

Total No. of printed pages = 6.

3 (Sem 4) CHM M2

2015

## CHEMISTRY

(Major)

Theory Paper : M-4.2

Full Marks – 60

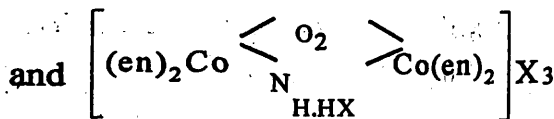
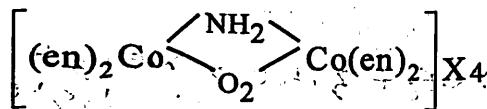
Time – 2½ hours

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

1. Answer the following questions :  $1 \times 7 = 7$

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

(b) Following are two co-ordination compounds :



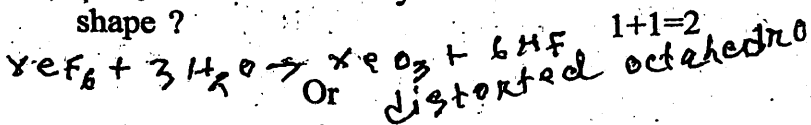
What type of isomerism are they exhibiting ?

[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  $\text{XeF}_6$  ? How would you account for its shape ?



Explain why colours of the halogen vapours change from pale yellow in  $\text{F}_2$  to intense red in  $\text{I}_2$ .

- (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.  $4 \times \frac{1}{2} = 2$
- (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  $(\text{NPCl}_2)_3$  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  $\text{P}_4\text{O}_6$  and  $\text{P}_4\text{O}_{10}$ . 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 aluminothermite 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 jewellery 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)  $[\text{Pt}(\text{Py})_4][\text{PtCl}_4]$  Tetrapyridine platinum(II) chloride

(ii)  $[\text{Co}(\text{NH}_3)_5(\text{ONO})]\text{Cl}_2$

(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

$[\text{Co}(\text{NH}_2 - \text{CH}_2 - \text{CH}_2 - \text{NH}_2)_3]^{3+}$ ? Draw their structures. 1+2=3

(c) Draw the structure of  $\text{Co}_2(\text{CO})_8$ . Verify EAN rule in this compound. 2

(d) Give one method of preparation of  $\text{N}_2$  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  $\text{O}_2$ -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  $3AgCl + 6KCN \rightarrow 3K_3[Ag(CN)_3] + 3KCl$

(iii)  $Na_2S_2O_3$   $AgCl + 2Na_2S_2O_3 \rightarrow Na_4[Ag(S_2O_3)_2] + 2NaCl$

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