

Total Pages : 7

End Semester Examination of Semester-III, 2015

Subject : CHEMISTRY (HONS.)

Paper : CEMH-301

Full Marks : 40

Time : 2 Hrs

The figures in the margin indicate the marks corresponding to the question

Candidates are requested to give their answers in their own word as far as practicable.

Illustrate the answers wherever necessary.

Use separate Answer scripts for Group A and Group B

Group A (Organic) (Marks : 20)

Group A(a)

Answer any one question 10x1=10

1. a) cis-2-butene $\xrightarrow{\text{Br}_2}$

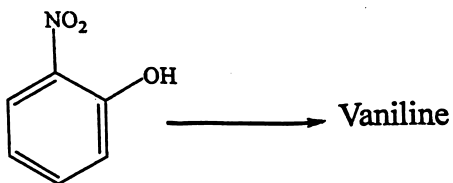
Predict the product(s). From the stereo-chemical results of bromination how would you establish that these addition involve cyclic bromination instead of open carbocation intermediate. 3

b) In Perkin reaction, when benzaldehyde is treated with acetic anhydride in presence of sodium acetate, styrene is formed as side product. Explain its formation. 2

(2)

c) Convert :

2



OR

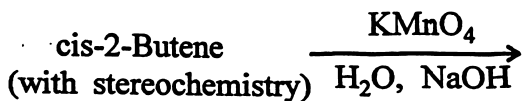


d) Naphthalene undergoes electrophilic substitution preferentially at 1-position. Why? 2

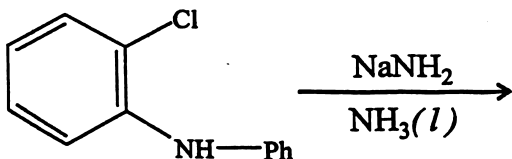
e) Acetylacetone gives (+)ve haloform test but not Ethylaceto acetate. Explain. 1

2. a) Discuss the reaction of 1, 3-Butadiene with HBr in absence of air with an energy profile diagram. 2

b) Predict the product : 2

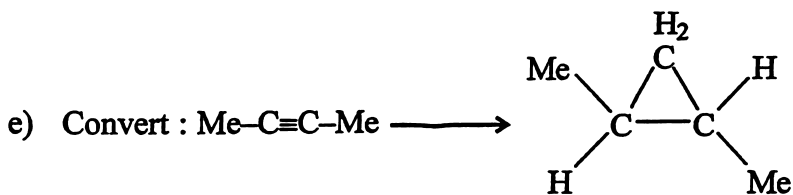


OR

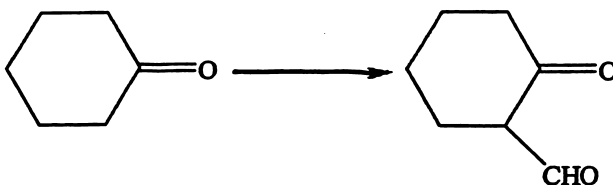


(3)

- c) Acidic hydrolysis of Birch Reduction product of Anisole gives 2-cyclohexanone – suggest a mechanism. 2
- d) Acylation of Naphthalene with acetylchloride and AlCl_3 in nitrobenzene give methyl-2-naphthyl ketone as the major product whereas in CS_2 the major product is methyl 1-naphthyl ketone. Explain. 2



OR



(By storkeanamine reaction)

Group A(b)

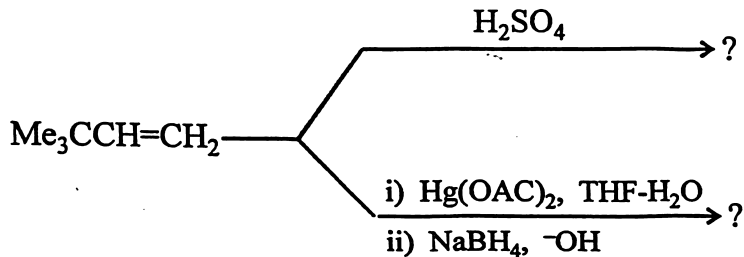
Answer any one question

6X1=6

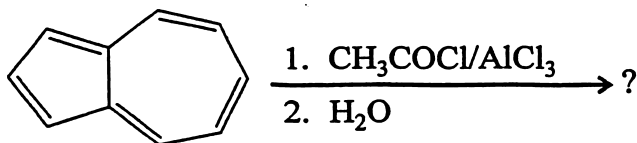
3. a) When treated with aqueous solution of bromine both p-hydroxy benzoic acid and p-hydroxy benzene sulfonic acid yield the same product – explain. 3

(4)

