淡江大學 107 學年度日間部轉學生招生考試試題

系別：化學學系、尖端材料學程二年級　　科目：普通化學 12-1

考試日期：7 月 26 日(星期四) 第 2 節　　本試題共 8 大題，1 頁

1. Name the following compounds. (15 pts)
   (a) N_2 (b) Al_2O_3 (c) H_2SO_3 (d) KCl (e) H_2

2. Draw the Lewis structures of the following compounds. (20 pts)
   (a) PCl_5 (b) I_3^- (c) CH_3OH (d) XeO_4 (e) SF_6

3. At 1000 °C, ammonia gas, $NH_3(g)$ reacts with oxygen gas to form gaseous nitric oxide, NO(g), and water vapor. Balance the equation for this reaction. (10 pts)

4. When 1 mole of methane (CH_4) is burned at constant pressure, 890 kJ of energy is released as heat. Calculate enthalpy for a process in which a 5.8 g sample of methane is burned at constant pressure. (M_w of H is 1.008, M_w of C is 12.01) (15 pts)

5. Calculate the root mean square velocity for the atoms in a sample of helium gas at 300 K. (10 pts)

6. Calculate the pH of a solution that contains 1.0 M HCN ($K_a = 6.2 \times 10^{-10}$) and 5.0 M HNO_2 ($K_a = 4.0 \times 10^{-4}$). Also calculate the concentration of cyanide ion (CN^-) in this solution at equilibrium. (15 pts)

7. Predict the trend in radius for the following ions: Be^{2+}, Mg^{2+}, Ca^{2+}, and Sr^{2+}.(5 pts)

8. (1) Compare the first ionization energy of the following elements: Na, Mg, Al, Si, P, S, Cl and Ar. (5 pts) (2) Explain why. (5 pts)