KATHMANDU UNIVERSITY
End Semester Examination [C]
November/December, 2023

Marks Scored:

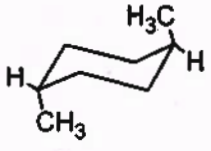
Level : B.E.
Year : II
Course : CHEM 201
Semester : I
Exam Roll No. :
Time: 30 mins.
F. M. : 20
Registration No.:
Date 01 DEC 2023 or; Dec-2023

SECTION "A"
[20 Q. × 1 = 20 marks]

Choose and mark [X] the most appropriate option.

1. The acid catalyzed dehydration mechanism for alcohol is best described as a/an
[ ] E1 [ ] E2 [ ] SN1 [ ] SN2

2. The name of the compound is.....
[ ] Cis-1,4-dimethylcyclohexane
[ ] Trans-1,4-dimethylcyclohexane
[ ] Cis-1,3-dimethylcyclohexane
[ ] Trans-2,4methylcyclohexane



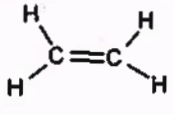
3. Which statement is **TRUE** about SN1 reaction?
a. It proceeds with complete inversion.
b. Its reactivity for alky halide is methyl> 1°>2°>3°
c. It proceeds with racemization.
d. Its reactivity for alky halide is methyl<1°<2°<3°
[ ] ab [ ] bc [ ]cd [ ] ad

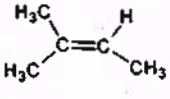
4. An ethanol solution of 8g quinine in 100mL displays a rotation of -13.6° in a 1dm polarimeter tube.What is the specific rotation of quinine?
[ ] -85° [ ] -26° [ ] -170° [ ] -43°

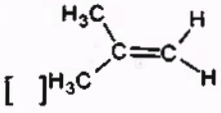
5. CF_3CH_2-OH is.....solvent.
[ ] polar protic [ ] polar aprotic [ ] non-polar [ ] nonpolar protic

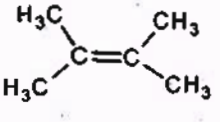
6. The orientation of free-radical addition doesn't depend on
[ ] Polar factor [ ] Steric factor
[ ] Stability of carbocation [ ] stability of free radical

7. The most stable alkene among the following is

[ ] 

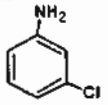
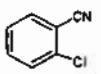
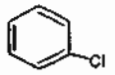
[ ] 

[ ] 

[ ] 

8. Free radical addition to asymmetrical alkenes follow the..... Orientation.
[ ] Anti-Markovnikov's [ ] Markovnikov's
[ ] Both [ ] none

9. The least reactive towards nucleophilic aromatic substitution reaction is

[ ]  [ ]  [ ]  [ ] 

10. How many optically active stereoisomers are possible for butane-2,3-diol?

[ ] 1 [ ] 2 [ ] 3 [ ] 4

11. SO_3 is

[ ] a nucleophile [ ] a free radical [ ] an elecrophile [ ] an anion

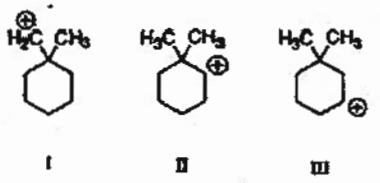
12. An ethanol solution of 8g quinine in 100mL displays a rotation of -13.6° in a 1dm polarimeter tube. What is the specific rotation of quinine?

[ ] -85° [ ] -26° [ ] -170° [ ] -43°

13. Which of the following carbocations is likely to undergo rearrangement through a methyl shift?

[ ] I [ ] II

[ ] I&II [ ] I &III



I II III

14. R-MgX reacts with Methanal to give ....after hydrolysis

[ ] Tertiary alcohol [ ] Secondary alcohol

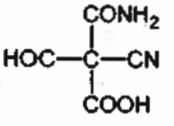
[ ] Primary alcohol [ ] Carboxylic acid

15. Which of the following compounds would react rapidly in an SN2 reaction?

[ ] $(CH_3)_3Cl$ [ ] $(CH_3)_2CHI$ [ ] CH_3CH_2I [ ] $CH_2=CHI$

Fill in the blanks with most appropriate value or world.

