2018

(October)

CHEMISTRY

(Honours)

(Part-B : Organic Chemistry—I)

(Chem-H-501)

Marks : 37

Time : 2 hours

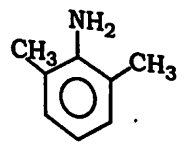
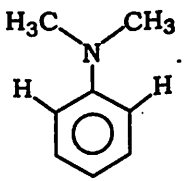
The figures in the margin indicate full marks for the questions

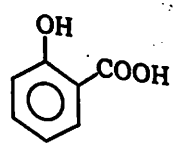
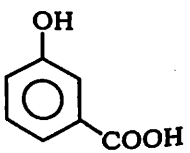
1. *(a)* Lewis concept of acids and bases is more comprehensive than Brönsted-Lowry concept. Explain with example. 2

(b) Arrange the following acids in order of increasing acidity with appropriate explanation : 2

$Cl—CH_2—COOH$, $Br—CH_2—COOH$, $I—CH_2COOH$

(c) Arrange the following in order of increasing basicity or acidity with reasons : $1\frac{1}{2}\times2=3$

(i)  and 

(ii)  and 

(d) Which of the following acids is more acidic? Explain on the basis of H-bonding effect : 2

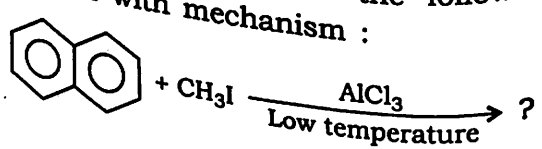
(i) Maleic acid

(ii) Fumaric acid

OR

2. (a) Electrophilic substitution reaction in naphthalene takes place preferentially at α-position. Explain. 2

(b) Suggest the product of the following reaction with mechanism : 2



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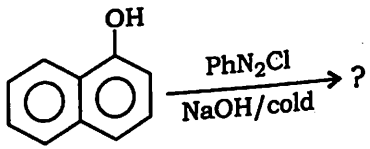
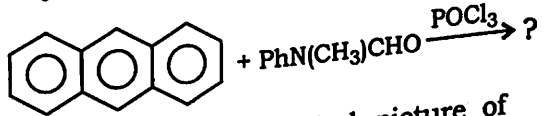
(c) Give the method of preparation of anthracene from benzene using Haworth method. 2

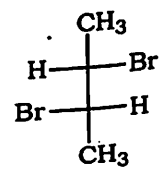
(d) Complete the following reactions : $1\times2=2$

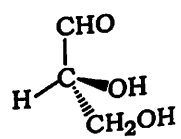
(i) 

(ii) 

(e) Draw the molecular orbital picture of naphthalene. 1

3. (a) Assign *R* and *S* for the following optical isomers : $1\times2=2$

(i) 

(ii) 

(b) Draw the Newman projection formula of the different conformers of *n*-butane. Sketch the energy diagram of the conformers, and from it deduce the most stable conformer. $1\frac{1}{2}+1+\frac{1}{2}=3$

(Turn Over)

(c) Draw all the conformers of 1,4-dichloro-cyclohexane. Which is the most stable and why? 1+1=2

(d) Write a short note on relative and absolute configurations. 2

OR

4. (a) What are dienes? Classify them giving example in each case. 1+1=2

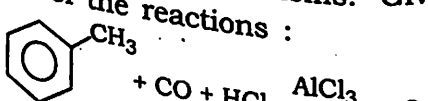
(b) Give one method of preparation each of 1,3-butadiene and isoprene. 1+1=2

(c) Write a stepwise free radical polymerization of polyethylene from ethylene. 3

(d) Give one method of preparation of Dacron. 2

5. (a) Suggest a reaction mechanism for an acid assisted cleavage of acetals. 2

(b) Predict the product of the following reactions with mechanisms. Give the names of the reactions : 2×3=6

(i) 

(ii) $CH_3CHO + CH_2(COOC_2H_5)_2 \xrightarrow[2)\ H_3O^+/\Delta]{1)\ \text{Pyridine}} ?$

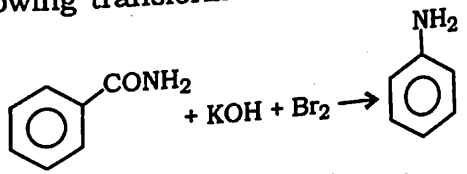
(iii) $C_6H_5CH{=}CH{-}CHO + Ph_3P{=}CH_2 \longrightarrow ?$

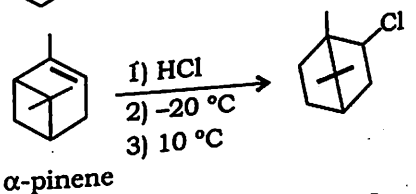
(Continued)

(c) Why is $NaBH_4$ more selective than $LiAlH_4$? 1

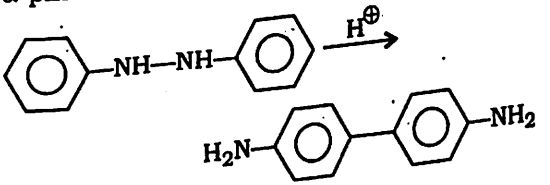
OR

6. (a) Propose a suitable mechanism for the following transformations : 2×3=6

(i) 

(ii) 

α-pinene

(iii) 

(b) Give one application each for the following with reactions : 1½×2=3

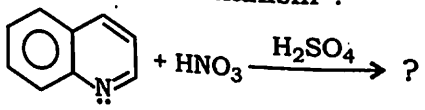
(i) Lead tetraacetate

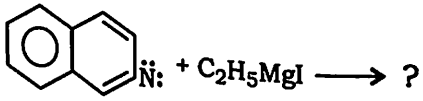
(ii) $KMnO_4$

7. (a) How is indole prepared by Fischer synthesis? 3

(Turn Over)

(b) Suggest the products of the following reactions with mechanism : 2×2=4

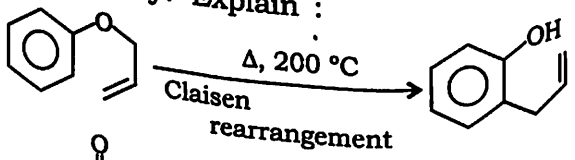
(i) 

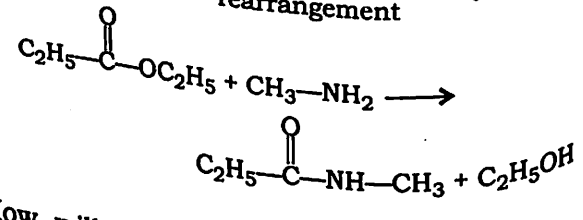
(ii) 

(c) State and explain any two basic principles of green chemistry. 1½+1½=3

OR

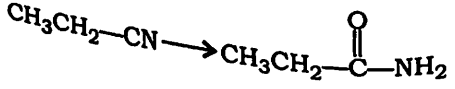
8. (a) Which of the following reactions is not atom economy? Explain : 2

(i) 

(ii) 

(b) How will you carry out the following conversions? 1½×4=6

(i) Aniline to phenol

(ii) 

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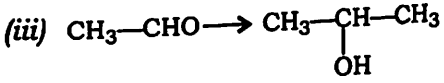
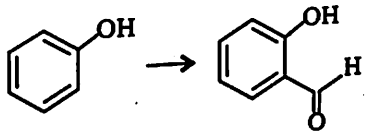
(iii) 

(iv) 

(c) What are solid-state reactions? Cite an example. 2

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