臺北市立大學

105 學年度研究所碩士班入學考試試題

班　　別：應用物理暨化學系碩士班
科　　目：普通化學（選考）
考試時間：90 分鐘【08：30－10：00】
總　　分：100 分

不得使用計算機或任何儀具。

※ **注意：**不必抄題，作答時請將試題題號及答案依照順序寫在答卷上；**限用藍色或黑色筆作答**，使用其他顏色或鉛筆作答者，所考科目以零分計算。**（於本試題紙上作答者，不予計分。）**

1. Distinguish between the following pairs: (10%)
   （1）slightly soluble and weak electrolyte
   （2）intermolecular and intramolecular forces
2. Please explain the following terms（a）the first law of thermodynamics,（b）Le Chetelier's principal,（c）redox reaction（d）Nernst equation（e）band theory（for metallic bonding）(25%)
3. What is the difference between the Arrhenius , Bronsted-Lowry, and Lewis defininations of an acid? (15%)
4. Sketch a picture of the bonding and antibonding molecular orbitals of H_2 and O_2. (10%)
5. What is Dalton's atomic theory ? Use Dalton's atomic theory to account for each of the following. (10%)（a）the law of conservation of mass（b）the law of definite proportion
6. Maleic acid is a dicarboxylic acid. (20%)
   （1）combustion of 0.25 g of the acid gives 0.39 g of CO_2 and 0.0776 g of H_2O. Calculate the empirical formula of the acid.
   （2）A 0.261-g sample of the acid requires 34.60 ml of 0.130M NaOH for complete titration. What is the molecular of the acid?
   （3）Draw a Lewis structure for the acid?

（4）Describe the hybridization used by the C atoms.

7. A solution contains Cl^-（as NaCl　0.02M）and CrO_4^{2-}（as K_2CrO_4, 0.0020M）. a solution of $AgNO_3$ is added slowly. Which precipitates first, AgCl or Ag_2CrO_4?（AgCl　$K_{sp}=1.8\times10^{-10}$,　Ag_2CrO_4　$K_{sp}=9.0\times10^{-12}$）(10%)