বিদ্যাসাগর বিশ্ববিদ্যালয়

VIDYASAGAR UNIVERSITY

Question Paper

B.Sc. Honours Examinations 2020

(Under CBCS Pattern)

Semester - I

Subject: CHEMISTRY

Paper : C 1-T & C 1-P

Organic Chemistry - I

Full Marks : 60 (Theory-40 + Practical-20)

Time : 3 Hours

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

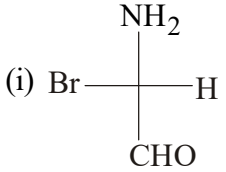
Answer any ***two*** questions : $2 \times 20 = 40$

1. (a) Write significance of DBE. Calculate DBE of the compound $C_7H_5NO_3$.

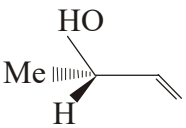
   (b) Define enantiomeric excess (ee). If a mixture shows 97% ee what would be the ratio of two isomers ?

   (c) Define specific rotation and explain the terms.

   (d) Give R & S-nomenclature of the following compounds.

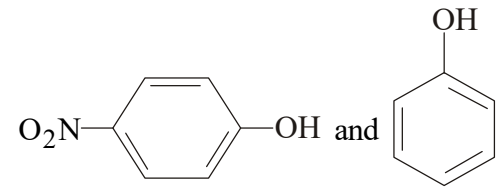


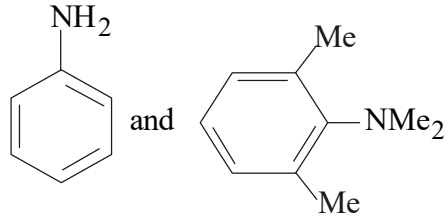
(i)



(ii)

(e) Compare the acidity and basicity of the following compounds.

(i) 

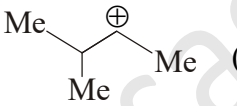
(ii) 

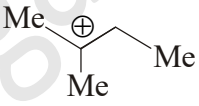
(f) Define dipole moment and give its unit in SI unit.

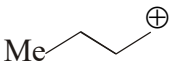
(g) State and explain the stability of carbenes.

(h) What is racemization ? Chiral amino acid recemizes on treatment with base — explain.

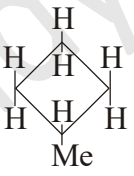
(i) Give stability order of the following carbocations with explanation.

(i) 

(ii) 

(iii) 

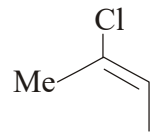
(j) Label the chemically non-equivalent protons in methyl cyclobutane (A).

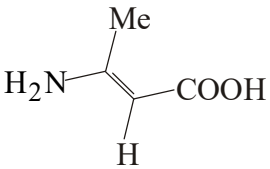


(A)

2. (a) Draw conformation diagram of n-butane C_2 and C_4 rotation. 4

(b) Give E/Z-nomenclature of the two compounds

(i) 

(ii) 

2+2

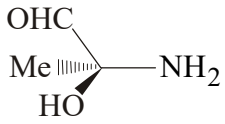
(c) Explain (any two) :

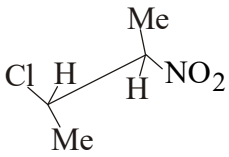
(i) Conformation

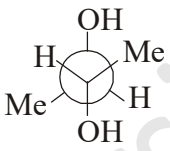
(ii) Dihedral angle, and

(iii) Torsional strain. 2+2

(d) Convert the following projection formula into Fischer projection formula :

(i) 

(ii) 

(iii) 

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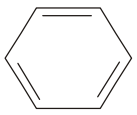
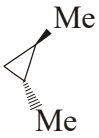
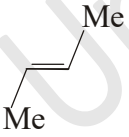
(e) Helium does not form He_2 but hydrogen form H_2 — Explain. 2

3. (a) What symmetry elements and point groups are present in following compounds?

(i) 
(ii) 

(iii) 

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(b) Give boiling point order for the following compounds with explanation :

i) l-Butene,

ii) *cis*-butene and *trans*-butene 4

(c) Explain Resonance with an example. Heat of hydrogenation of cyclohexene and benzene are 28.5 Kcal/mol and 49.0 Kcal/mol. Resonance stability of Benzene is 36 Kcal/mol. Correlate the result. 4

(d) Compare between VB theory and MO theory. 3

(e) Why S_N^2 nucleophilic substitution is called Umbrella inversion? Justify mechanistically. 3

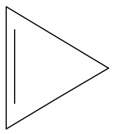
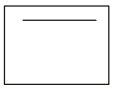
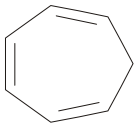
4. (a) Draw MO of buta-2-diene. Explain Ground state and excited state HOMO and LUMO. 5

(b) Define homolytic and heterolytic cleavage. 2½

(c) How would you distinguish between *cis*- and *trans*- Olefiniccarboxylic acid by decarboxylation and dipole moment measurement ? 2½

(d) State Hückel rule of aromaticity ? 2

(e) How would you aromatize following molecules after forming to aromatic compounds?

(i)  (ii)  (iii)  (iv)  4

(f) Explain Singlet and triplet carbene addition to olefine. 4

Paper - C-1-P

(Practical)

Full Marks : 20

Answer any ***one*** of the following questions : $1 \times 20 = 20$

1. Write down the procedure for the identification of any one of the following organic compounds : 20×1

   (i) Benzaldehyde

   (ii) Urea

   (iii) Succinic Acid