淡江大學 102 學年度日間部轉學生招生考試試題

系別：化學學系二年級　　科目：普通化學

考試日期：7 月 23 日(星期二) 第 3 節　　本試題共　五　大題，壹　頁

本試題共五大題，每題 20 分

1. Calculate the concentration of H^+ in 1.0 *M* HCN solution. $K_a = 6.2 \times 10^{-10}$ The K_{sp} value for silver chromate is 9.0×10^{-12}. Calculate the solubility of Ag_2CrO_4 in 0.100 *M* solution of $AgNO_3$.

2. Using the molecular orbital model to describe the molecular orbital energy level diagram of NO. Predict the bond orders and relative bond lengths for NO, NO^-, and NO^+. How many unpaired electrons are present in each species.

3. Give the structure for each of the following species.
   a)*o*-ethyltoluene b)*cis*-2,3-dichloro-2-pentene c)isopropanol d) IF_3 e)SO_3^{2-}

4. The decomposition of N_2O_5 in the gas phase was studied at constant temperature:
   $2\ N_2O_5(g) \longrightarrow 4\ NO_2(g) + O_2(g)$
   the following results were collected:
   Using these data, verify that the rate law is first order in $[N_2O_5]$, and calculate the rate constant.

N_2O_5 (mol/L)	Time (s)
0.1000	0
0.0707	50
0.0500	100
0.0250	200
0.0125	300
0.00625	400

5. 逐句完整翻譯這段敘速成中文：Molecular structure is the three-dimensional arrangement of the atoms that constitute a molecule. It determines several properties of a substance including its reactivity, polarity, phase of matter, color, magnetism, and biological activity. The angles between bonds that an atom forms depend only weakly on the rest of molecule, i.e. they can be understood as approximately local and hence transferable properties.