2017

3rd Semester

CHEMISTRY

PAPER—C6

(Honours)

Full Marks : 40 *Time : 2 Hours*

The figures in the right-hand margin indicate full marks.

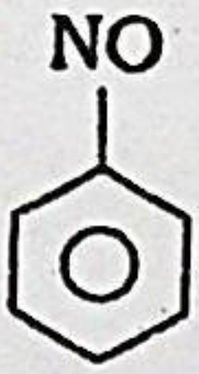
Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Core Paper-VI

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

(a) Predict the favoured position of electrophilic substitution of the following compounds.

(i) 

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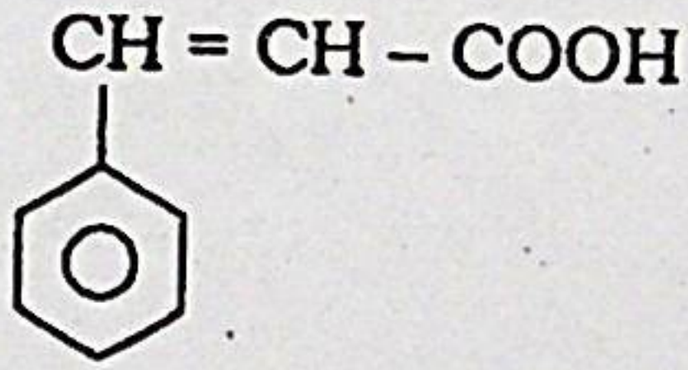
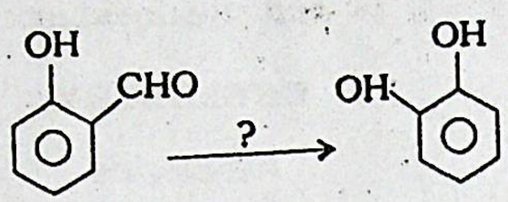
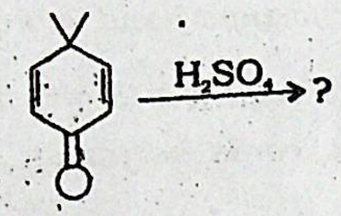
(ii) 

(b) Identify the missing reagent/s in the following conversion:

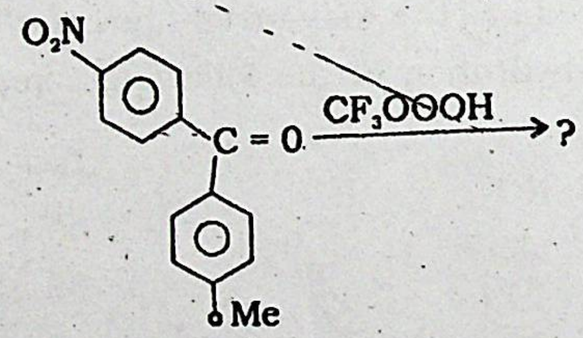


(c) Write down the product in the following reaction:



(d) Write down the increasing acid strength order of different nitrophenols.

(e) Complete the following reaction.



(f) What will be the major product when di isopropyl benzene is subjected to nitration reaction?

(g) Suggest a suitable product of the following reaction:

$$CH_3\overset{O}{\overset{\|}{C}} - OH + CH_2N_2 \longrightarrow ?$$

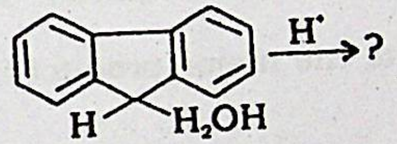
(h) Give product(s) of the following reaction :

$$Ph - O - \overset{O}{\overset{\|}{C}} - CH_3 \xrightarrow[EtOH]{h\gamma} ?$$

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

(a) How can you distinguish chemically between N-Methyl aniline and N, N-dimethyl aniline?

(b) Write the product with mechanism of the following reaction :

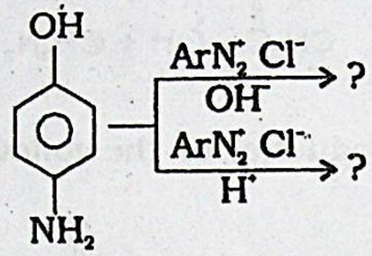


(c) Predict the structures of X and Y :

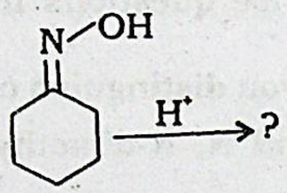
$$\text{O-Xylene} \xrightarrow[EtOH]{Na/NH_3(l)} X \xrightarrow[2.\ Zn/H_2O]{1.\ O_3(2\ moles)} Y$$

(d) Give experimental evidence for the intramolecular nature of Benzidine rearragement reaction.

