淡江大學九十三學年度碩士班招生考試試題

系別：化學學系　　科目：無 機 化 學

准帶項目請打「○」否則打「×」
簡單型計算機

本試題共 / 頁

淡江大學化學系碩士班入學考試無機試題

1. To describe the followings (30%)
   A. Hard and soft acids and bases of inorganic ions
   B. Effective nuclear charge of atoms
   C. Jahn-Teller effect of Cu^{2+} ion in Oh crystal field
   D. Crystal field stabilization energy (CFSE)
   E. Chelate effect of metal complexes

2. Use the VSEPR(valence shell pair repulsion theory) model to predict the molecular structures of the following molecules:(15%)
   A. NH_3 ,ClF_3 and NH_4^+
   B. NO_2, NO_2^+ and NO_2^-
   C. $[SiO_4]^{4-}$, $[PO_4]^{3-}$, $[SO_4]^{2-}$ and $[ClO_4]^-$

3. Give the examples to describe the trans-effect of the ligand substitution reaction in square-planar metal complex.(10%)

4. Give the examples to describe the inner sphere electron transfer and outter-sphere electron transfer reaction in the transition metal complexes.(10%)

5. Give one example to describe the organo-metallic compounds to carry out
   (a) Oxidative addition (b) Reductive elimination (10%)

6. Why the electronic absorption bands exhibit different energy for the complexes: $[Co(NH_3)_6]^{3+}$ 22900 cm^{-1}, $[Rh(NH_3)_6]^{3+}$ 34100 cm^{-1}, and $[Ir(NH_3)_6]^{3+}$ 41000 cm^{-1} ? (10%)

7. Use the temperature dependence of magnetic susceptibility to define the (a) paramagnetism (b) ferromagnetism and (c) antiferromagnetism. (15%)