KATHMANDU UNIVERSITY
End Semester Examination
July/August 2024

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

29 JUL 2024

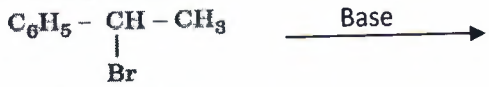
Course : CHEM 201
Semester : I
F. M. : 55

SECTION "B"
[55 marks]

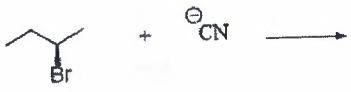
Attempt ALL questions.

1. [2+2+2+2=8]

a .Consider the E1 reaction.



i. Write down the product/s
ii. Draw the mechanism
iii. Is there any possibility of rearrangement? explain
iv. What will be the effect of strong base in the mechanism?

b. For $S_N2$reactions: 

[2.5+2.5=5]

i. Write down the mechanism
ii. Explain the stereochemistry

2. [4×3=12]

Explain the following statements.
a. Chair conformation of cyclohexane is more stable than boat.
b. Meso compounds are optically inactive
c. The order of reactivity of haloalkanes for E2 reaction is Teriary>Secondary>Primary
d. Why Halogens are deactivating but Ortho & para directing in electrophilic substitution reaction?

3. [5×3=15]

Write a shorts notes on
a. Resolution of racemic mixture
b. Confirmations of n-Butane
c. Carbocation Stability
d. Resolution of racemic mixture
e. Phase transfer catalyst

4. [5×3=15]

Write the mechanism for the following reactions
a. Oxymercuration-demercuration
b. Addition of an alcohol to aldehyde in presence of acid
c. Dehydration of tertiary alcohol
d. Free radical polymerization of ethene
e. Elimination–addition reaction

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Marks Scored:

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Course : CHEM 201
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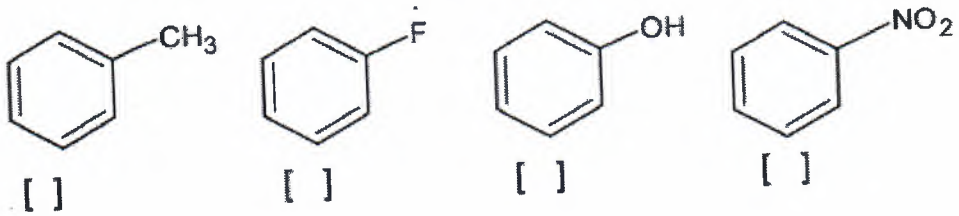
Time: 30 mins.
F. M. : 20
Date :

SECTION "A"
[20Q. × 1 = 20 marks]

Choose and encircle the most appropriate option from each set of choices.

1. Which of the following groups has the highest priority in the Cahn-Ingold-Prelog sequence rules?
[ ] CH_2OH [ ] CH_2OCH_3 [ ] CH=O [ ] CO_2H

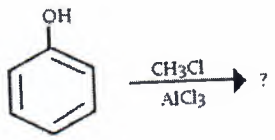
2. Which is least reactive in electrophilic substitution?



[ ] [ ] [ ] [ ]

3. Which of the following statements is wrong?
[ ] S_N1 reactions proceed via carbenium ion intermediates.
[ ] The S_N2 mechanism does not involve an intermediate.
[ ] The rate constant of an S_N1 reaction depends on the nucleofile
[ ] The rate constant of an S_N2 reaction does not depend on the nucleofile

4. What will be the product in the given reaction?
[ ] m-chlorophenol
[ ] m-hydroxytoluene
[ ] o-chlorophenol and p-chlorophenol
[ ] o-hydroxytoluene and p-hydroxytoluene



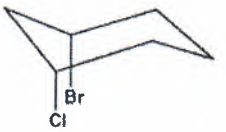
5. Which of the following is not true about the five membered rings?
[ ] Five membered rings are more stable than 4 membered rings
[ ] Five membered rings are more stable than 6 membered rings
[ ] Five membered rings are more stable than 7 membered rings
[ ] Five membered rings are more stable than 8 membered rings

6. Which of the following reactions are favoured by polar aprotic solvent?
[ ] SN1 reactions
[ ] SN_2 reactions
[ ] Both SN_1 and SN_1 reactions
[ ] None of the mentioned

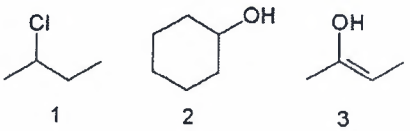
7. The nucleophilic aromatic substitution that can occur on a benzene ring is affected by the substituent group(s) present. Which one of the following statements correctly describes such a substituent group and its effects?
[ ] –CN, electron withdrawing, destabilizes carbanion.
[ ] –COOH, electron releasing, activates the ring.
[ ] $-NO_2$, stabilizes carbanion, activates the ring.
[ ] $-CH_3$, destabilizes carbanion, electron withdrawing.

8. Which reagent will react with benzaldehyde to yield a Oxime?
[ ] NH_2NH_2 [ ] $C_6H_5NHNH_2$ [ ] NH_2OH [ ] $NH_2NHCONH_2$

9. In the following molecule, what is the relationship between the two groups?
[ ] They are equatorial to one another
[ ] They are axial to one another
[ ] They are cis to one another
[ ] They are trans to one another



10. Which of the molecules below is optically active?
[ ]1, 2 and 3 [ ]1 and 2 [ ] 1 and 3 [ ] 1 only



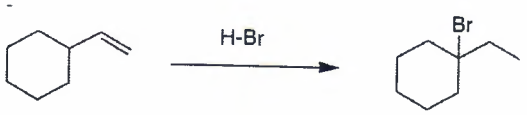
1 2 3

11. On increasing the number of alkyl groups, the stability of carbanions _____
[ ] Increases [ ] Decreases [ ] Remains same [ ] None of the mentioned

12. A certain substance (+)-X, when optically pure, has a specific rotation [α] of +40°. A mixture of (+)-X and its enantiomer (-)-X has a specific rotation of -8°. What percent of the mixture is (+)-X?
[ ] 30% [ ] 35% [ ] 40% [ ] 45%

13. Which of the following statements apply to E1 reactions of alkyl halides?
[ ] Rate = k[base] [ ] Rate = k[base][RX]
[ ] Rate = k[RX] [ ] The reactions occur in singe step.

14. The product from the reaction below is the result of a:



[ ]1,2-methyl shift [ ] carbine [ ] bromonium ion [ ] 1,2-hydride shift

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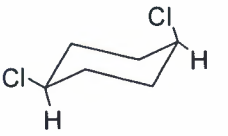
Fill in the blanks

15. The name of the compound is_____



16. Dehydrohalogenation of 2-bromo-2 methyl pentane give major product_____

17. The potential energy difference between half-chair and chair confermers is _____

18. The acid catalyzed dehydration of alcohol is best described as _____ mechanism.

19. Friedel-Craft reaction of bromobenzene with methyliodide gives _____

20. An aldehyde reacts with excess of alcohol in acidic medium to produce _____