(e) Identify the products in the following reaction :

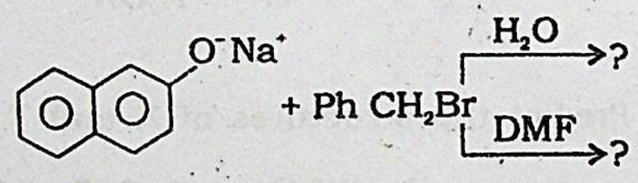


(f) Predict the product in the following reaction :



(g) In Arndt-Eistert synthesis, two equivalents of diazomethane is required. Why?

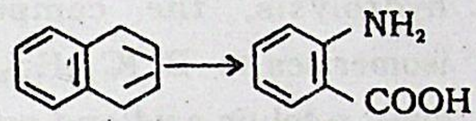
(h) Indicate the major product in the following reaction:



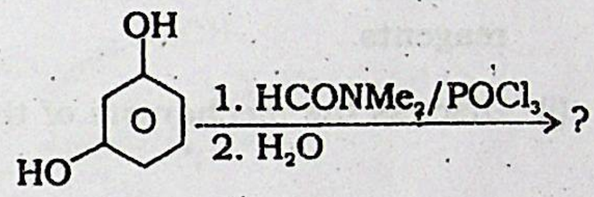
3. Answer any *three* questions from the following : 3×5

(a) (i) Predict the most suitable conditon for the coupling of benzene diazonium chloride with P-toluidine at O°C to obtain the best possible yield. Give proper reasons.

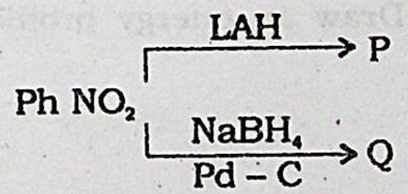
(ii) Carryout the following transformation using Hofmann rearrangement : 3+2



(b) (i) Predict the product of the following reaction and give suitable mechanism :



(ii) What are P & Q? 3+2



(c) (i) What happens when p-bromonitrobenzene is treated with KCN in aqueous ethanol at 150°C?

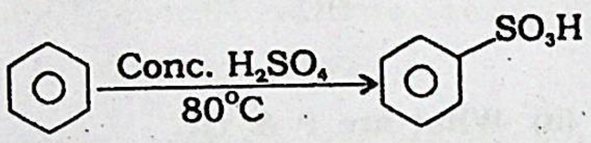
Explain the formation of the product with mechanism.

(ii) p-Nitroaniline has considerable dipole moment value. Why? 3+2

(d) (i) When treated with PCl_5 in ether followed by hydrolysis, the compound 'A' ($C_{14}H_{13}NO$) isomerises to 'B' ($C_{14}H_{13}NO$). The compound 'B' gives p-toluic acid and aniline on hydrolysis with dilute acid. Deduce the structures of 'A' and 'B'.

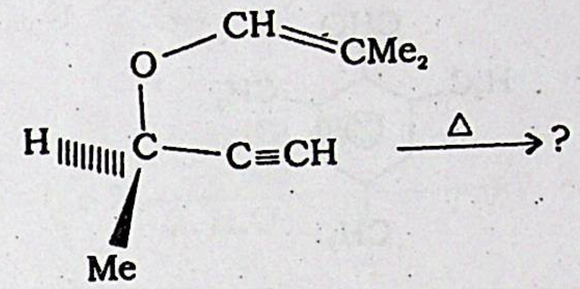
(ii) Outline Haworth synthesis for naphthalene starting from benzene using other needed reagents. 3+2

(e) (i) Discuss the mechanism of the following reaction:



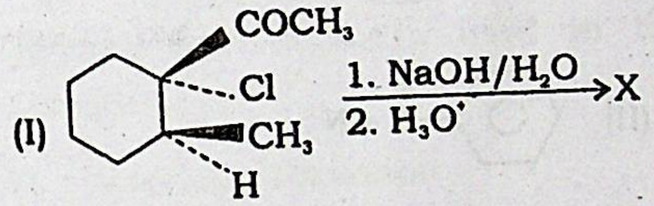
Draw an energy profile for the above reaction.

