}$ [ ] $\overset{\oplus}{C}H_3$

6. What is the polymer obtained from following reaction?
$nCF_2\text{-}CF_2 \longrightarrow$
[ ] Bakellite [ ] Polyurethane [ ] PVC [ ] Teflon

7. Which of the following mechanism involves inversion of configuration?
[ ] S_N1 [ ] S_N2 [ ] E1 [ ] E2

8. What functional class is represented by the alkaloid-coniine?
[ ] Amine [ ] Amide
[ ] Nitrile [ ] Imine



structure of coniine

9. Which of the following compounds reacts rapidly with aqueous Br_2 under identical reaction condition?
[ ] Benzene [ ] Nitrobenzene [ ] Chlorobenzene [ ] Aniline

10. Which of the following substituents on a benzene ring is meta directing?
[ ] –N=O [ ] $-CH_3$ [ ] $-NHCOCH_3$ [ ] –COOH

11. The reagent needed to convert 2-butyne to cis-2-butene is:
[ ] H_2/Pt [ ] H_2 /Lindlar's catalyst
[ ] Li/NH_3 [ ] Na/NH_3

12. Which is an essential aminoacid?
[ ] Glycine [ ] (+)-Alanine [ ] (-)-Tyrocine [ ] (+)-Isoleucine

13. In polar protic solvents organometallic reagents react as
[ ] Bronsted acids [ ] Lewis acids [ ] Bronsted bases [ ] Lewis bases

14. Which one of the following aldehydes fails to give Cannizarro's reaction?
[ ] Methanal [ ] Benzaldehyde
[ ] Cyclohexanecarbaldehyde [ ] 2,2-dimethylpropanal

15. What will be the product when toluene is oxidized with $KMnO_4$ followed by bromination?
[ ] m-Nitrobenzoicacid [ ] p-Nitrobenzoicacid
[ ] m-Bromobenzoicacid [ ] o-Bromotoluene

Fill in the blanks with appropriate words/ symbols

16. Treatment of methyl magnesium chloride with CO_2 followed by hydrolysis yields .....

17. The IUPAC name of the product formed by the addition of HCN to propanal is .....

18. PVC is the homopolymer of .....

19. An animo acid will be positively charged if the *pH* of the solution is .....than its isoelectric point, *pI*

20. A ..... is a reagent that seeks electron rich center.

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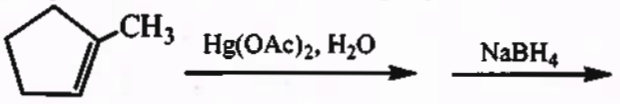
SECTION "B"

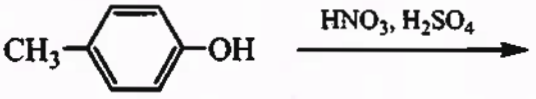
Attempt *ALL* questions.

1. a. Give the structure corresponding to each IUPAC names. [4]
   i. 2,4-pentanedione ii. 2-ethylcyclopentanecarbaldehyde
   iii. 3-ethyl-2-methylhexane iv. *N,N*-dimethylmethanamide

   b. Define the following terms with an example of each: [4]
   i. Isotactic polymer ii. Markovnikov's rule
   iii. Electrophile iv. Deactivating group

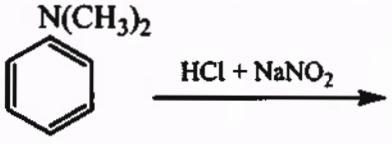
2. a. Give product/s for the following equations: [5]

   i. 

   ii. 

   iii. $CH_3C{\equiv}CH + n\text{-}BuLi \longrightarrow$

   iv. $CH_3CHO + NH_2OH \longrightarrow$

   v. 

   b. Give an example of. [1+1+1+1 = 4]
   i. Williamson ether synthesis.
   ii. Wittig reaction
   iii. Wolf-Kishner reduction.
   iv. Wurtz reaction.

3. Give the appropriate reasons. (*ANY FIVE*) [5 × 2 = 10]
   a. Hydrocarbons are nonpolar compounds.
   b. Alkenes undergo electrophilic addition.
   c. Ethanol boils at higher temperature than its isomer methoxymethane.
   d. Alkylhalides undergo nucleophilic substitution reaction.
   e. Organometallic compounds are the sources of carbon nucleophiles.
   f. For electrophilic aromatic substitution toluene is more reactive than benzene.
   g. Benzaldehyde is less reactive than cyclohexanecarbaldehyde towards nucleophilic attack.

4. Propose general mechanism for the following reactions *(ANY FOUR)*. [4 × 2.5 = 10]
   a. Electrophilic aromatic substitution
   b. Free radical polymerization
   c. Nucleophilic substitution bimolecular (S_N2)

5. Give structures for the products represented by the letters for following series of reactions. [3 + 3 = 6]

i.  $\xrightarrow{CH_3Cl / AlCl_3}$ A $\xrightarrow{KMnO_4}$ B $\xrightarrow{HNO_3 / H_2SO_4}$ C

ii. $CH_3CH_2Cl \xrightarrow{NaOH(aq)} X \xrightarrow[in\ CH_2Cl_2]{C_5H_5NH^+CrO_3Cl^-} Y \xrightarrow{NaOH} Z$

6. Write short notes on: [4 × 3 = 12]
   a. Reactions of Grignard reagent with aldehydes and ketones.
   b. Structure of benzene.
   c. Hydrolysis of peptide by using chymotrypsin catalyst.
   d. General physical properties of carboxylic acids.