臺北市立大學

106 學年度第一學期學士班二、三年級轉學生招生考試試題

系　　別：應用物理暨化學系（三年級）
科　　目：普通化學
考試時間：90 分鐘【10:30-12:00】
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案卷上；**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。）**

問答題（共 100 分）

一、Answer the following short questions: (4% for each, 40% total)

a. Write down the Arrhenius equation?
b. How is a catalyst able to increase the reaction rate?
c. What is a pseudo-first-order reaction?
d. What is energy gap?
e. What is formal charge?
f. What is VSEPR?
g. Why ionic compounds are insoluble in pentane?
h. How soap removes oily dirt?
i. What is solubility product constant?
j. Why is mass conserved in ordinary chemical reaction but not in nuclear reaction?

二、Draw the molecular orbital energy level diagram for the ground state of the nitrogen molecule, N_2, and write the electron configuration. (10%)

三、Write the mechanism for the S_{N2} reaction of hydroxide ion, OH^-, with *cis*-1-chloro-3-methlycyclopentane. (10%)

四、An ionic compound can dissolve in water because the cations and anions are attracted to water molecules. Which of the following cations should be most strongly attracted to water: Na^{+}, Mg^{2+}, or Al^{3+}? Explain briefly. (15%)

五、What is the difference between the Arrhenius, Bronsted-Lowry, and Lewis definitions of an acid? (15%)

六、Sketch the molecular orbitals energy-level diagram expected for O_2. (10%)