淡江大學九十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「x」	
計算機	字典
X	X

1. 10 points

   Elements are arranged in a systematic way in the periodic table.　Give a major reason why this arrangement is very useful for chemists.

2. 10 points

   Compare 'octet rule', 'eighteen electron rule', and 'sixteen electron rule'.

3. 15 points

   a. Define and compare Arrhenius, Brøndted-Lowry, and Lewis acid-base concepts.

   b. Describe the relationship among coordination, Lewis acid-base reactions, and oxidation-reduction reactions.

4. 30 points

   a. For homonuclear diatomic molecules, draw and explain the energy levels for the molecular orbitals from combinations of atomic p orbitals.

   b. For an octahedral transition metal complex, the five d orbitals are not degenerate anymore.　How and why?

   c. For an octahedral transition metal compound, if the two ligands on the z-axis were removed, how would these two sets of orbitals further split? Why?

5. 15 points

   Describe the bonding with orbital drawing between

   a. a metal center and a η^2-alkene ligand.

   b. a metal center and a carbonyl ligand.

   c. a metal center and a η^2-dihydrogen ligand.

6. 10 points

   Define and compare Walsh diagram and Jahn-Teller effect.

7. 10 points

   a. Define 'chiral compounds'?

   b. Which of the following is chiral?　Why?