KATHMANDU UNIVERSITY
End Semester Examination
March/April 2017

Marks Scored:

Level : B.E./B.Sc./B.Pharm./B.Tech.
Year : II

Course : CHEM 201
Semester: I

Exam. Roll No.:

Time : 30 mins.

F. M. : 20

Registration No.:

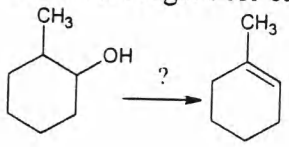
Date : APR 0 3 2017

SECTION "A"
[20 Q.×1=20 marks]

I. Select the most appropriate answer.

1. Markovnikov's addition of HBr is not applicable to
[ ] Propene [ ] 1-Butene [ ] 1- Pentene [ ] 2- Butene

2. Which is the best reagent for carrying out the following conversion?



[ ] $LiAlH_4$ [ ] H_2/Pt [ ] Conc. H_2SO_4 [ ] NaOH

3. Enantiomers are
[ ] stereoisomers having non-identical mirror image configurations
[ ] stereoisomers that do not have non-identical mirror image configurations
[ ] stereoisomers having a mirror plane of symmetry
[ ] achiral stereoisomers

4. The most typical reaction of simple alkene is
[ ] electrophilic substitution
[ ] electrophilic addition
[ ] nucleophilic substitution
[ ] nucleophilic addition

5. A tertiary carbocation is more stable than either a secondary or primary carbocation because
[ ] it carries three positive charges
[ ] it has a pyramidal configuration
[ ] it has a trigonal planar configuration
[ ] it possesses three electron-donating substituent groups

6. In the S_N2 reaction of cyanide ion with $(CH_3)_2CHCH_2CH_2X$, what is the relative order of reactivity for the following X substituents? (i) X = F (ii) X = Cl (iii) X = Br (iv) X = I
[ ] (i) > (ii) > (iii) > (iv)
[ ] (iii) > (i) > (ii) > (iv)
[ ] (iv) > (iii) > (ii) > (i)
[ ] (ii) > (iii) > (iv) > (i)

7. Which of the following is a semicarbazone derivative of an aldehyde RCHO?
[ ] $RCH=N-NHCONH_2$
[ ] $RCH=N-NH_2$
[ ] RCH=N-OH
[ ] $RCH=N-CH(CH_3)_2$

8. What is the order of reactivity of the following compounds in electrophilic substitution? (more reactive to less reactive)

(i) Toluene (ii) Nitrobenzene (iii) Benzene (iv) Phenol

[ ] (i) > (ii) > (iii) > (iv) [ ] (iv) > (iii) > (ii) > (i)

[ ] (i) > (iii) > (iv) > (ii) [ ] (iv) > (i) > (iii) > (ii)

9. The disubstituted benzene has .....isomeric forms.

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

10. Which statement is true about S_N2 reaction?

(i) It proceeds with complete inversion.

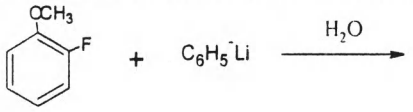
(ii) Its reactivity for alky halide is methyl > 1° > 2° > 3°

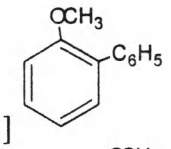
(iii) It proceeds with racemization.

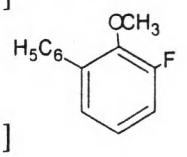
(iv) Its reactivity for alky halide is methyl < 1° < 2° < 3°

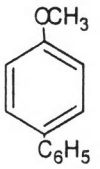
[ ] i,ii [ ] ii,iii [ ] iii,iv [ ] i,iv

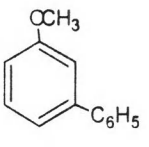
11. The product for the reaction is .....



[ ] 

[ ] 

[ ] 

[ ] 

12. The orientation of free-radical addition doesn't depend on

[ ] polar factor [ ] steric factor

[ ] stability of carbocation [ ] stability of free radical

13. Which of the following is incorrect?

[ ] Methyl: activating; *o*- and *p*-directing [ ] OH: activating; *o*- and *p*-directing

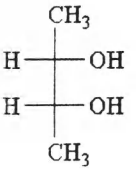
[ ] Cl: activating; *o*- and *p*-directing [ ] NO_2: deactivating; *m*-directing

14. 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°

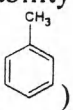
15. The configuration of chiral carbons of the given compounds are (counting carbon from bottom)

[ ] 2R, 3S [ ] 2S, 3R [ ] 2S, 3S [ ] 2R, 3R



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

16. The order of stability of different conformations of cyclohexane is ..... .

17. When toluene () reacts with Cl_2 in presence of light, the major product formed will be..... .

18. A carbonyl compound reacts with HCN in acidic condition to yield..... .

19. According to Huckel's rule, the number of delocalized pie electrons needed to be an aromatic compounds is..... .

20. CF_3CH_2-OH is.....solvent.

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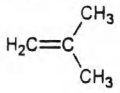
SECTION "B"

Attempt *ALL* the questions.

