KATHMANDU UNIVERSITY
End Semester Examination
June/July, 2023

Marks Scored:

Level : B.E.
Year : II
Course : CHEM 201
Semester : I
Exam Roll No. :
Time: 30 mins.
F. M. : 20
Registration No.:
Date :

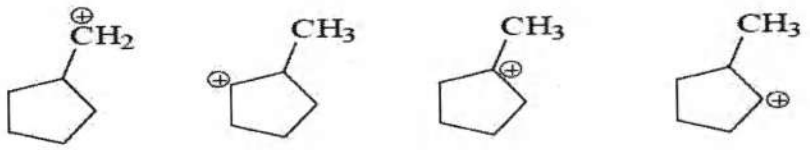
SECTION "A"
[20Q. × 1 = 20 marks]

Mark [X] to the most appropriate option.

1. Which is the most common product of the reaction between HBr and 3-methylpent-2-ene?
[ ] 2,3-dibromo-3-methylpentane [ ] 2-bromo-3-methylpentane
[ ] 2,4-dibromo-3-methylpentane [ ] 3-bromo-3-methylpentane

2. E 2 reaction is favored on.....by.....
a. Tertiary haloalkanes b. primary haloalkanes
c. weaker base d. stronger base
[ ] ac [ ] bd [ ] ad [ ] bc

3. Predict which of the following carbocations has the highest energy:

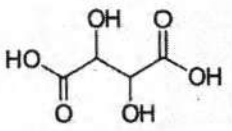


[ ] [ ] [ ] [ ]

4. What will be the total number of isomers formed when 2-methyl butane is subjected to monochlorination?
[ ] 5 [ ] 4 [ ] 3 [ ] 6

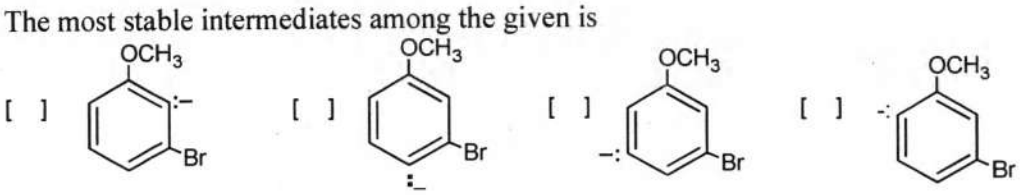
5. The observed rotation of 0.3 gm of an optically active compound dissolved in 15 ml of a solvent is -0.78^0 and the specific rotation of that compound is -39^0? What is the length of sample tube?
[ ] 5 cm [ ] 10 cm [ ] 15 cm [ ] 20 cm

6. How many stereoisomer are possible for the given structure?
[ ] 1 [ ] 2
[ ] 3 [ ] 4



7. Acetaldehyde reacts with C_2H_5MgCl the final product is which of the following?
[ ] An aldehyde [ ] A ketone
[ ] A primary alcohol [ ] A secondary alcohol

8. The most stable intermediates among the given is



9. Nitro group is meta-directing in electrophilic aromatic substitution reactions?
[ ] increases electron density at meta-position
[ ] increases electrons density at ortho and para-positions
[ ] decreases electron density at meta-position
[ ] decreases electron density at ortho and para-positions

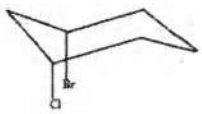
10. The dehydration of alcohols is an example of _____.
[ ] Bimolecular elimination/E2 reaction [ ] SN2 reaction
[ ] SN1 reaction [ ] Unimolecular elimination/E1 reaction

11. Which of the following solvent is highly favorable for the SN1 reaction?
[ ] Water [ ] Ethanol
[ ] Dimethylsulfoxide [ ] Trifluroacetic acid

12. The orientation of free-radical addition doesn't depend on
[ ] Polar factor [ ] Steric factor
[ ] Stability of carbocation [ ] stability of free radical

13. Which statement is **TRUE** about SN2 reaction?
a. It proceeds with complete inversion.
b. Its reactivity for alky halide is methyl> $1^{o}>2^{o}>3^{o}$
c. It proceeds with racemization.
d. Its reactivity for alky halide is methyl<$1^{o}<2^{o}<3^{o}$
[ ] ab [ ] bc [ ] cd [ ] ad

14. What is the relationship between the two groups in the following molecules?
[ ] They are equatorial to one another
[ ] They are axial to one another
[ ] They are cis to one another
[ ] They are trans to one another

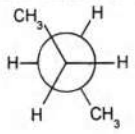


15. Which of the following reaction proceeds with Anti- Markovnikov's orientation?
a. Oxymercuration-demercuration c. Hydroboration-oxidation
b. Free radical polymerization of alkenes. d. Dimerization of alkenes
[ ] ab [ ] bc [ ] ca [ ] da

Fill in the blanks.

