B.Sc.(Honours)Examination, 2018

Semester-V

Chemistry (Honours)

Course: BCHC-51

(Inorganic Chemistry)

Time: Three Hours **Full Marks: 30**

Questions are of value as indicated in the margin.

Answer***any three***questions.

1. Attempt ***any five*** questions: 5x2
   a) Draw the resonating structure of a porphyrin ring.
   b) Tetracycline-EDTA is a better combination drug than tetracycline itself – why?
   c) What are the basic routes of enzymatic activity of carbonic anhydrase?
   d) What is zinc finger protein?
   e) Compare the E^o-values and structure of Fe_2S_2 ferredoxin and Rieske protein.
   f) Name the important metal complexes used as the MRI contrast agents.

2. a) Attempt ***any five*** questions: 5x1
      i) What is the biological function of superoxide dismutase?
      ii) Compare the biological functions of catalase and peroxidase.
      iii) Draw the structures and names of two Pt(II) complexes as the anticancer drugs.
      iv) What is Wilson's disease?
      v) Draw the structure of oxy- and deoxy-forms of hemocyanin.
      vi) Give the origin of the colour of oxy-hemerythrin.
   b) i) A face-centered tetragonal cell is not possible – why? 2
      ii) Comment on the octahedral hole sharing in ccp and hcp arrangements. 3

3. Attempt ***any four*** questions: 4x2.5
   a) Cupric sulfide dissolves in hot dilute nitric acid forming cupric nitrate, nitric oxide and sulfur. Balance the reaction by ion-electron method. Comment on the role of nitric acid.
   b) Represent the dry cell chemically and write down the chemical reactions involved.
   c) The EMF of the cell, Pt, H_2 (1 atm)$|H^+$ (M=1)|| Mercurous ion (0.1 M) is 0.767 V at 25 ^oC. Find out the charge on mercurous ion. (Given: $E^o_{\text{mercurous ion/Hg}}$ = 0.796 V at 25 ^oC).
   d) $E^o_{Cr_2O_7^{=}/Cr^{3+},\ H+}$ value (1.33 V) is greater than $E^o_{\frac{1}{2}I_2/I^-}$ value (0.54 V). Still dichromate cannot oxidize iodide to iodine at neutral medium. Justify the observation.
   e) Suppose we titrate 100 cm^3 of 0.1 N solution of Fe^{2+} by 0.1 N $KMnO_4$ solution maintaining H^+ concentration at 1 M through all stages of the titration. Calculate the potential at the equivalent point.

4. Attempt ***any four*** questions: 4x2.5
   a) Give the packing efficiency, projection in a plane and z-slicing of diamond cube (dc) structure. Comment on the value of packing efficiency.
   b) What do you mean by bond valence sum (BVS)? What is its importance? Calculate BVS of MgO from given data (R, R_0 and B, are respectively, 210.56 pm, 163.6 pm and 42).
   c) Vertex shared polyhedra show better stability compare to the edge or face shared one: justify the statement with suitable example.
   d) How will you translate a cubic close packing arrangement to a face centered cube structure?
   e) What is tolerance factor? Give its derivation.

P.T.O.

5. Attempt ***any four*** questions: 4x2.5
   a) What is Latimer diagram? Mention its utility.
   b) What is Zimmermann-Reinhardt's reagent? Mention the role of each component of this reagent.
   c) Comment on the thermodynamic genesis of crystal defects.
   d) Why NaCl cannot afford Frenkel defect, but AgCl can?
   e) What is color centre? The absorption of colour centre is independent of the source of electron: justify the statement.

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