MANIPAL UNIVERSITY

Reg No										

DEPARTMENT OF SCIENCES

II SEMESTER M.Sc (CHEMISTRY) END SEMESTER EXAMINATIONS, June 2017

SUBJECT: INORGANIC CHEMISTRY II [CHM 602]

REVISED CREDIT SYSTEM

Time: 3 Hours Date:13/06/2017 MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Draw diagrams and write equations wherever necessary.

1. A. i) a) Describe any four applications of coordination compounds.

b) How do you distinguish overall stability constant from stepwise stability constant in complexes.

ii) Distinguish between the following; **a)** Distribution coefficient and distribution ratio **b)** Inorganic and organometallic complexes.

B. i) Explain four factors that affect the column efficiency of liquid chromatography.

ii) Describe the following isomerism in coordination compounds: **a)** Ionization isomerism **b)** Linkage isomerism. **(6+4)**

2. A. i) Explain three basic steps involved in the mechanism of solvent extraction process for metals. Write the solvent extraction procedure for the determination of copper. How do you choose a solvent for a particular extraction?

ii) Describe the three processes which create magnetic fields in an atom. List the sources of paramagnetism in inorganic complexes.

B. i) Describe the principles and applications of the following chromatography techniques; **a)** Ion exchange chromatography **b)** Size exclusion chromatography

ii) Iron forms a chelate that will extract into nitrobenzene with a distribution coefficient of 3. What percentage of the iron will be extracted from a 25 mL sample if 10 mL of nitrobenzene is used?

(6+4)

3. A. i) Describe different steps involved in the column chromatographic process. Write a technical note on the applications of GC in the qualitative and quantitative analysis.

ii) Sketch all stereoisomers for each of the following and state the type of isomerism;

a) $Pt(NH_3)_2Br_2$ (square planar) **b)** $[Cr(en)_3]^{3+}$, [en=$H_2NCH_2CH_2NH_2$]

B. i) Describe the two limitations of CFT.

ii) Sketch and explain the orbital picture and MOELD for an octahedral complex with metal-ligand pi bonding involving ligands having the pi-donor capability.

(6+4)

4. A. i) What is the role of matrix in a composites? Explain the synthesis of thin films by PVD method.

ii) What is coenzyme B12? Explain its function in metabolism with an example.

B. Give reasons for the following observations;

a) $[Cu(CN)_2]^-$ is colorless while $[Cu(NH_3)_4]^{2+}$ has blue color

b) *cis*-$[PtCl_2(en)]$ is chiral while *cis*-$[RhCl_2(NH_3)_4]^+$ is achiral.

c) $[Cr(CN)_6]^{4-}$ is a low spin complex, whereas $[Cr(H_2O)_6]^{2+}$ is a high spin complex

d) $[Fe(H_2O)_6]^{2+}$ is paramagnetic whereas $[Fe(CN)_6]^{4-}$ is diamagnetic.

(6+4)

5. A. i) Explain Bohr's effect on oxygen saturation curves of hemoglobin and myoglobin. What are the differences in their saturation curves?

ii) What are the roles of metal ions in the biological systems? Explain the structure and function of carbonic anhydrase.

B. i) What are apoenzymes? Explain the mechanisms of enzyme catalysis.

ii) What do you mean by cooperative binding of oxygen in hemoglobin? Explain the picket fence model of hemoglobin.

(6 +4)

6. A. i) Explain the principle of liquid crystal thermography? Describe two of its applications.

ii) Distinguish the followings;

a) Thermotropic and lyotropic liquid crystals

b) fuel cell and galvanic cell

c) Soda glass and pyrex glass

B. i) Describe the construction and working of solar cells.

ii) Write an explanatory note on any two types of smart materials.

(6 + 4)

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