1. A. A cyclopropane is the least stable member of cycloalkanes. How do you justify it? [2]
B. Show with mechanism the possible products of dimerization of isobutylene

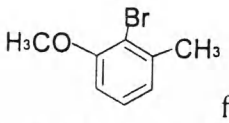


( ) performed in proper acidic condition. [2]

C. Give the chemical structures of any two polar aprotic solvents and explain what are they good for? [2]

2. Give appropriate reasons for the following facts (any *FIVE*). [5×2=10]

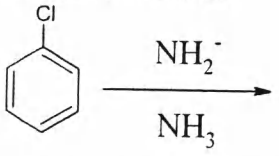
A. Heterolysis of an alkyl halide in gas phase requires relatively high energy whereas same heterolysis in S_N1 reaction solution occurs readily.
B. Larger rings of cycloalkanes are stable in terms of energy yet are difficult to synthesize.
C. S_N1 reactions are favored by polar solvents whereas S_N2 reactions are favored by solvents of low polarity.



D. fails to react with sodamide in presence of liquid ammonia (NH_2^-/NH_3).
E. Aryl halides are less reactive than alkyl halides towards nucleophilic substitution reaction.
F. Element effect helps in supporting E2 mechanism.

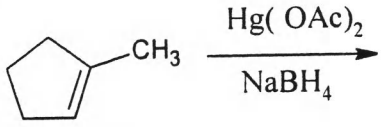
3. Give mechanisms for the following reactions (any *FOUR*). [4×2.5=10]

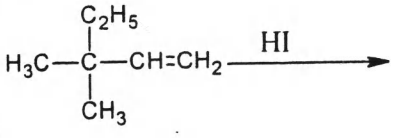
A. Addition of HBr to ethene in the presence of peroxide
B. Nitration of benzene
C. Cannizaro reaction

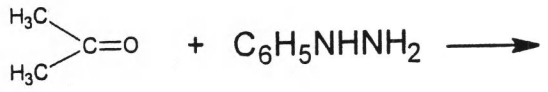


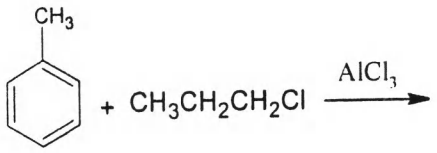
D.
E. Bromination of propene

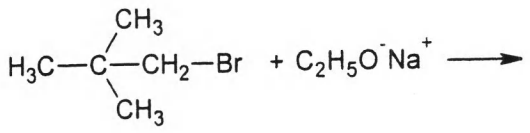
4. Give reactions of the following reactants. [6×1=6]

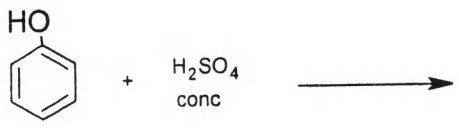
A. 

B. 

C. 

D. 

E. 

F. 

5. How do you convert to respective products (give appropriate reactions) (*ANY THREE*)? [3×1=3]

A. Benzene to *m*-Bromonitrobenzene
B. Ethylene to 1, 2-Ethanediol
C. Ethanol to Ethene
D. Benzene to Ethyl Benzene

6. A. Draw the Newman projections (eclipsed and staggered) and figure out the stable conformation of 2, 3-Dichlorobutane. [2]
B. Base and nature of alkyl group can direct the reaction to E2 or E1 mechanism. Explain it. [2]
C. How can you prove that electrophilic aromatic substitution involves two steps? [2]
D. How does halogen affect in reactivity and orientation in electrophilic aromatic substitution? [2]
E. Synthesis of chiral compounds from achiral reactants always yields the racemic modification. Explain it. [2]

7. Write short notes on [4×2.5=10]
A. Phase transfer catalysis
B. Stability of carbocation
C. Diasteromers
D. Resolution of racemic modification