'समानो मन्त्रः समितिः समानी'

UNIVERSITY OF NORTH BENGAL

B.Sc. Honours 3rd Semester Examination, 2022

CC6-CHEMISTRY

ORGANIC CHEMISTRY-II

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: 1×5 = 5

(a) Which of the following S_N1 reactions would you expect to take place more rapidly and why?

(i) $(CH_3)_3C-I+CH_3OH \rightarrow (CH_3)_3COCH_3+HI$

(ii) $(CH_3)_3C-Cl+CH_3OH \rightarrow (CH_3)_3COCH_3+HCl$

(b) Pyridine unlike benzene undergo faster aromatic nucleophilic substitution reaction. Why?

(c) Halocyclopropanes are unreactive towards S_N2 pathway. Why?

(d) Which solvent do you prefer to work with LAH?

(e) Aromatic hydrocarbons are often identified using picric acid. Why?

(f) Why cyanide ion is regarded as a unique reagent for benzoin condensation?

(g) Why does the dehydration of $CH_3CH(OH)CH_2CHO$ occur readily in presence of base on heating?

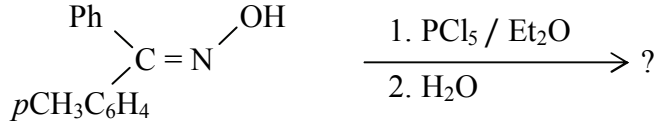
(h) Explain the reaction of pyrrole with methyl magnesium iodide.

GROUP-B

2. Answer any ***three*** questions from the following: 5×3 = 15

(a) (i) Explain why the hydrolysis of methyl chloride with aqueous NaOH is essentially irreversible. $2\frac{1}{2}\times2=5$

(ii) Predict the product of the following reaction:



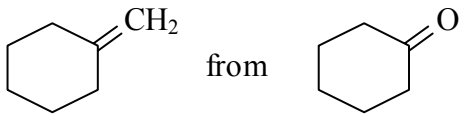
(b) (i) With the help of examples how can you justify the higher reactivity of organolithium than the Grignard reagent? 3

(ii) $EtSCH_2CH_2Cl$ undergoes hydrolysis very much faster than $EtOCH_2CH_2Cl$. Explain. 2

(c) (i) What are ylides? Why are sulphur ylides more stable than nitrogen ylides? 2

(ii) How can you differentiate between 3-pentanone and 2-pentanone by a chemical test? $1\frac{1}{2}$

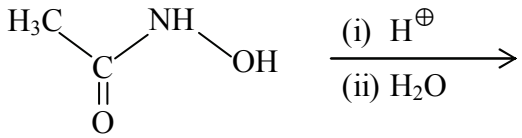
(iii) Show the scheme of preparation of $1\frac{1}{2}$



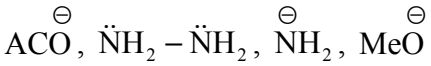
(d) Predict the products with suitable mechanism: $2\frac{1}{2} \times 2 = 5$

(i)

(ii)



(e) (i) Arrange the following nucleophiles with increasing order of nucleophilicity: $2\frac{1}{2}$



Justify your order of choice.

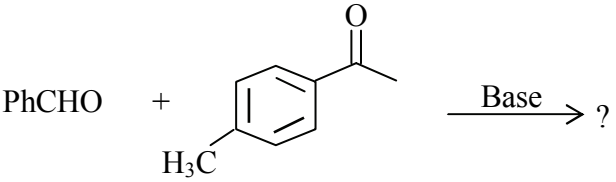
(ii) Explain why benzene diazonium chloride couples with N, N-dimethyl aniline but not with its 2, 6-dimethyl derivative. $2\frac{1}{2}$

GROUP-C

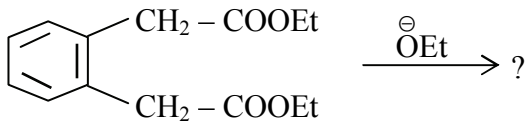
3. Answer any ***two*** questions from the following: $10 \times 2 = 20$

(a) Predict the product(s) and suggest plausible mechanism: $2\frac{1}{2} \times 4 = 10$

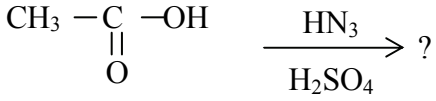
(i)



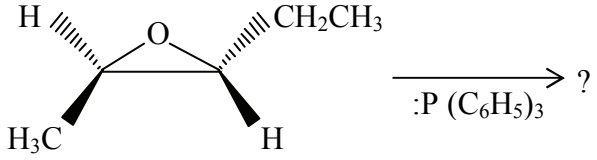
(ii)



(iii)

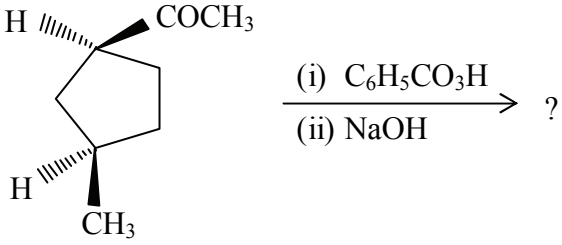


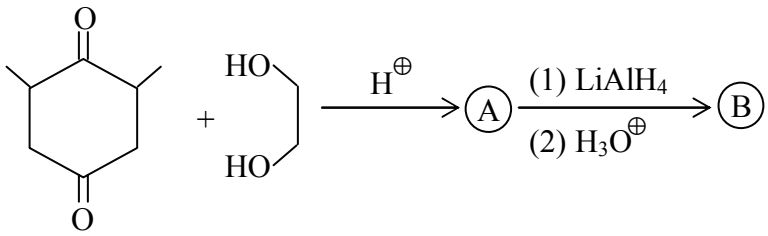
(iv)



(b) (i) Compare the effectiveness of acetate, phenoxide and benzene sulfonate anions as leaving group if the strength of their conjugate acids are given by their pK_a values of 4.5, 10.0 and 2.6 respectively. 2

(ii) Carry out the following transformations with mechanism: $2\frac{1}{2} \times 2 = 5$





(iii) What happens when benzil undergoes base-catalysed rearrangement reaction in presence of MeONa instead of NaOH? 3

(c) (i) How does CH_3COCl and $CH_3CH = O$ differ when reacted with HCN. $2\frac{1}{2} \times 4 = 10$

(ii) How would you proceed to synthesize $CH_3\ CH = CHCOOH$ from CH_3COOH using a Grignard reagent as an intermediate?

(iii) Explain why acetamide cannot be used for acetylating organic compounds.

(iv) Convert ethylene into succinic acid.

(d) (i) Starting from suitable substrates give a synthesis of dimedone. Give mechanism for the steps involved. 7

(ii) Starting from acetaldehyde suggest a synthetic route to Pentaerythritol. 3

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