বিদ্যাসাগর বিশ্ববিদ্যালয়

VIDYASAGAR UNIVERSITY

B.Sc. Honours Examination 2021

(CBCS)

1st Semester

CHEMISTRY

PAPER—C1T & C1P

ORGANIC CHEMISTRY – I

Full Marks : 60

Time : 3 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.

THEORY : C1T

Group – A

Answer any *three* questions. 3×12

1. (a) Draw the orbital picture of the following compounds.

(i) $CH_3 - CH = C = 0$

(ii) $CH \equiv C - CH = CH_2$.

(b) Draw π MOs of 1,3-butadiene. Indicate HOMO and LUMO.

(c) State Huckel's rule of aromaticity. What do you mean by aromatic and antiaromatic compounds ? 4+4+4

2. (a) Arrange the following compounds in order of increasing pK_a value and give reason.

Aniline, 4-nitroaniline, 2,6-dimethyl-4-nitroaniline, 3,5-dimethyl-4-nitroaniline.

(b) Arrange the following compounds in order of their increasing acid strength with explanation.

Benzoic acid, 2-hydroxybenzoic acid, 4-hydroxybenzoic acid, 2,6-dihydroxy benzoie acid.

(c) Arrange with proper explanation the following compounds in order of increasing dipole moment

$H_3C - H_2C - Cl, \quad HC \equiv C - Cl, \quad H_2C = CH - Cl$ 4+4+4

3. (a) What do you mean by enantiomers and diastereomers ? Illustrate with suitable examples.

(b) What do you mean by stereogenic centre ? Are centres of stereogenicity always centres of chirality ? Explain with suitable examples.

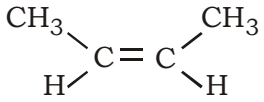
(c) Draw all the possible stereoisomers of

Et – CH = CH – CHBr – CH = CH – Et and mention whether they are R or S and optically active or not. 4+4+4

4. (a) Draw Fisher and sawhorse projection formula of mesotartaric acid. Inspite of unsymmetric carbon atom the molecule is not optically active. Explain.

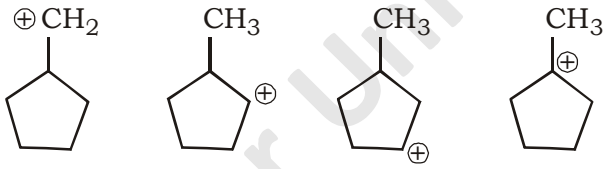
(b) Predict the symmetry elements present in the following molecules :

(i) $CH_2 = C = CH_2$

(ii) 

(c) How many conformers of 2-methylbutane are possible for rotation around $C_2 - C_3$ bond ? Represent them all in Newman projections and compare their relative stabilities. 4+4+4

5. (a) Explain and arrange the following in order of increasing stability.



(b) Define specific rotation and molar rotation. How they are related ?

(c) Draw all possible stereoisomers of the following compound and identify them as (R/S) and (E/Z) $CH_3CH(OH)CH = CHBr$. 4+4+4

6. (a) Arrange the followings, with reasons, as indicated below :

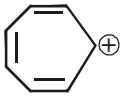
(i) I^-, F^-, Cl^-, Br^- (in the increasing order of nucleophilicity in aqueous solution)

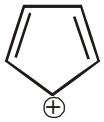
(ii) $\bar{O}H$, $\bar{O}C_2H_5$, $CH_3\,C\bar{O}O$ (in the increasing order of basic character)

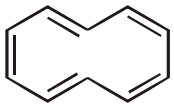
(b) Differentiate between SN_1 and SN_2 reaction with proper examples.

(c) Which of the following compounds are aromatic, antiaromatic and nonaromatic ? Justify your answer.

(i) 

(ii) 

(iii) 

(iv) 

(2×2)+4+4

Group – B

Answer any *two* questions. 2×2

7. Between  and  which is polar and why ?

8. Write down the structure of butane 2L, 3D-diol.

9. Between $(CH_3)_2\overset{\ominus}{C}H$ and $(CH_3)_3\overset{\ominus}{C}$ which is more reactive. Explain.

10. Arrange the following in increasing order of basicity

$HC \equiv \bar{C}$, $CH_3\bar{C}H_2$, $CH_2 = \bar{C}H$

PRACTICAL : C1P

CHEMISTRY LAB-I

Group – A

Answer any *one* question. 1×15

1. You are given a mixture of benzoic acid and p-toluidine. Write the separation procedure of these compound. 15

2. You are given any *one* of the following pure organic compound.

(i) Write the systematic analysis for grouping.

(ii) Confirmative tests.

(iii) Conclusion. 10+2.5+2.5

Benzoic acid, Salicylic acid, Ethanol, Acetone.

3. Write down the method and procedure for the determination of boiling point of anisole. 15

Group – B

Answer any *one* question. 1×5

4. How will you identify oxalic acid ?

5. How will you identify resorcinol ?

6. How will you identify nitrobenzene ?