

# 淡江大學 106 學年度日間部轉學生招生考試試題 2-18

系別：化學工程與材料工程學系  
二年級

科目：普通化學

18-1

考試日期：7 月 20 日(星期四) 第 3 節

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1. Name the following compounds. (15 pts)  
(a)  $\text{MgBr}_2$  (b)  $\text{LiF}$  (c)  $\text{K}_2\text{CO}_3$  (d)  $\text{NaCl}$  (e)  $\text{O}_2$
2. Draw the Lewis structures of the following compounds. (20 pts)  
(a)  $\text{PCl}_3$  (b)  $\text{I}_3^-$  (c)  $\text{CF}_4$  (d)  $\text{XeO}_3$  (e)  $\text{NO}_2^-$
3. Draw the molecular orbital (M.O.) energy level diagram of the following diatomic compounds in ground state. (10 pts)  
(a)  $\text{N}_2$  (b)  $\text{F}_2$
4. Calculate the mass percent of iron and oxygen in iron (III) oxide and (average mass of iron: 55.85, oxygen atom: 16.00) (5 pts)
5. What is the average mass of natural copper? (The natural composition of  $^{63}\text{Cu}$  and  $^{65}\text{Cu}$  are 69.09% and 30.91%, and the mass values for  $^{63}\text{Cu}$  and  $^{65}\text{Cu}$  are 62.93 amu and 64.93 amu, respectively) (5 pts)
6. Balance the reaction between solid lead (II) oxide and ammonia gas to produce nitrogen gas, liquid water, and solid lead. (7 pts)
7. (a) Explain the **penetration effect** in detail. (10 pts)  
(b) Draw the exact orbital shape of  $3p$  and describe the numbers of nodal plane in  $3p$  orbital. (8 pts)
8. HCN is a very weak acid ( $K_a = 6.2 \times 10^{-10}$ ) when dissolved in water. If a 50 mL sample of 0.1 M HCN is titrated with 0.1 M NaOH, calculate the pH of the solution. (20 pts)  
(a) After 8.0 mL of 0.1 M NaOH has been added.  
(b) At the equivalence point of the titration.