

2014.

CHEMISTRY

(Major)

Paper : 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) Addition of which metal imparts resistance to chemical attack in stainless steel?
- (b) Name two elements used for doping to prepare conductor from insulator.
- (c) Give example of a chelating compound.
- (d) Write the electronic configuration of Mo.
- (e) Although Pb can show both +2 and +4 oxidation state, only +2 state is more common. Give reasons.

- (f) Draw the structure of most stable isomer of $B_{10}C_2H_{12}$.
- (g) Which metal is responsible for green colour of emerald gem? Why is it green but not orange?

2. Answer the following questions : 2×4=8

- (a) Give an explanation of shape and structure of XeF_4 .
- (b) All the alkali metals when dissolve in liquid NH_3 giving deep blue solutions. Give reasons.
- (c) Show with example the amphoteric behaviour of SnO_2 .
- (d) How is mercurous chloride prepared? Mention one use of it.

3. Answer any two from the following :

- (a) What are silicones? Give one method of preparation of silicones. What are the desirable properties of silicone polymers? 1+2+2=5

(b) What are pseudohalogens? Why are they so called? Describe the important characteristics of pseudohalogens.

1+2+2=5

(c) How are talc and mica formed? What are their characteristics?

3+2=5

(d) Write a short note on boron cage compound.

5

4. (a) Name one important ore of manganese. Describe the extraction of Cr from its ore.

1+4=5

Or

(b) Write a short note on intermetallic compounds.

5

5. (a) Describe the general trend in physical and chemical properties of alkaline earth metals and their compounds.

10

Or

(b) Though there are no vacant *d*-orbitals in the valency shell; Zn, Cd and Hg form coordination compounds. Give explanation. How their coordination compounds are stabilized? Discuss the stereochemistry of Zn coordination compound.

3+2+5=10

6. Answer any *two* from the following :

(a) Give a comparative study of the following properties of 1st row transition elements : 4+3+3=10

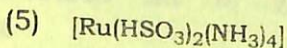
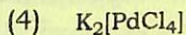
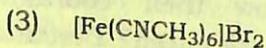
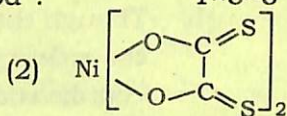
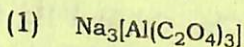
- (i) Oxidation state
- (ii) Magnetic properties
- (iii) Catalytic behaviour

(b) (i) Discuss the bonding of metal-carbonyl complexes. Why is carbonyl considered as π -acceptor ligand? 4+1=5

(ii) Show the possible stereoisomers of $[\text{CoCl}_2(\text{en})_2]\text{Cl}$. Comment on the optical activity of these stereoisomers. 3+2=5

(c) Describe the trends in physical and chemical properties of second and third transition series in comparison to the first series. 10

(d) (i) Name the following compounds using IUPAC method : 1 \times 5 = 5



(5)

- (ii) (1) Account for the existence of red and yellow isomers of $[\text{Co}(\text{NO}_2)(\text{NH}_3)_5]^{2+}$.
- (2) Write the variety of bonding mode of carboxylate ligand with metal atom. 2+3=5.

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