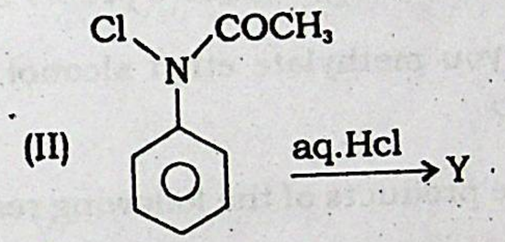
(ii) Predict the product with proper mechanism. 3+2



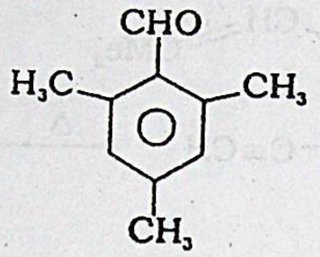
4. Answer any *one* question : 1×10

(a) (i) Write down the products X and Y in the following reactions and explain their formation with mechanism :

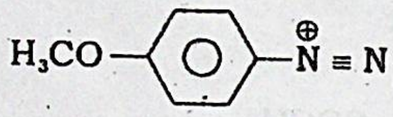


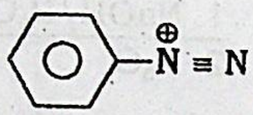


(ii) How can you prepare the following compound from mesitylene?



(iii) Between the two diazonium cations, which one undergoes nucleophilic displacement of nitrogen at a faster rate? Explain.

(I) 

(II) 

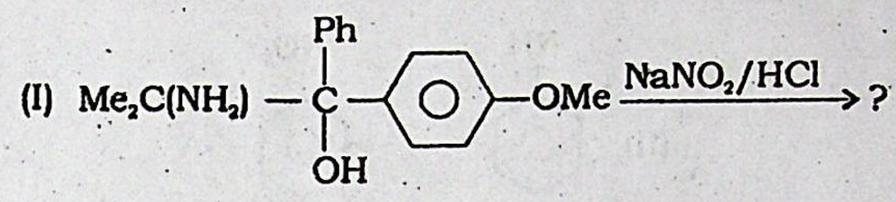
(3+3)+2+2

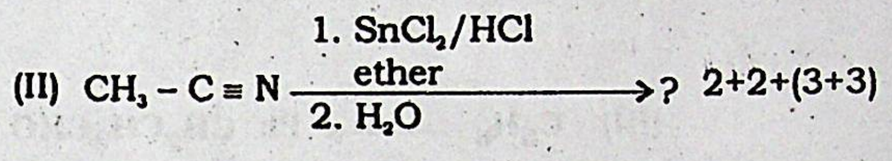
(b) (i) What happens when 1, 2–diamino benzene is treated with $NaNO_2/HCl$ (Give proper mechanism)

(ii) How can you methylate ethyl alcohol by the use of CH_2N_2?

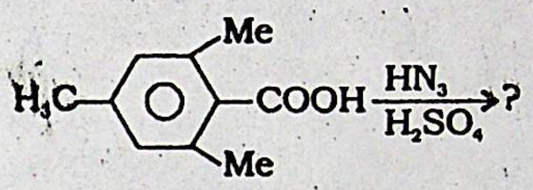
(iii) Predict the products of the following reactions and give mechanism in each case.

KN

(I) 

(II) 

(c) (i) Identify the Product/s in the following reaction :

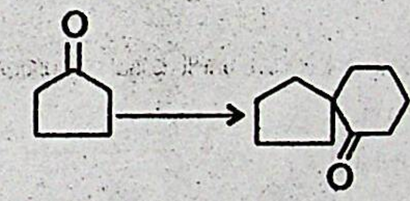


(ii) Indicate the reagent/s used in the following reactions :

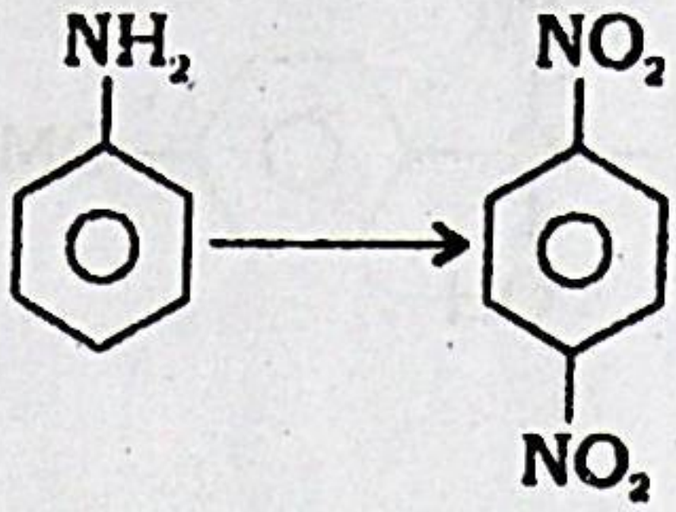
(I) Oppenaur Oxidation

(II) Gatterman—Koch

(iii) Carryout the following conversions :

(I) 

(II)



(III) $C_6H_6 \longrightarrow Ph\ CH_2CH_2CHO$

2+(1+1)+(2+2+2)
