REV-01
BSC/04/09

2023/06

SET A

B.Sc. CHEMISTRY
SECOND SEMESTER
ORGANIC CHEMISTRY-I
BSC – 201 [REPEAT]

[USE OMR FOR OBJECTIVE PART]

Duration: 3 hrs. Full Marks: 70

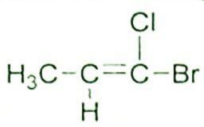
Objective

Time: 30 min. Marks: 20

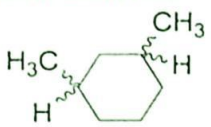
Choose the correct answer from the following: ***1×20=20***

1. An inductive effect refers to the movement of electrons through
   a. π bonds
   b. *p* orbitals
   c. non-polar bonds
   d. sigma bonds

2. Molecules which will exhibit geometrical isomerism



1



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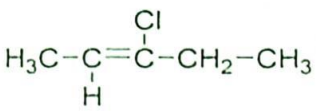
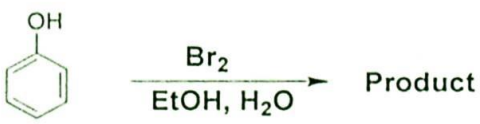
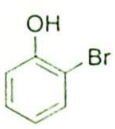


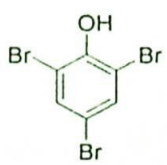
3

   a. 2 & 3
   b. 1, 2 & 3
   c. 1 & 2
   d. 1 & 3

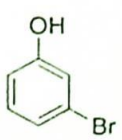
3. Which one is the product of the following reaction?



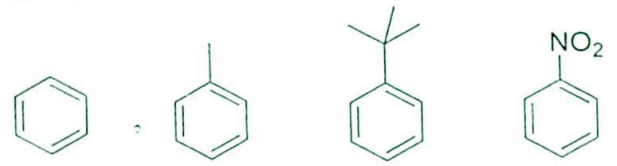
a. 

b. 

c. 

d. 

4. Identify the correct order of reactivity in electrophilic aromatic substitution reaction from the following compound.

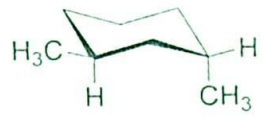


i) ii) iii) iv)

a. ii > iii > iv > i
b. ii > i > iii > iv
c. iii > ii > i > iv
d. iii > ii > iv > i

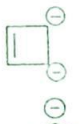
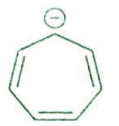
5. The major product of dehydration of 2-Methyl-2-Butanol with conc. H_2SO_4 is
a. $(CH_3)_2C{=}CHCH_3$
b. $CH_3CH{=}CHCH_2CH_3$
c. $H_2C{=}C(CH_3)CH_2CH_3$
d. $(CH_3)_3C{=}CH_2$

6. What is the IUPAC name for the following compound?

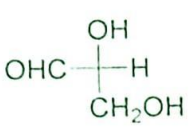


a. Dimethyl cyclohexane
b. 1,3-Dimethylcyclohexane
c. Cis-1,3-dimethylcyclohexane
d. Trans-1,3-dimethylcyclohexane

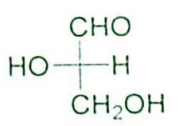
7. Which one is NOT Aromatic?

a. 
b. 
c. 
d. 

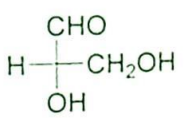
8. Which of the following are D-glyceraldehyde?



x



y



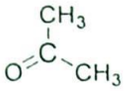
z

a. x and y
b. y and z
c. x only
d. y only

9. AntiMarkovnikov addition of HBr is not observed in
   a. Propene
   b. 1-Butene
   c. 2-Butene
   d. 1-Pentene

10. Predict the product formed in the following reaction

$$H_3C-C\equiv C-H \quad + \quad H_2O \xrightarrow{H_2SO_4} \quad ?$$

   a. 
   b. $CH_3CH=CHCH_3$
   c. $CH_3CH=C(OH)CH_3$
   d. $CH_3CH=CHCH_2OH$

11. 2-Butene on hydroboration followed by treatment with alkaline H_2O_2 gives
   a. 1-Butanol
   b. 2-Butanol
   c. Butanal
   d. None of these

12. The Diels-Alder reaction is a
   a. $2\pi + 2\pi$ Cycloaddition
   b. $2\pi + 4\pi$ Cycloaddition
   c. $4\pi + 4\pi$ Cycloaddition
   d. $4\pi + 6\pi$ Cycloaddition

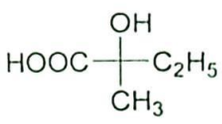
13. Carbocations are
   a. carbon atoms with a negative charge
   b. carbon atoms with a positive charge
   c. carbon atoms with no charge
   d. any atom with a positive charge

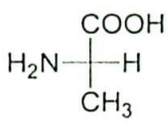
14. Total number of stereoisomers possible for the molecule CH_3-CH(OH)-CH=CH-CH_3 are
   a. 2
   b. 3
   c. 4
   d. 6

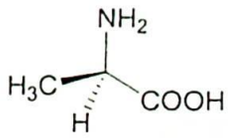
15. Bronsted-Lowry acids are defined as
   a. proton donors
   b. proton acceptors
   c. electron pair donors
   d. electron pair acceptors

