

淡江大學 105 學年度日間部寒假轉學生招生考試試題

系別：尖端材料科學學程二年級

科目：普通化學

4-1

考試日期：12月3日(星期六) 第1節

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本試題係由印刷

第一部分：選擇題（單選，每題5分，共20分）

1. Which of the following atoms has the largest first ionization energy?

- (A) F (B) Ne (C) Na (D) He

2. Which of the following molecules has the shortest carbon-carbon bond lengths?

- (A) C₃H₆ (B) C₂H₆ (C) C₂H₄ (D) C₂H₂

3. How many different structural isomers are present for C₆H₁₄?

- (A) 3 (B) 4 (C) 5 (D) 6

4. Which of the following molecules is the strongest acid among them?

- (A) HF (B) HCl (C) HBr (D) HI

第二部分：解釋名詞（每題5分，共30分）

1. Pauli exclusion principle
2. Isotope
3. Hess's law
4. Half-life
5. Sublimation
6. Penetration effect

第三部分：問答題與計算題（共50分）

1. Describe (a) the Lewis structures, (b) the molecular structures by VSEPR model and (15%)
(c) the hybrid orbitals of XeF₄.

背面尚有試題

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2. A certain oxygen atom has the electron configuration $1s^2 2s^2 2p_x^2 p_y^2$. (10%: 4%, 3%, 3%)
- (a) How many unpaired electrons are present? (b) Is this an excited state of oxygen?
(c) In going from this state to the ground state would energy be released or absorbed?
3. A 0.6025 g sample was dissolved, and the Ca^{2+} and Ba^{2+} ions present were precipitated as $\text{BaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$ and $\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$. The oxalates were then heated in the 320°C to 400°C range to produce an anhydrous residue (MC_2O_4 , $\text{M} = \text{Ca}$ or Ba) that weighed 0.5713 g. Subsequently, the anhydrous residue was heated in the 580°C to 620°C range and the resulting products corresponding to the two carbonates weighed 0.4673 g finally.
- (a) Write down the equations of the chemical reactions occurred in the 580°C to 620°C range. (10 pts)
- (b) Calculate the percentage Ca and percentage Ba in the sample. (15 pts)
- (Ba = 137.33, Ca = 40.08, C = 12.01)