KNT/KW/16/5112

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

CHEMISTRY (CH-301)

(Inorganic Chemistry)

Paper—I

Time : Three Hours] [Maximum Marks : 50

N.B. :— (1) All **FIVE** questions are compulsory and carry equal marks.

(2) Write equations and draw diagrams wherever necessary.

1. (A) What is LCAO approximation ? Construct and explain Coulson's MO diagram for CO molecule. Calculate its bond order. 5

(B) What are interhalogen compounds ? Give any two methods of preparation of IF_5 and discuss its structure. 5

OR

(C) Discuss the structure of Tetra-Sulphur Tetranitride. 2½

(D) Discuss the molecular orbital energy level diagram for N_2 molecule and calculate its bond order. 2½

(E) Explain the formation of HF molecule on the basis of M.O. theory. Calculate its bond order. 2½

(F) Discuss the structure and bonding in I_3^- ion. 2½

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

(i) Oxidation state, and

(ii) Catalytic activity. 5

(B) (i) Discuss acid-base reactions in liquid ammonia and liquid sulphur dioxide. Give one example of each.

(ii) Discuss the complex formation tendency of first transition elements. 5

OR

(C) Discuss the classification of Non-aqueous solvents on the basis of ionizing properties. 2½

(D) Discuss electronic configuration of first transition series elements. 2½

(E) Explain the colour properties of first transition series elements. 2½

(F) Discuss the atomic and ionic radii of 3d-block elements. 2½

3. (A) (i) Give a comparative account of the elements Cr, Mo and W with respect to their magnetic properties.

(ii) What are the different steps involved in rejection of result on the basis of 4d rule. 5

(B) Define the terms :

(i) Mean and

(ii) Median

A sample of steel was analysed for its chromium content, the observed values are 16.21 and 16.31%. If true value of chromium content is 16.27% :

Calculate :

(i) Absolute error, and

(ii) Relative error in percentage. 5

OR

(C) Explain the terms :

(i) Accuracy, and

(ii) Precision. 2½

(D) Find out the significant figures in the following :

(i) 10.04

(ii) 0.006404

(iii) 7.32×10^{-23}

(iv) 460000

(v) 57.040. 2½

(E) Write electronic configuration of 4d block element. 2½

(F) The results for percentage of oxygen is 0.47, 0.48, 0.47 and 0.50. Find whether the value 0.50 is to be retained or rejected if Q value for four observations is 0.76. 2½

4. (A) What is Lanthanide contraction ? Explain it causes. Discuss any two consequences of Lanthanide contraction. 5

(B) (i) Explain Actinides with reference to their oxidation state.

(ii) Discuss solvent extraction method for separation of Lanthanides. 5

OR

(C) Explain the complex formation tendency of Lanthanides. 2½

(D) Discuss Lanthanides with reference to their electronic configuration. 2½

(E) Discuss ion exchange method of separation of lanthanides. 2½

(F) Discuss the position of actinides in periodic table. 2½

5. Attempt any **TEN** questions of the following :—

(i) Explain why He_2 molecule does not exist in terms of MOT.

(ii) Draw the structure of ICl_4^- ion.

(iii) Write M.O. configuration of O_2 molecule.

(iv) Why is Zn^{+2} ion dimagnetic ?

(v) Why is second ionization potential of Cr higher than those of neighbours ?

(vi) Define Protonic solvents.

(vii) Write maximum oxidation state of Co-Rh-Ir elements.

(viii) Define systematic errors.

(ix) Define standard deviations.

(x) What are transuranic elements ?

(xi) Give the name and composition of one mineral of Lanthanides.

(xii) Name any two Lanthanides exhibiting +2 oxidation state. 1×10=10