'समानो मन्त्रः समितिः समानी'

UNIVERSITY OF NORTH BENGAL

B.Sc. Major 1st Semester Examination, 2023

UCHEMAJ11001-CHEMISTRY

ORGANIC CHEMISTRY

Time Allotted: 2 Hours | Full Marks: 40

The figures in the margin indicate full marks.

GROUP-A

1. Answer any ***five*** questions from the following: 2×5 = 10

   (a) What is Markovnikov's rule?

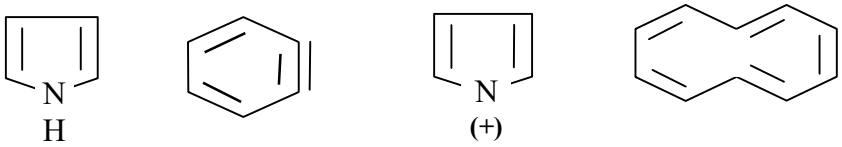
   (b) State two major differences between E1 and E1cB reactions.

   (c) In presence of peroxide, HCl and HI do not give anti-Markownikoff addition to alkenes. Why?

   (d) What is the role of conc. H_2SO_4 in mixed acid nitration?

   (e) Why carboxylic acids are stronger acids than phenols?

   (f) Identify the aromatic compounds:



   (g) Show that hyperconjugative structures of 2-butene.

   (h) Why cyclohexane is more resistant to ring opening than cyclopropane?

GROUP-B

2. Answer any ***four*** questions from the following: 5×4 = 20

   (a) (i) Write down the mechanism of E2 reactions. 'E1 reactions often go through rearrangement'. Cite one example. 3

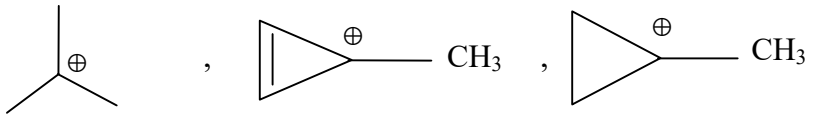
   (ii) 'Friedel-Crafts acylation requires an excess of Lewis acid catalyst' — Why? 2

   (b) (i) How would you prepare *cis*-1,2-cyclohexane diol from cyclohexane? Why the *cis* form is more stable than *trans* form? 3

   (ii) What is syn elimination? Give one example. 2

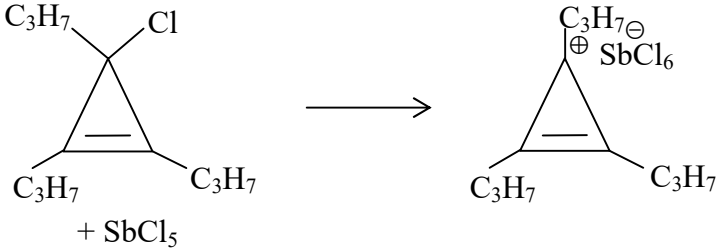
   (c) (i) How would you justify the statement "Bromination is more selective than chlorination of alkanes"? 3

(ii) Arrange the following carbocations in order of increasing stability with proper reasoning: 2

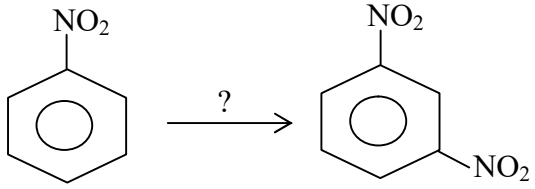


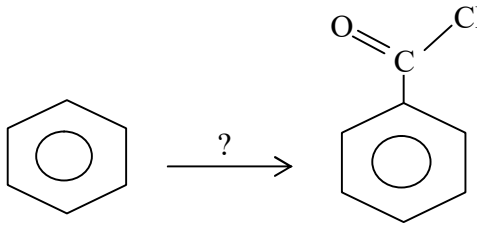
(d) (i) Aniline is more basic than 4-nitroaniline — Explain. 2

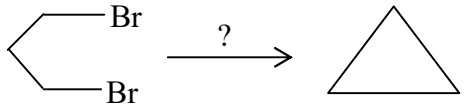
(ii) Justify the formation of highly stable carbocation in the following reaction: 3

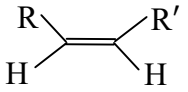


(e) Complete the following reactions. 1×5 = 5

(i) 

(ii) 

(iii) 

(iv) $R - C \equiv C - R'$ $\xrightarrow{?}$ 

(v) $CH_3CH_2OH \xrightarrow{?} CH_2 = CH_2$

(f) (i) Benzoic acid is *m*-directing in aqueous or acidic medium, but *o*,*p*-directing in presence of base. Explain the fact. 2

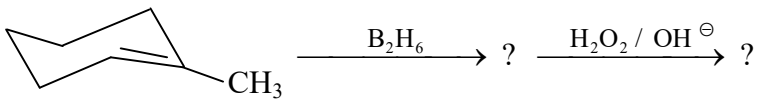
(ii) Compound (A) $C_6H_{14}O$, on treatment with hot H_2SO_4 yields an unsaturated compound (B) C_6H_{12} which on ozonolysis gives mixture of carbonyl compounds (C) C_3H_6O and (D) C_3H_6O. 3

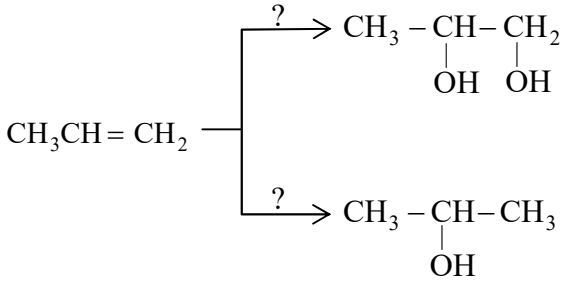
Deduce the structure of A, B, C and D.

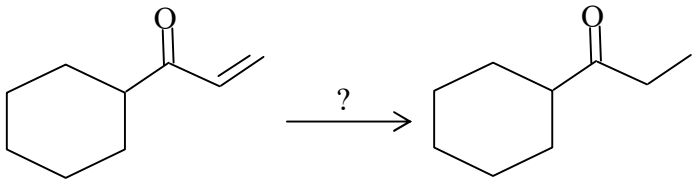
GROUP-C

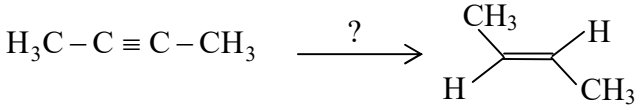
3. Answer any ***one*** question from the following: 10×1 = 10

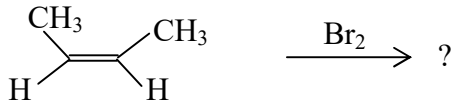
(a) Carry out the following transformation with logical mechanism: 2×5 = 10

(i) 

(ii) 

(iii) 

(iv) 

(v) 

(b) (i) Cyclopentadiene reacts readily with base, while cycloheptatriene does not. How can you account for the difference? 2

(ii) Treatment of benzene with cold H_2SO_4 gives benzene sulfonic acid, the treatment of latter with 50% H_2SO_4 at 150°C regenerates benzene. Why? 2

(iii) Write short notes: (any ***two***) 3×2 = 6

(I) Ozonolysis

(II) Baeyer Strain Theory

(III) Aromatic electrophilic substitution.

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