UG/1st Sem/CHEM(H)/T/19

2019

B.Sc.

1st Semester Examination

# CHEMISTRY (Honours)

## Paper - C 1-T



Full Marks : 40 Time : 2 Hours

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

### Group - A

1. Answer any *five* questions : 5×2=10

   (a) Define non-classical carbocation with an example.

   (b) Show that the reaction of trans 2-butane with methylene obtained from diazomethane takes place in a stereospecific manner.

   (c) Calculate the double bond equvalent (D.B.E.) of the following : $C_{14}H_8O_2$ and $C_{10}H_{14}N_2$.

*[ Turn Over ]*

(d) What do you mean by homoaromaticity. Give an example.

(e) What do you mean by stereogenic centre ?

(f) Draw E and Z isomers of Butanone oxime and azobenzene.

(g) Determine symmetry point group of staggered ethane and 1, 3-dimethylallene

(h) What do you mean by "optical purity" and "enantiomeric excess" ?

**Group - B**

Answer any ***four*** questions : 5×4=20

2. (a) The bond dissociation energy of $Ph-CH_2-H$ bond is considerably smaller than that of $CH_3-H$ bond — Explain. 2

(b) Calculate formal charge of $CH_3$, $\dot{C}H_3$ and $\ddot{C}H_3$. 3

3. (a) Hyperconjugation is not observed in C—C bond in α-position with respect to carbocation — Why ? 2



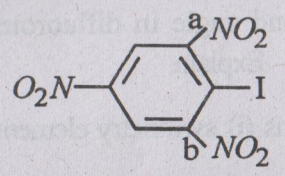
(b) Calculate the double bond equivalent of $C_7H_6O_2$, $C_3H_7N$ and $C_{10}H_7Cl$. 3

4. (a) Draw all stereo isomers of Pent-3-ene-2-ol. Which of these are enantiomers ? 2+1

(b) What do you mean by asymmetric and dissymmetric molecules ? Give examples. 2

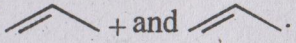
5. (a) The group moment of $NH_2$ and $NO_2$ are 1.35D and 3.95D respectively, but the measured dipole moment of p-nitroaniline is 6.20D — Explain. 2½

(b) Which C—N bond *a* or *b* has a higher bond length and why ?




2½

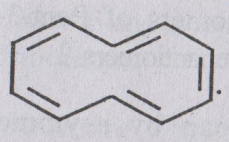
6. (a) Why singlet difluoro carbene is found to be more stable than its triplet state ? 2

(b) Draw the M.O. diagram mentioning HOMO, LUMO, SOMO of  and .

1½×2=3

7. (a) Draw resonance structure of $N_3^-$ and $O_3$. 2

(b) Define aromaticity. Comment on aromaticity of



2

(c) What do you mean by "epimers" ? 1

## Group - C

Answer any ***one*** question : 1×10=10

8. (a) What are radical inhibitors and how do they work ? 1+1

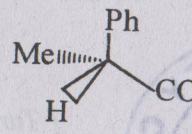
(b) The $\angle HCH$ bond angle in methane is 109°28′ but $\angle FCF$ bond angle in difluoromethane is much smaller — Explain. 2

(c) Explain the terms (i) symmetry element and

(ii) symmetry operation. 1+1

(d) What is the significance of specific rotation and molar rotation ? 1½+1½

(e) Assign R or s configuration to the following -




1



9. (a) Discuss the procedure of resolution of optically active alcohol. 2

(b) Draw the threo and erythro isomers of 3-bromo-2 butanol. 2

(c) Draw the orbital picture of $CH_3CONH_2$ and $CH_2 = CH - COCH_3$. 1+1

(d) What is a pseudoassymetric centre ? Show whether it is reflection invariant or not. 1+1

(e) The boiling point of 2.3 pentanediol (188°C) is much lower than its isomeric 1, 5 pentanediol (238°C) — Explain. 2