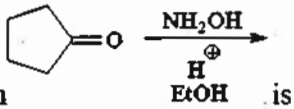
16. During Friedel-Craft alkylation the catalyst used is... .....

17. According to the sequence rule the priority order of the given groups is 

.....

18. The potential energy difference between half-chair and boat confirmers is.....

19. The structural formula of the aprotic solvent Dimethylformamide is.....

20. Product of the reacton  is.....

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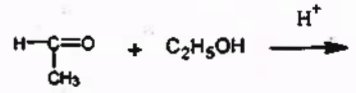
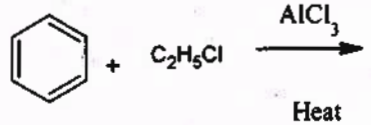
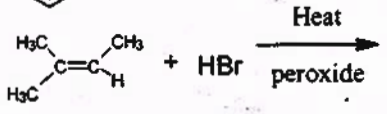
SECTION "B"

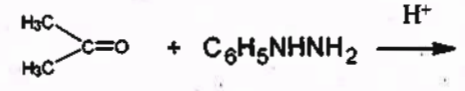
Attempt *ALL* questions.

1. Give the mechanism for following [4Q × 3 = 12]

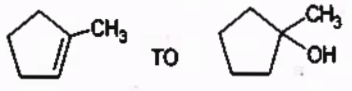
i) 

ii) 

iii) 

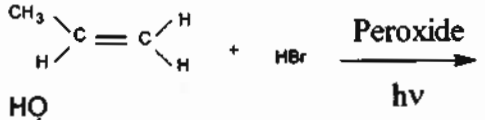
iv) 

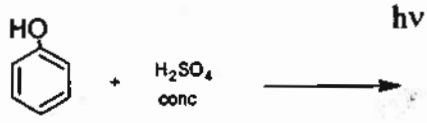
2. Give reason the following observations: [5Q. × 2.5=12.5]
   a. E2- reactions are not accompanied by hydrogen exchange.
   b. In electrophilic aromatic substitution halogens are deactivating and ortho-para directing group.
   c. Ortho- deuterioflurobenzene is converted into aniline only very slowly but loses its deuterium rapidly to yield flurobenzen.
   d. In nucleophilic aromatic substitution reaction of chloro benzene, the presence of NO_2 group at ortho and para position favors the reaction.
   e. Free radical addition of HBr to asymmetrical alkene fallows anti –Markovnikov orientation.

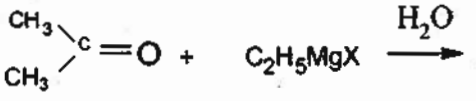
3. How do you convert the following compounds to the respective products (give the appropriate reactions) [7Q. × 1.5=10.5]
   a. Chloro-benzene to aniline
   b. Alcohol to acetal
   c. Benzene to Nitrobenene
   d. A Ketone to Semicarbazone.
   e. 2-Methyl-1-butanol to 2-Methyl-2- butene.
   f. An ethene to polyethene
   g. 

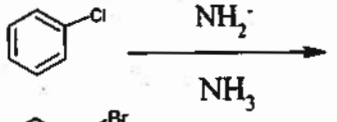
4. Explain the following with examples. [5Q. × 2 =10]
   a. Resolution of racemic modification
   b. Conformational analysis of Cyclohexane
   c. Baeyer Strain Theory
   d. Phase Transfer Catalyst
   e. Canizzaro Reaction

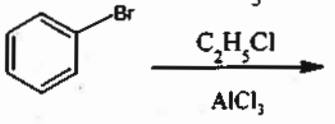
5. A. Give product/s for the following reactions. [5Q × 1=5]

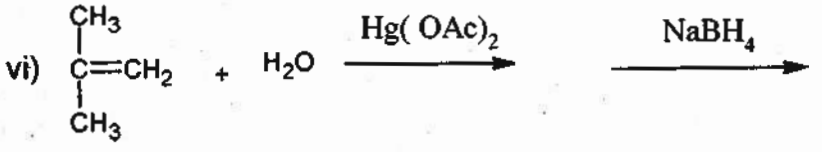
i) 

ii) 

iii) 

iv) 

v) 

vi) 

B. Write the differences between [2Q × 2.5 =5]

i) Enatiomers and diasteriomers

ii) Electrophiles and Nucleophiles