KATHMANDU UNIVERSITY
End Semester Examination [C]
April/May, 2023

Marks scored:

Level: B.Sc.
Year : II

Course : CHEM 207
Semester : I

Exam. Roll No.:

Time: 30 mins.

F.M. : 20

30 APR 2023

Registration No.:

Date :

SECTION "A"
[20 Q × 1 = 20 marks]

Mark [X] the most appropriate option.

1. Homolytic fission of covalent bond between carbon atoms will produce
   [ ] Two carbonium ions [ ] Two molecules
   [ ] Free radicals [ ] Carbonium ion and carbanion

2. Which of the following is a correct name according to the IUPAC rules?
   [ ] 2-Methylcyclohexane [ ] 2-Ethyl-2-methylpentane
   [ ] 3,4-Dimethylpentane [ ] 3-Ethyl-2-methylpentane

3. Which of the following is not a nucleophile ?
   [ ] NH_3 [ ] CH_3O^- [ ] BF_3 [ ] H_2O

4. Which reagent will react with butanal to give a butanaloxime?
   [ ] NH_2NH_2 [ ] $C_6H_5NHNH_2$ [ ] NH_2OH [ ] $NH_2NHCONH_2$

5. A tertiary carbon is bonded directly to:
   [ ] 2 hydrogens [ ] 3 carbons [ ] 2 carbons [ ] 4 carbons

6. Which statement is **CORRECT**?
   [ ] Energy is released when a bond breaks
   [ ] A sigma bond results from attraction of protons and electrons
   [ ] Energy is released when a bond forms
   [ ] A carbanion is positively charged

7. Which reaction conditions would best convert 2-butyne to trans-2-butene?
   [ ] Pt catalyst and H_2 [ ] Lindlar's catalyst and H_2
   [ ] Na in liquid NH_3 [ ] $NaNH_2$ in liquid NH_3

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

9. n-Propyl iodide reacts with sodium ethoxide to give:
   [ ] $CH_3CH_2OCH_2CH_3$ [ ] $CH_3CH_2OCH_2CH_2CH_3$
   [ ] $CH_3CH_2OCH_3$ [ ] $CH_3OCH_2CH_2CH_3$

10. Which of the following compounds reacts rapidly with aqueous Br_2 under identical reaction condition?

[ ] Benzene [ ] Nitrobenzene
[ ] Chlorobenzene [ ] Aniline

11. Which of the following substituents on a benzene ring is meta directing?

[ ] $-OCOCH_3$ [ ] $-COCH_3$ [ ] -OH [ ] $-CH_3$

12. Which alkyl halides react most readily by nucleophilic substitution?

[ ] CH_3CH_2Cl [ ] CH_3CH_2I [ ] CH_3CH_2Br [ ] CH_3CH_2F

13. Which of the following common names represent a dicarboxylic acid?

[ ] Lactic acid [ ] Oxalic acid [ ] Acetic acid [ ] Butyric acid

14. The typical reaction of alkene is

[ ] an electrophilic substitution [ ] a nucleophilic substitution
[ ] an electrophilic addition [ ] a radical substitution

15. Which of the following aldehydes used alone will undergo an aldol reaction?

[ ] Methanal [ ] Benzaldehyde
[ ] Cyclohexanecarbaldehyde [ ] 2,2-dimethylpropanal

Fill in the blanks with appropriate words/ symbols.

16. Polymerization of adipic acid and hexamethylenediammine to form Nylon-6,6 is an example of ..... polymerization.

17. Water soluble proteins are classified as.....proteins.

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

19. The pH at which an amino acid in solution does not migrate at any electrode under electric field is called.....

20. The enzyme chymotrypsin catalyzes hydrolysis of .....bond.

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Semester : I
F. M. : 55

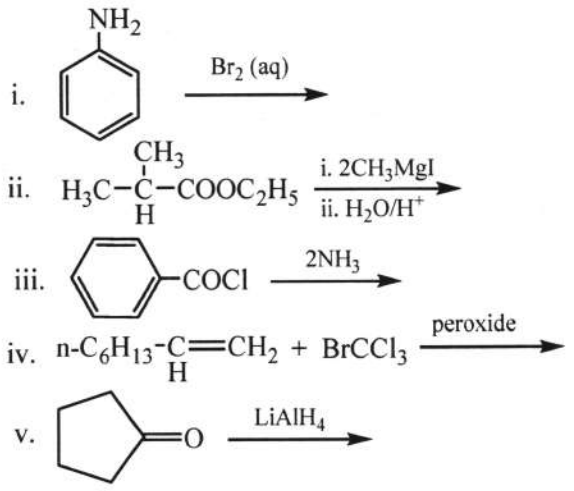
SECTION "B"

Attempt *ALL* questions.

1. a. Give structures of the following IUPAC names of the compounds. [4]
   i. 4-Bromobenzaldehyde
   ii. *N, N*-Diethylbenzamide
   iii. Cyclohexanecarbaldehyde
   iv. Pent-4-en-2-one

   b. Define the following terms with an example of each: [4]
   i. Markovnikov's rule
   ii. Homolymer
   iii. Leaving group
   iv. Cannizzaro's reaction

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

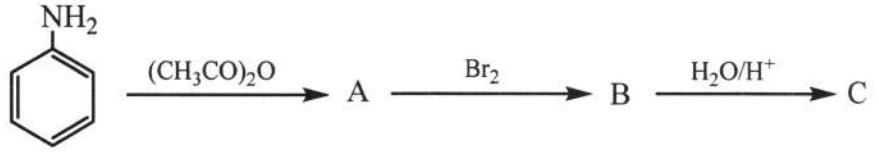


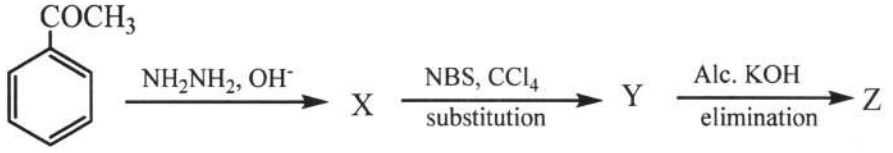
   b. Explain with illustration. [2 × 2 = 4]
   i. Saytzeff's rule.
   ii. Directive effect of substituents in benzene ring for further electrophilic substitution.

3. Give the appropriate reasons on *ANY FIVE.* [5 × 2 = 10]
   a. Organometallic compounds provide carbon nucleophiles.
   b. Although both butyl bromide and 4-bromo-1-butene are primary halides, the latter undergoes elimination more rapidly.
   c. Peroxide effect is only observed in the addition of HBr but not for HCl and HI.
   d. Pentane boils at higher temperature than its isomer 2,2-dimethylpropane.
   e. 2-chloro-3-methylbutane reacts with aqueous sodium hydroxide to give mixture of 2-methylbutan-2-ol and 3-methylbutan-2-ol.
   f. Nitration of phenol is easier than that for benzene.

4. Propose general mechanism for the following reactions. [4 × 2.5 = 10]
   a. Nucleophilic aliphatic substitution by S_N2
   b. Electrophilic addition by E1 mechanism
   c. Electrophilic aromatic substitution
   d. Nucleophilic addition

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

i. 

ii. 

6. Write short notes on: [4 × 3 = 12]
   a. Reactions of Grignard's reagent.
   b. Geometry of peptide.
   c. Catalysis by Chymotrypsin.
   d. Tacticity of polymers