

2016

CHEMISTRY

( Major )

Paper : 4.2

Full Marks : 60

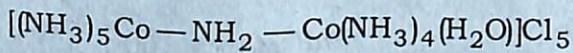
Time : 3 hours

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

1. Fill in the blanks/Answer the following :  $1 \times 7 = 7$

- (a) When dry, the important aluminosilicate zeolites are used as \_\_\_\_\_.
- (b) Neutral interhalogen compounds are of the type  $XX'_n$ , where  $n$  is an odd number. Therefore the compounds are \_\_\_\_\_.
- (c) Nickel of purity 99.90 to 99.99% can be obtained by thermal decomposition of \_\_\_\_\_.
- (d) Chromium metal can be obtained by reduction of  $Cr_2O_3$  with \_\_\_\_\_.

- (e) The metal with highest known electrical and thermal conductivities is \_\_\_\_\_.
- (f) The platinum group metals can also be thrown out from acid solutions by the action of Zn known as \_\_\_\_\_.
- (g) Name the compound according to IUPAC



2. Answer the following as directed :  $2 \times 4 = 8$

(a) Write the reaction for preparation of hexachlorocyclotriphosphazene.

(b) Write the reaction for preparation of 1,7- $\text{B}_{10}\text{H}_{10}\text{C}_2\text{RR}'$ .

(c) Write a reaction for production of a polyoxometallate.

(d) (i) The anomalous behaviour of the metals in 5d series is because of \_\_\_\_\_ . (Fill in the blanks)

(ii) The ionization energy generally \_\_\_\_\_ down a group and \_\_\_\_\_ across a period for d-metals. (Fill in the blanks)

3. Answer any three from the following questions :  $5 \times 3 = 15$

(a) Explain the preparation and structures of xenon fluorides.

- (b) Explain the inert pair-effect in Pb, Sn and Ti.
- (c) Explain the preparation, properties and uses of organosilicon compounds.
- (d) What are the postulates of Werner's theory?
- (e) Explain the general trends in (i) radii, (ii) oxidation states, (iii) metal-metal bonding, (iv) magnetic properties and (v) stereochemistry of second and third transition metals.

4. Answer any *three* questions : 10×3=30

(a) Explain the chemistry of interhalogen compounds. 10

(b) Write in detail preparation, properties and structure of borazine. Explain the structural differences between boron nitride and graphite. Also, explain why cubic boron nitride is used as abrasive even though of lower mechanical hardness than diamond.

2+4+2+1+1=10

(c) (i) Explain the chemistry involved in Solvay process for manufacture of sodium carbonate.

(ii) Explain the use of alkaline earth metal and its salts in firework and flares.

6+4=10

( 4 )

- (d) Explain the different types of isomerism shown by coordination compounds in square planar, tetrahedral and octahedral geometry.  $2+2+6=10$
- (e) Explain the synthesis of homoleptic carbonyls of Ni, Co, Fe and Cr. Explain the properties giving emphasis on (i) physical properties, (ii) oxidation and reduction of carbonyls, (iii) metal carbonyl basicity and (iv) reactions of the CO ligand. What are the structures of  $\text{Fe}(\text{CO})_5$ ,  $\text{Fe}_2(\text{CO})_9$  and  $\text{Fe}_3(\text{CO})_{12}$ ? Explain the 18e rule in each.  $2+6+2=10$

\*\*\*