KATHMANDU UNIVERSITY
End Semester Examination
June/July, 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 : 16 JUL 2023

SECTION "A"
[20 Q. × 1 = 10 marks]

Mark [**X**] appropriate answer from the given choices

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

2. Which of the following alkenes will give a mixture of acetone and acetaldehyde an ozonolysis?
   [ ] 1-butene [ ] 2-methyl-2-butene
   [ ] 2-butene [ ] 2-methylpropene

3. What is the name given for a species that contains a positively charged carbon atom?
   [ ] carbanion [ ] carbocation [ ] methyl radical [ ] free radical

4. Alkyl halides undergo
   [ ] Electrophilic substitution reactions [ ] Electrophilic addition reactions
   [ ] Nucleophilic substitution reactions [ ] Nucleophilic addition reactions

5. Which reaction conditions would best convert 3-hexyne to trans-3-hexene?
   [ ] Pt catalyst and H_2 [ ] Lindlar's catalyst and H_2
   [ ] Na in liquid NH_3 [ ] $NaNH_2$ in liquid NH_3

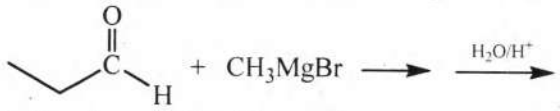
6. Which of the following mechanism involves inversion of configuration?
   [ ] S_N1 [ ] S_N2 [ ] E1 [ ] E2

7. What structural changes take place when an alkene undergoes a Simmons-Smith reaction?
   [ ] addition of ethene gives cyclobutane derivatives
   [ ] the double bond is shifted to a more substituted location
   [ ] the double bond is converted into triple bond
   [ ] a methylene group is added to give cyclopropane derivatives

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

9. Which of the following substituents on a benzene ring is ortho-para directing?
   [ ] –Cl [ ] $-COCH_3$ [ ] -COOH [ ] -CN

10. What is the major product of the following reaction?



[ ] 1-Butanol [ ] Butanal [ ] 2-Butanol [ ] Butanone

11. Which reagent reacts with butanal to give a butanaloxime ?
[ ] NH_2NH_2 [ ] NH_2OH [ ] $C_6H_5NHNH_2$ [ ] $NH_2NHCONH_2$

12. Benzaldehyde reacts with a mixture of concentrated sulfuric acid and nitric acid to give
[ ] p-Nitrobenzaldehyde [ ] o-Nitrobenzaldehyde
[ ] p-Nitrobenzoic acid [ ] m-Nitrobenzaldehyde

13. The typical reaction of alkene is
[ ] an electrophilic substitution [ ] a nucleophilic substitution
[ ] an electrophilic addition [ ] a radical substitution

14. Which of the following aldehydes used alone will undergo an aldol reaction?
[ ] Methanal [ ] Benzaldehyde
[ ] Cyclohexanecarbaldehyde [ ] 2,2-dimethylpropanal

15. Methyl benzoate on hydrolysis gives
[ ] Acetic acid [ ] Benzoic acid [ ] Picric acid [ ] Phenylacetic acid

Fill in the blanks with appropriate words/ symbols

16. According to X-ray study the value of peptide bond length in polypeptide is .....A^0.

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

18. Oxidation of butanol with pyridinium chlorochromate (PCC) in gives .....

19. The isoelectric point of an aminoacid is the pH at which the net charge on the molecule is zero; this structure is referred to as the .....

20. Polymerization of tetrafluoroethene to form ***teflon*** is an example of ..... polymerization.

KATHMANDU UNIVERSITY
End Semester Examination
June/July, 2023

16 JUL 2023

Level : B.Sc.
Year : II
Time : 2 hrs. 30 mins.

Course : CHEM 207
Semester : I
F. M. : 55

SECTION "B"

Attempt *ALL* questions.

1. a. Give structures of the following compounds. [4]
   i. 3,5-Dihydroxybenzoicacid
   ii. 3-Ethyl-2-methylpentane
   iii. *N, N*-Dimethylbenzamide
   iv. 4-Methyl-2-pentene

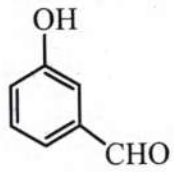
   b. Write an example of the following name reactions. [4]
   i. Williamson ether synthesis
   ii. Wolf-Kishner reduction
   iii. Aldol condensation
   iv. Cannizzaro reaction

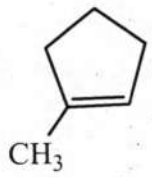
2. a. Give product/s for the following equations: [5]

   i. $CH_3\text{-}CH_2\text{-}\overset{\overset{O}{\|}}{C}\text{-}H \xrightarrow{KMnO_4}$

   ii. $CH_3\text{-}\overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}}\text{—}\overset{\overset{H}{|}}{\underset{\underset{Br}{|}}{C}}\text{-}CH_3 + \text{aq. NaOH} \longrightarrow$

   iii. $C_6H_5CH_2COOH \xrightarrow[2.\ NH_3]{1.\ SOCl_2}$

   iv.  $\xrightarrow{Br_2,\ FeBr_3}$

   v.  $\xrightarrow[2.\ H_2O_2,OH^-]{1.\ (BH_3)_2}$

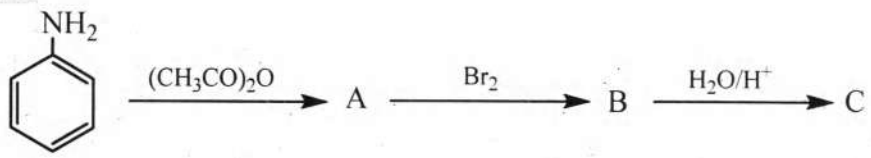
   b. Explain with appropriate example. [2+2 = 4]
   i. Peroxide effect.
   ii. Ring activating group for electrophilic aromatic substitution.

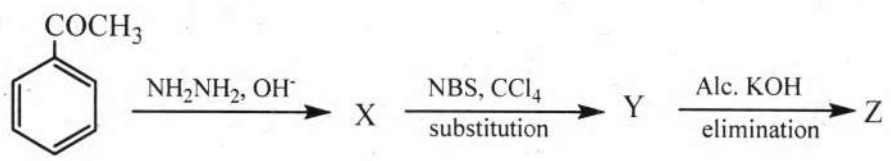
3. Give an example and propose mechanism for the example of following reactions. [10]
   i. Electrophilic aromatic substitution reaction
   ii. Nucleophilic addition
   iii. Nucleophilic substitution bimolecular(S_N2)
   iv. Electrophilic addition
   v. Elimination unimolecular (E1)

4. Give the appropriate reasons. (*ANY FIVE*) [5 × 2 = 10]

i. At isoelectric point an amino acid exists as zwitter ion.
ii. Peroxide effect is only observed in the addition of HBr but not for HCl and HI.
iii. Ethanol has higher boiling point than diethylether.
iv. 2-chloro-3-methylbutane reacts with aqueous sodium hydroxide to give mixture of 2-methylbutan-2-ol and 3-methylbutan-2-ol.
v. Organometallic compounds are the sources of carbon nucleophiles.
vi. –COOH group is deactivating for further electrophilic substitution on a benzene ring.
vii. Alkanes are insoluble in water

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]

i. Reactions of Grignard's reagent.
ii. Secondary structure of protein.
iii. Activating and deactivating groups for Electrophilic Aromatic Substitution.
iv. Mechanism of hydrolysis of protein by Chymotrypsin.