KATHMANDU UNIVERSITY
End Semester Examination [C]
May/June, 2019

Marks Scored:

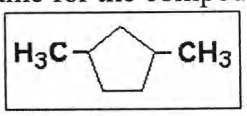
Level : B.Sc.
Year : II
Course : CHEM 207
Semester: I
Exam Roll No. :
Time: 30 mins.
F. M. : 20
Registration No.:
Date 31 MAY 2019

SECTION "A"
[20Q × 1 = 20 marks]

I. Choose the most appropriate answer among the given options and mark [×] *in the box of your choice.*

1. During Friedel Crafts acylation of benzene, the reagents used are _____.
   [ ] R-Cl/$AlCl_3$ [ ] R-CO-Cl/$AlCl_3$
   [ ] Cl_2/$AlCl_3$ [ ] R-CO-Cl/H_2SO_4

2. The IUPAC name for the compound below is

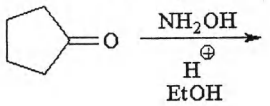


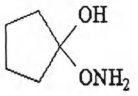
   [ ] 1,4-Dimethylcyclopentane [ ] 1,3-Dimethylcyclopentane
   [ ] 2,5-Dimethylcyclopentane [ ] 2,3-Dimethylcyclopentane

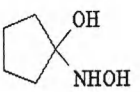
3. Secondary alcohol upon oxidation gives _____.
   [ ] aldehyde [ ] ketone [ ] carboxylic acid [ ] ester

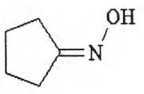
4. During the isolation of various oils from coal tar, _____ is applied.
   [ ] selective precipitation [ ] fractional distillation
   [ ] destructive distillation [ ] column chromatography

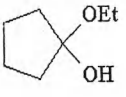
5. In the following reaction, the major product is _____.



   [ ] 

   [ ] 

   [ ] 

   [ ] 

6. Which of the following does not undergo Aldol condensation reaction?
   [ ] HCHO [ ] CH_3COCH_3
   [ ] CH_3CHO [ ] CH_3CH_2CHO

7. Addition of HCN on _____ gives cyanohydrin.
   [ ] alcohol [ ] ester
   [ ] carboxylic acid [ ] aldehyde

8. During coordination polymerization, _____ is not applicable.
[ ] low crystallinity polymer [ ] linear polymer
[ ] Ziegler-Natta catalyst [ ] stereochemical control

9. Which of the following statement is false regarding substituent in electrophilic aromatic substitution?
[ ] –OH activator and *o,p* director [ ] –CN deactivator and *m* director
[ ] –F deactivator and *m* director [ ] $-OCH_3$ activator and *o,p* director

10. The most typical reaction of alkyl halide is
[ ] electrophilic substitution [ ] electrophilic addition
[ ] nucleophilic substitution [ ] nucleophilic addition

11. Which of the following statement is not correct?
[ ] S_N2 reaction gives inversion of configuration of the product.
[ ] S_N1 reaction gives racemization plus some net inversion.
[ ] Rate of S_N1 reaction depends upon concentration of alkyl halide only.
[ ] Stability of the carbocation follows the order 1°>2°>3°.

12. Saturated hydrocarbons are also referred as _____.
[ ] alkane [ ] alkene [ ] alkyne [ ] alkaloid

13. What is the major product of the reaction of 2 °amine with nitrous acid?
[ ] Diazonium salt [ ] N-Nitrosoamine
[ ] *p*-Nitrosocompound [ ] Mixture of alcohol and alkane

14. During the elecrrophilic addition to alkene, the first step is characterized by the formation of ___.
[ ] carbocation [ ] carbanion [ ] free radical [ ] substituted product

15. For Wolf-Kishner reduction of carbonyl compounds, _____ is used.
[ ] NH_2-NH_2/base [ ] Zn (Hg)/conc. HCl
[ ] H_2/Ni [ ] $LiAlH_4$

II. Fill in the blanks with appropriate words/symbols.

16. The main reagents used for nitration of benzene are _____.

17. The most common solvent used in the reaction of Grignard reagent is _____.

18. The reactivity order of the alkyl halide for S_N2 reaction is _____.

19. The two common functional groups in amino acids are _____ and _____.

20. The product formed upon the hydrogenation of benzene is _____.

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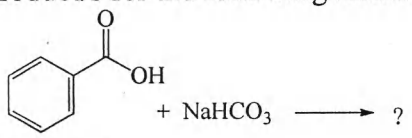
SECTION "B"

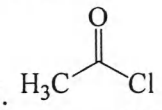
Attempt *ALL* questions.

1. a. Draw structural formulas of [4 × 1 = 4]
   i. 2,4,6-Trimethoxybenzaldehyde
   ii. 3-Bromophenol
   iii. 3-Methylpentane
   iv. 2-Methylcyclopentanol
   b. Write down the chemical reaction of propene with HBr in presence and in absence of peroxides. [2]
   c. What are the common derivatives of carboxylic acid? Write one reaction of each derivative. [2]

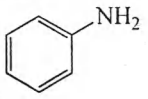
2. a. Give product/s for the following reactions. [5 × 1 = 5]



i. + $NaHCO_3$ ⟶ ?



ii. + NH_3 ⟶ ?



iii. $\xrightarrow{\text{Aq. } Br_2}$?

iv. $CH_3MgBr + CH_3CHO \longrightarrow$?

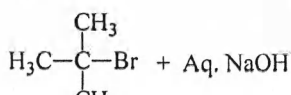
v. $nCH_2 = CHCl \xrightarrow{\text{Initiator}}$?

   b. What happens when acetylene reacts with ozone? [2]
   c. How can you show that ions can be used in polymerization process? [2]

3. Give appropriate reasons (*ANY FOUR*). [4 × 2 = 8]
   a. Aldehyde and ketone show similar chemical reactions.
   b. Nitrobenzene is *meta* director for electrophilic substitution.
   c. Electrohilic aromatic substitution goes easily compared to nucleophilic aromatic substitution.
   d. Alkyl group on the amine increases its basicity.
   e. Alkenes are more reactives than alkanes.

4. a. How can you convert cyclopentanone to (i) cyclopentanol (ii) cyclopentane? [2]
   b. How can you selectively prepare *cis* and *trans* alkene from alkyne? [2]
   c. Organometallic compounds are widely used in organic synthesis. Justify the statement. [2]
   d. Predict the product and also propose the mechanism for the following reactions. [2 × 3 = 6]

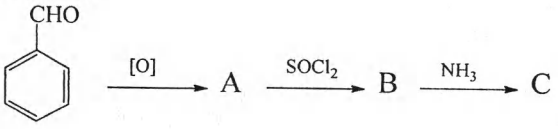
i. $CH_4 + Cl_2 \xrightarrow{\text{Light}}$?



ii. + Aq. NaOH ⟶ ?

iii. $CH_3CHO \xrightarrow{\text{Aldol Condensation}}$?

5. Assign structures to the compounds represented by the letters for the following series of reactions. [2 × 3 = 6]

a. 

b. $CH_3CH_2OH \xrightarrow[\text{Heat}]{\text{Alc. NaOH}} A \xrightarrow{HBr} B \xrightarrow{NaCN} C$

6. Write short notes on (*ANY FOUR*) [4 × 3 = 12]

a. Ziegler-Natta reaction
b. Sources of alcohol
c. Organic chemistry in nature and industry
d. Enzymatic action of chymotrypsin
e. Nitration and sulfonation on benzene