Vitthalbhai Patel & Rajratna P. T. Patel Science College,
Vallabh Vidyanagar
B. Sc. (Semester-IV)
Subject : INORGANIC CHEMISTRY (US04CCHE01)

Date : 09-03-2019 **Internal Test** **Marks : 50**

Day : Saturday **Time : 3.00 p.m. to 5.00 p.m.**

Note: (i) All questions are to be attempted.
(ii) Figures to the right indicate marks.

Q.1 **Choose the correct option for the following :** [08]

(i) Which of the following is not a π-acid ligand ?
(a) NH_3 (b) CO (c) CNR (d) PCl_3

(ii) $[Ni(H_2O)_6]^{2+}$ is blue green in colour whereas $[Ni(H_2O)_6]^{2+}$ is ..... .
(a) Yellow (b) Red (c) Blue (d) Blue green

(iii) Which of the following square planar complexes exist as cis- and trans- isomeric form ?
(a) Ma_2b_2 (b) Ma_4 (c) Ma_3b (d) Mabcd

(iv) ..... is not ambidentate ligand.
(a) ONO^- (b) $S_2O_3^{2-}$ (c) CN^- (d) ethylene diamine

(v) Which is the most widely used extracting solvent for lanthanides ?
(a) TBP (b) Xylene (c) Kerosene (d) Benzene

(vi) Which of the following pair of elements has identical ionic radii due to lanthanide contraction ?
(a) Cr^{3+} and Mo^{3+} (b) Zr^{4+} and Hf^{4+} (c) V^{5+} and Nb^{5+} (d) Ag^+ and Au^+

(vii) Which of the following metallic carbonyl is not diamagnetic ?
(a) $[Cr(CO)_6]$ (b) $[V(CO)_6]$ (c) $[Fe(CO)_5]$ (d) $[Ni(CO)_4]$

(viii) Sodium nitroprusside gives ..... colouration with aqueous sulphide ion solution.
(a) red (b) violet (c) green (d) blue

Q:2 **Answer the following (Attempt any Five) :** [10]

(i) Why d-block elements show variable oxidation state ?
(ii) "The transition metal ions containing empty d-orbitals or completely filled d-orbitals are colourless". Explain.
(iii) Draw the structure of optical isomers of $[Co^{3+}(en)_3]^{3+}$.
(iv) Give the conditions for a molecule to show optical isomerism.
(v) List the modern methods used for the separation of lanthanides.
(vi) What is actinide contraction ?
(vii) Calculate EAN for $[Cr(CO)_6]$ and $[Fe(CO)_5]$ metal carbonyls. [Given: Cr(Z=24) and Fe(Z=26)]
(viii) Draw the structure of $Fe_3(CO)_{12}$.

Q:3 Answer the following: [08]

(a) Write the name, symbol, complete and valence shell electronic configuration of 2nd transition series elements.
(b) Deduce the formula for calculating the magnetic moment of transition metal complexes.

OR

Q:3 Answer the following: [08]

(a) Explain the purple colour of $[Ti(H_2O)_6]^{3+}$ ion attributed to d-d transition.
(b) Give the preparation and properties of Interstitial carbides.

Q:4 **Answer the following:** [08]

(a) Explain the basic postulates of Werner's co-ordination theory.

(b) Write note on optical isomerism found in any four type of octahedral complexes.

OR

Q:4 **Answer the following:** [08]

(a) Discuss the Grinberg's method to distinguish between cis- and trans- isomers.

(b) Explain the structure of Co(III) ammines on the basis of Werner's co-ordination theory.

Q:5 **Answer the following:** [08]

(a) Define Actinides. Give the name, symbol, atomic number and electronic configuration of actinides.

(b) Discuss the position of lanthanides in periodic table.

OR

Q:5 **Answer the following:** [08]

(a) Describe the ion-exchange method for separation of lanthanides.

(b) Give the comparison between lanthanides and actinides.

Q:6 **Answer the following:** [08]

(a) Give the general methods of preparation of metal carbonyls.

(b) Discuss the preparation, properties and structure of $[Fe_2(CO)_9]$.

OR

Q:6 **Answer the following:** [08]

(a) Describe the nature of M-CO bonding in metal carbonyls.

(b) Discuss the preparation, properties and structure of $[Ni(CO)_4]$.

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