16. The number of racemic forms of molecules having (n) number of chiral carbons is.
   a. 2n
   b. 2^n
   c. 2^{n-1}
   d. 2^{n+1}

17. The configuration of the following optical isomers


x


y

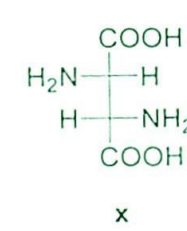

z

a. x→R, y→S, z→S
b. x→S, y→S, z→R
c. x→R, y→R, z→S
d. x→R, y→R, z→R

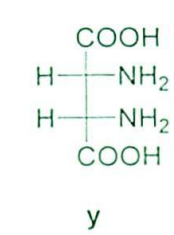
A conjugate base results from
a. an acid losing a proton
b. a base accepting a proton
c. an acid gaining a proton
d. a base accepting an electron pair

Dehydrohalogenation of 2-Bromobutene with alc.KOH gives mainly
a. 1-Butene
b. 2-Butene
c. 2-Methylpropene
d. 2-Butanol

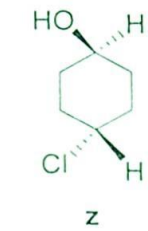
Which of the following molecules are optically inactive?



x



y



z

a. y and z
b. x and y
c. x and z
d. y only

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Descriptive

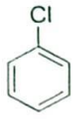
Time : 2 hrs. 30 mins. Marks : 50

[Answer question no.1 & any four (4) from the rest]

1. a. Discuss about the relative reactivities of alkanes towards halogenations. 4+6=10

   b. Predict the products formed in the following reactions.

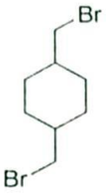
(i) $CH_3CH_2Br + 2Na + CH_3Br \xrightarrow{\text{Dry ether}} ?$

(ii)  $+ 2Na + CH_3CH(Cl)CH_3 \xrightarrow{\text{Dry ether}}$

(iii)  $\xrightarrow[\text{Dry ether}]{Na} ?$

(iv) $(C_2H_5)_2CuLi + CH_3CH_2CH_2Br \longrightarrow$

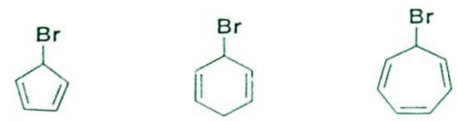
(v) $C_2H_5COONa + NaOH \xrightarrow[\triangle]{CaO} ?$

(vi)  $\xrightarrow[\text{Dry ether}]{Na} ?$

2. a. What is Wurtz reaction? Explain with suitable mechanisms. What are the advantages and disadvantages of Wurtz reaction? 6+4=10

   b. What is Wurtz-Fittig reaction? Explain the mechanism of the reaction with suitable examples. ...

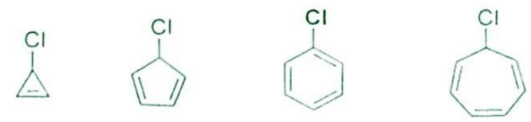
a. Which one of the following compounds will give precipitation in the presence of $AgNO_3$? Justify your answer. 3+3+4 =10



(I) (II) (III)

b. What is Annulene? Write the structure of 8-annulene and comment whether it is aromatic, antiaromatic or nonaromatic.

c. Which of the following compounds will react with $SbCl_5$? Justify your answer.



(I) (II) (III) (IV)

a. What is Diels-Alder reaction? Explain with examples. 3+4+3= 10

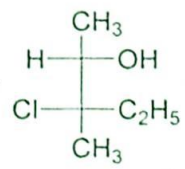
b. What is Hoffmann and Saytzeff rule? Explain with examples about the use of these two rules.

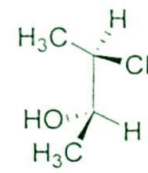
c. Explain with examples about the Markovnikov's and anti-Markovnikov's addition of alkenes.

a. Define specific rotation of an optically active compound. 2+3+3+ 2=10

b. 30 mg of an optically active compound dissolved in 1 cm^3 ethanol solution in 10 cm long polarimeter cell, gave optical rotation (-) 4.2 ° at 20 °C. Find the specific rotation of the optically compound.

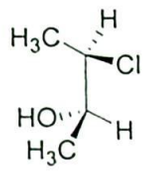
c. Convert the following structures:

(i) 

to Newman's projection (ii) 

to

d. Assign R and S configurations for chiral centres in the following molecule



6. a. Explain homolytic and heterolytic fission with examples. 2+3+3+2=10

b. What are nucleophiles? How are they generated? Which of the following are nucleophiles? $AlCl_3$, CH_3OH, $FeBr_3$, SO_3

c. What are carbenes? Explain singlet and triplet carbenes.

d. Define the following with examples

(i) addition reaction and (ii) substitution reaction

7. a. What is Mesomeric effect? Give one example of a system this effect is operative. 3+3+4=10

b. What is Resonance effect? What is the essential difference between Inductive effect and Resonance effect?

c. Define hyperconjugation. What do you mean by isovalent and heterovalent hyperconjugation? Explain with suitable examples.

8. a. Draw Newman's projection for Chair and boat conformations of cyclohexane. Mention axial and eqiutorial bonds of cyclohexane. 3+3+4=10

b. Why chair conformation of cyclohexane is more stable compared to boat conformation? Explain.

c. Discuss in details conformations of methyl cyclohexane. Present these forms in Newman's projection. Draw energy profile of inter conversions of these forms with explanations.

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