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1241/MH

CS-2058
INORGANIC CHEMISTRY-I
(Common for B.Sc., B.Sc. Biotech.)
(Semester-VI)

Time Allowed : 3 Hours] **[Maximum Marks : 26**

Note :- Attempt five questions in all, selecting nvo questions each from Section A and B. Section C is compulsory.

SECTION-A

I. (a) What is Pearson's HSAB Principle ? What are the various limitations of this principle ? 1.5

(b) Discuss the effect of substitution on hardness and softness of an acid. 1.5

(c) Which of the following rx. will proceed in the forward direction and why ?

(i) $BF_3\,H^+ + BH_3F^- \longrightarrow BF_4^- + BH_4^+$

(ii) $CaO + H_2S \rightarrow CaS + H_2O$. 1

II. (a) Describe how Mulliken-Jaffe definition of electronegativity is related to hardness of acids and bases, with example ? 2.5

(b) Write a short note on symbiosis with example. 1.5

III. (a) Explain mechanism of H_2 reduction by nitrogenase enzyme complex. 2.5

(b) Discuss co-operativity in haemoglobin and how is it conveyed ? 1.5

IV. (a) What are metalloporphyrins ? Discuss the structure and role played by haemoglobin and myoglobin as O_2 carriers. 2.5

(b) Discuss the biological importance of Ca^{2+} . How is it different from that of Mg^{2+} ? 1.5

SECTION-B

V. (a) Discuss Muller-Roehow process for the synthesis of silicones. 2

(b) Why do polyphosphazene chains prefer cis-trans conformations to a trans-trans conformation ? Give three important uses of polyphosphazene. 2

VI. (a) Discuss general features of dn-pn model for bonding in $(NPCl_2)_3$. 2

(b) Complete the following reactions :

(i) $SiHCl_3 + C_6H_6 \rightarrow$

(ii) $PCl_5 + NH_4Cl \rightarrow$

(iii) $(NPCl_2)_3 + C_6H_5MgI \rightarrow$

(iv) $(NPCL_2)_3 \xrightarrow{KSO_2f}$ 2

VII. (a) How homogeneous hydrogenation of C_2H_4 is carried oujt by using Wilkinson's catalyst ? 1.5

(b) Define metal carbonyls. Draw structure of

(i) $Ni(CO)_4$

(ii) $Fe(CO)_5$

(iii) $Cr(CO)_6$

(iv) $Mn_2(CO)_{10}$. 2.5

VIII. (a) Explain EAN rule. Which of the following obey this rule ?

$Cr(CO)_6$: $Mn(CO)_3$ (π - C_5H_5); $Fe(\pi - C_5H_5)_2$. 2

(b) What do you understand by beta-elimination in transition metal-alkyls ?) How can it be avoided ? Give examples. 2

SECTION-C
(Compulsory Question)

IX. Answer all the following :

(a) Hard-hard interactions are generally ionic, soft-soft interactions are generally covalent. Why ?

(b) Sodium pump is electrogenic in nature. Comment.

(c) Write a short note on organoaluminium compounds.

(d) Discuss and draw the structure of Zeise's salt.

(e) What are metal olefin complexes? Discuss the structure of $[Pt\ Cl_3(C_2H_4)]$ ion. (5x2=10)