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Y—17—2019

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) (Backlog) EXAMINATION

OCTOBER/NOVEMBER, 2019

(CBCS Pattern)

CHEMISTRY

Paper-XIV–A_1

(Organic and Inorganic Chemistry)

(Thursday, 14-11-2019) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Figures to the right indicate full marks.

Section A

(Organic Chemistry)

1. Answer any *five* of the following : 5×2=10

(*a*) State and explain Lembert's law.

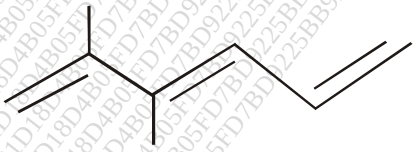
(*b*) Explain $\sigma \rightarrow \sigma^*$ and $n \rightarrow \sigma^*$ transitions.

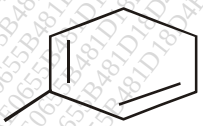
(*c*) Predict the number of PMR signals of :

(*i*) Methanol

(*ii*) Ethylamine.

(*d*) Calculate the λ_{max} of :

(*i*) 

(*ii*) 

P.T.O.

(*e*) Define coupling constant and wavelength.

(*f*) What are peptides ? How are they classified ?

(*g*) Explain N-terminus and C-terminus protecting agents.

(*h*) What are equivalent and non-equivalent protons ?

2. Answer any *two* of the following : 2×5=10

(*a*) Explain Favorskii rearrangement with mechanism.

(*b*) How will you distinguish between Ethane, Ethene, Ethyne by using I.R. Spectroscopy ?

(*c*) Predict the products :

(*i*) $H_2N{\cdot}CH_2{\cdot}COOH + Ba(OH)_2 \xrightarrow{\Delta}$

(*ii*) $H_2NCH_2COOH + 4[H] \xrightarrow{LiAlH_4}$

(*iii*) $H_2NCH_2COOH + CH_3COCl \xrightarrow[\Delta]{Base}$

(*iv*) $H_2NCH_2\ COOH + HNO_2 \xrightarrow{(NaNO_2+HCl)}$

(*iv*) $H_2N{\cdot}CH_2{\cdot}COOH + H{-}\overset{\overset{O}{\|}}{C}{-}H \longrightarrow$

3. Answer any *one* of the following : 1×7=7

(*a*) Deduce the structure and name of an organic compound with molecular formula $C_2H_4O_2$ and having the following spectral data :

UV : Transparent λ_{max} 210 nm (E_{max} 50).

IR : 3100 – 2975 cm^{-1} (Broad),

1715 – 1720 cm^{-1}.

PMR (δppm) : $\delta_{2.1}$ (S, 3H)

$\delta_{11.7}$ (S, 1H) Exchangeable with D_2O.

(*b*) (*i*) Explain Shielding and deshielding effect with suitable example.

(*ii*) Deduce the structure of compound based on the following PMR spectral data :

Molecular formula : C_2H_5Br

PMR(δ_{ppm}) : $\delta_{1.7}$ (*t*, 3H)

$\delta_{3.4}$ (*q*, 2H).

Section B

(Inorganic Chemistry)

4. Solve any *three* of the following : 3×3=9

(*a*) What are outer orbital complexes ? Explain with suitable example.

(*b*) Define CFSE and calculate CFSE in octahedral complexes having d^4 and d^5 configurations in weak ligand field.

(*c*) Explain the following factors affecting the magnitude of crystal field splitting :

(*i*) Nature of the ligands

(*ii*) Oxidation state of the metal ion.

(*d*) Calculate the spectroscopic ground state term symbol of d^1 configuration.

(*e*) Describe orgel energy level diagram for d^1 and d^9 configuration.

5. Solve any *two* of the following : 2×2=4

(*a*) Draw and explain the shapes of d-orbitals.

(*b*) What are the limitations of VBT ?

(*c*) How size of d-orbitals affect the magnitude of 10D*q* ?

(*d*) Write a note on metal to ligand charge transfer (MLCT).