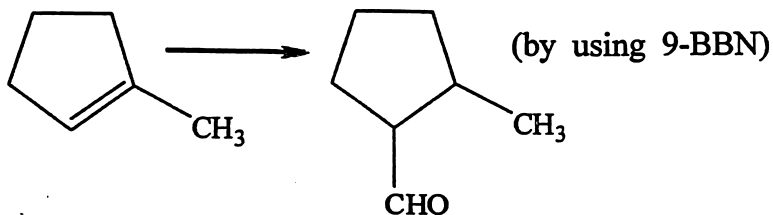
b) Write down the product with explanation. 3



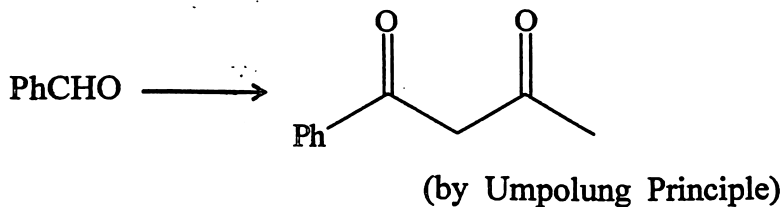
4. a) Predict the product : 2



b) How would you convert : 2



OR



(5)

- c) Benzoic acid undergoes reaction at m-position in acidic solution but at -o, -p in presence of a base. Why? 2

Group A(c)

Answer any two question 2x2=4

5. The addition rate of bromine to ethylene increases by addition of $AlBr_3$ but decreases by addition of KBr — Explain. 2
6. The $-NHCOCH_3$ group activates the ring in acetanilide, whereas deactivates the ring in 2, 6-dimethyl acetanilide towards electrophilic reaction — explain. 2
7. How would you establish that attacking entity of Reimer-Tiemann reaction is $:CCl_2$? 2

8. (s)-4-chloro-3-pentanone $\xrightarrow{LiAlH_4}$
Explain the formation of major product by Cram's rule. 2

Group B (Inorganic) (Marks : 20)

Group B(a)

Answer any one question 10x1=10

1. i) Balance the following equation by ion-electron method :
 $P + OH^- + H_2O \rightarrow PH_3 + H_2PO_2^-$ 2 $\frac{1}{2}$
- ii) How is borazine prepared in the laboratory? Why it is more reactive than benzene? 2 $\frac{1}{2}$

iii) SiHCl_3 boils at lower temperature than CHCl_3 — Why?

 $2\frac{1}{2}$

iv) NH_3 is a good donor while PH_3 is not — Comment.

 $2\frac{1}{2}$

2. i) Covalent azides are explosives while ionic azides are stable. Rationalize.

 $2\frac{1}{2}$

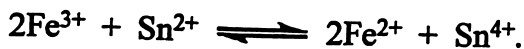
ii) Prove that the six hydrogen atoms of B_2H_6 are non-equivalent.

 $2\frac{1}{2}$

iii) SiF_6^{2-} is readily formed but SiCl_6^{2-} is not — Why?

 $2\frac{1}{2}$

iv) Determine the equilibrium constant of the following redox reaction at 298 K



Given; $E^0_{\text{Fe}^{3+}/\text{Fe}^{2+}} = 0.77\text{V}$; $E^0_{\text{Sn}^{4+}/\text{Sn}^{2+}} = 0.15\text{V}$. $2\frac{1}{2}$

Group B(b)

Answer any one question

6x1=6

3. i) Will Cu^+ ion disproportionate in aqueous solution?

Given $E^0_{\text{Cu}^+/\text{Cu}} = 0.52\text{V}$; $E^0_{\text{Cu}^{2+}/\text{Cu}^+} = 1.15\text{V}$ $2\frac{1}{2}$

ii) Pb(IV) is highly oxidising but Pb(II) is stable. Comment.

 $2\frac{1}{2}$

iii) What is inorganic rubber?

1

4. i) Both NO and NO₂ are odd electron molecules. The latter readily dimerises but the former does not – why? $2\frac{1}{2}$
- ii) ¹⁹F NMR study considers equivalent nature of all the five F-atoms in PF₅. Explain. $2\frac{1}{2}$
- iii) What is PTFE? 1

Group B(c)

Answer any two question

2x2=4

5. Establish Nernst equation for the following redox process :
 $\text{AsO}_4^{3-} + \text{H}^+ \rightarrow \text{AsO}_3^{3-}$ 2
6. BH₃ forms adduct with CO but BF₃ does not. Explain. 2
7. PCl₅ exists but PH₅ does not — why? 2
8. SiCl₄ readily undergoes hydrolysis but CCl₄ does not. Comment. 2
-