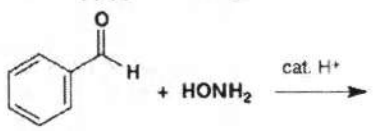
16. If a solution of a compound (30.0 g/100 mL of solution) has a measured rotation of +15° in a 20 cm tube, the specific rotation is.....

17. The chair form structure of trans 1,4-dimethylcyclohexane is.....

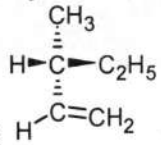


18. _____ on rotation of 90^{0} of sigma bond of carbon-2 and carbon-3 gives the .....(write Newman projection)

19. The major product of the given reaction is .....



20. According to sequence rule the priority order of the



substituents in the chiral compound is .....

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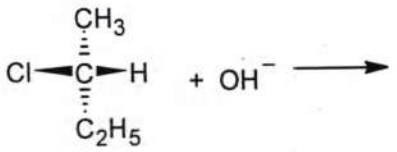
SECTION "B"

Attempt *ALL* the questions.

1. Write the mechanism for the following reaction. [2+2+2+2=8]
   a. when OH^- is a base.
   b. when OH^- is a nucleophile
   c. How the nature of bases affect the mechanism in (a)
   d. Discuss the role of solvent for (b) reactions

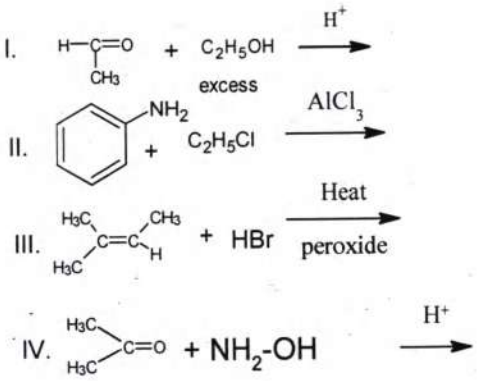


(I)

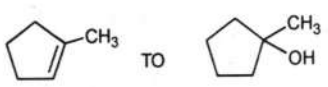
2. Write notes on: [2+2+2+2=8]
   a. Conformations of cyclohexane.
   b. Orientation of free radical addition reaction
   c. Elimination – addition mechanism
   d. Resolution of racemic mixture

3. Give the appropriate reasons for the following facts. [5 × 2=10]
   a. Chlorobenzene is less reactive than chloroethane towards nucleophilic substitution reaction.
   b. The heat of hydrogenation for Benzene is 36 kcal less than the calculated value.
   c. Dehydration of alchol is acid catalized where as dehydrohalogenation required base.
   d. Ortho- deuterioflurobenzene is converted into aniline only very slowly but loses its deuterium rapidly to yield flurobenzen
   e. Chair conformation of cyclohexane is more stable than boat conformation.

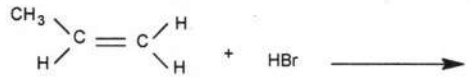
4. Give the mechanism for following. [3+3+3+2=11]

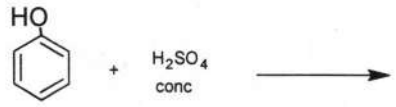


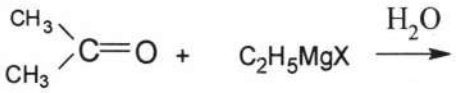
5. How do you convert the following compounds to the respective products (give the appropriate reactions) [5 × 1.5 = 7.5]
   a. Benzene to Bromobenzene
   b. A Ketone to Phenylhydrazone.
   c. 2-Methyl-1-butanol to 2-Methyl-2- butene.
   d. An alkene to cynoydrine
   e.

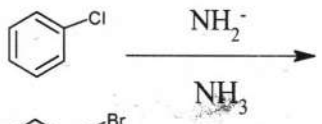


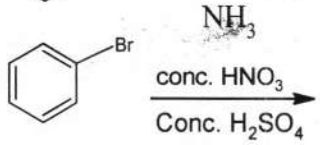
6. Give product/s for the following reactions. [10.5]

(i) 

(ii) 

(iii) 

(iv) 

(v) 

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