NKT/KS/17/5112

Bachelor of Science (B.Sc.) Semester—III (C.B.S.) Examination

CHEMISTRY (Inorganic Chemistry)

Paper—I

Time : Three Hours] [Maximum Marks : 50

Note :— (1) **All** questions are compulsory and carry equal marks.

(2) Write equations and draw diagrams wherever necessary.

1. (A) Draw and explain Caulson's M.O. diagram of carbon monoxide molecule. Write its molecular configuration and calculate its bond order. 5

(B) Give one method of preparation of AX_3 and AX_5 type of interhalogen compounds. Explain in detail the structure of S_4N_4. 5

OR

(C) Distinguish between bonding and antibonding molecular orbitals. 2½

(D) Discuss molecular orbital diagram of N_2 molecule and calculate its bond order. 2½

(E) What are interhalogen compounds ? Discuss the structure of IF_5. 2½

(F) What are polyhalides ? Explain the structure of I_3^- ion. 2½

2. (A) Discuss the first transition series elements with respect to their :

(i) Electronic configuration and

(ii) Magnetic properties. 5

(B) (i) Discuss the metathesis reactions in liq. NH_3 and liq. SO_2 giving one example of each.

(ii) Explain the catalytic activity of 3d-block elements. 5

OR

(C) Discuss the complex formation tendency of first transition series elements. 2½

(D) What do you mean by protic and aprotic solvents ? Discuss with example. 2½

(E) Explain :

(i) Zn does not show variable oxidation state, and

(ii) Zn compounds are colourless. 2½

(F) Calculate the magnetic moment of V^{2+} and Mn^{2+} ions (Atomic no. V = 23 and Mn = 25). 2½

3. (A) (i) Compare the oxidation states of Co, Rh and Ir.

(ii) Explain 4d rule for rejection of data. 5

(B) Define mean and median. Calculate mean, median, average deviation of the following set of data :

6.6, 6.6, 6.6, 6.5, 6.3, 6.4. 5

OR

(C) Write electronic configuration of 4d-block elements. 2½

(D) Describe Q-test for rejection of data. 2½

(E) What is determinate error ? Explain personal and instrumental errors with examples. 2½

(F) Identify the number of significant figures in the following :

(i) 1.00367

(ii) 1.83×10^5

(iii) 0.0503

(iv) 10400

(v) 7.3×10^{-4}. 2½

4. (A) (i) What are lanthanides ? Discuss their position in the periodic table.

(ii) Write down and explain the oxidation states of lanthanides. 5

(B) (i) Discuss lanthanides with respect to their electronic configuration.

(ii) Discuss the oxidation states of actinides. 5

OR

(C) What is lanthanide contraction ? Explain basic character of hydroxides of lanthanides. 2½

(D) Discuss complex forming tendency of lanthanides. 2½

(E) Discuss actinides with respect to their atomic and ionic radii. 2½

(F) Explain solvent extraction method for separation of lanthanide ions. 2½

5. Attempt any ***ten*** of the following questions :

(i) Write the M.O. configuration of O_2 molecule.

(ii) Draw structure of ClF_3 molecule.

(iii) Define bond order.

(iv) Explain why Mn^{+2} is more stable than Mn^{+4}.

(v) Explain why Ti^{+4} is colourless.

(vi) Write one acid-base reaction in liq. NH_3.

(vii) Why Cr^{+6} is strong oxidising agent but Mo^{6+} is not ?

(viii) Define accuracy and precision.

(ix) Define the terms absolute and relative error.

(x) What is meant by transuranic elements ?

(xi) Why are f-block elements called inner transition elements ?

(xii) Which reagent is used for the solvent extraction of lanthanides ? 1×10=10