Total No. of printed pages = 6

3 (Sem 4) CHM M2

2015

CHEMISTRY

(Major)

Theory Paper : M-4.2

Full Marks – 60

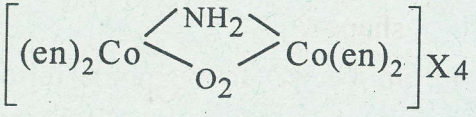
Time – 2½ hours

The figures in the margin indicate full marks for the questions.

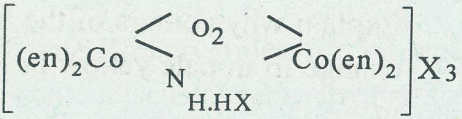
1. Answer the following questions : 1×7=7

(a) What are the most stable oxidation state in each of Cu, Ag and Au ?

(b) Following are two co-ordination compounds :



and



What type of isomerism are they exhibiting ?

[Turn over

(c) Although quite successful, where does Electron Sea Model fail to explain bonding in metals ?

(d) What is tin-plague ?

(e) Mercury shows only co-ordination number of two. What type of hybridization is expected to take place in such complexes ?

(f) Draw the structure of cyclic-dimethyl siloxane.

(g) Which interhalogen compound is used in the estimation of unsaturation in oils and fats through iodine value ?

2. Answer the following questions :

(a) What is the end product of hydrolysis of XeF_6 ? How would you account for its shape ? 1+1=2

Or

Explain why colours of the halogen vapours change from pale yellow in F_2 to intense red in I_2. 2

(b) Define term ligands. Give one example of a bidentate ligand where -

(i) both donor groups are neutral

(ii) both donor groups are anionic

(iii) one donor group is neutral and one donor group is anionic. 4×½=2

(c) Higher oxidation states usually become more common for 4d and 5d series of transition elements compared to 3d series. – Give reasons. 2

(d) Transition metals are good catalysts. Describe briefly their mechanism of action. 2

3. (a) Although $(NPCl_2)_3$ has a structure similar to the aromatic system, explanation of bonding is not adequate. Elucidate this statement. 5

Or

Give brief summary of Cage molecules of P_4O_6 and P_4O_{10}. 5

(b) State Hume-Rothery rules for intermetallic compounds. Discuss briefly its applicability among the metals of Group I. 2+3=5

(c) What are the most abundant elements on earth ? Mention the sequence of Bowen's reaction series. What is the last crystallised form in this series ? 1+3+1=5

Or

What are Pyroxenes and amphiboles ? Illustrate structurally. What are the best known amphiboles ? How Pyroxenes and amphiboles are identified ? 3+1+1=5

4. What is the source of Vanadium ? Describe the extraction of this metal from its ore. What is thermite in alumino thermite process ? Why only initial heating is required in this process ? Name two metals from your syllabus which are extracted by this process. 1+5+1+1+2=10

Or

When gold metal is found in lumps what is it called ? Describe the modern method of extraction of traces of gold. Besides jewellary what is the other major use of gold ? Why thin film of gold has been deposited on window glass in skyscraper building in a bank in Toronto in USA ? 1+5+2+2=10

5. (a) Give IUPAC name of the following compounds - 2

(i) $[Pt(Py)_4]\ [PtCl_4]$

(ii) $[Co(NH_3)_5(ONO)]CI_2$

(b) What are the conditions to be satisfied by Co-ordination compounds for optical activity ? How many optically active isomer possible for the coordination compound with molecular formula

$[Co(NH_2 - CH_2 - CH_2 - NH_2)_3]^{3+}$? Draw their structures. 1+2=3

(c) Draw the structure of $Co_2(CO)_8$. Varify EAN rule in this compound. 2

(d) Give one method of preparation of N_2 complex which finds application in the field of humanity and answer what is the reason of such application. 3

Or

Discuss the importance and activity of O_2-ligand in human life. 3

6. (a) Give a critical study of Stereochemistry of Sn. 5

Or

What are the different oxides of Mn known? Show with examples the oxidising property of MnO_2 in alkaline as well as in acidic medium. What are the different uses of MnO_2? 1+2+2=5

(b) What is the band theory of metals ? How does it help to explain semi conductor property of metals ? 3+2=5

Or

What is the native name of AgCl ? How silver chloride reacts with

(i) NH_3

(ii) KCN

(iii) $Na_2S_2O_3$.

Why AgCl becomes black when exposed to sunlight ? 1+3+1=5