淡江大學八十七學年度碩士班入學考試試題

系別： 化學系　　科目： 無機化學

A. Fill the blanks in followings. 2 points for each blank .

1. An nd^2 configuration od a free ion will have a ground stste term described as ___A___. The ground state term of this ion splits in octahedral complex into ___B___, ___C___, and ___D___ terms. Which of them is the ground state term___E___? How many electronic absorption peaks to be expected to have in this complex?___F___.

2. Which of the following ions, ClO_4^-, IO_4^- and PO_4^{3-}, has the greatest dπ–pπ double bond character.___G___. Which is the strongest oxidant?___H___. The structure of this ion is___I___.

3. In the molecular orbital theory designation of the **NO** moleculehow many effective bond are there?___J___σ–bond and ___K___π-bond.Two types of metal-**NO** bond was observed The structure of thes two types of bond are ___L___ and ___M___.

4. A gaseous 3d ion in **+2** oxidation state that contains **5** unpaired electrons is ___N___. The magnetic moment of this ion is ___O___*B.M.*. The *CFSE* of this ion in weak octahedral field is ___P___*Dq*; in strong octahedral field is ___Q___*Dq*; and in tetrahedral field is ___R___*Dq*'.

5. Predict and draw the structure of the follwing: XeF_4 is ___S___; BrF_5 is ___T___; B_4H_{10} is ___U___; and $Re_4(CO)_{16}^{2-}$ is ___V___.

6. Assign the following species belonging to point group: *trans*-$Co(NH3)_4Cl_2^+$ is ___W___; *cis*-$Co(NH3)_4Cl_2^+$ is ___X___ and $Co(en)_3^{3+}$ is ___Y___.

B. Answer the followings. 10 points for each question

7. Using any necessary usual physical constant from appropriate source, predict the electron affinity of fluorine(F) by means of a Born-Haber cycle.

8. Using molecular orbital theory predict the structure of H_3^+ ion(cyclic or linear). Give and discuss your proposed energy level diagram.

9. Discuss the two general mechanisms for electron transfer reactions in coordination compounds.

10. Outline the main steps by which Ziegler-Natta polymerization proceeds.

11. Show diagrammetically the splitting of the ***d***-orbitals, energwise, in tetragonal, square pyramidal and trigonal bipyramidal fields.