

淡江大學九十三年學年度轉學生招生考試試題 8-1

系別：化學學系二年級

科目：普通化學

准帶項目請打「○」否則打「×」	
X	簡單型計算機

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本試題雙面印製

*****請按題序作答並標示清楚答案之題號*****

第一部份：選擇題（單選，每題4分，共20分）

1. All of the following aqueous solutions have the same analytical concentrations. Which one has the correct pH relation?
(A) HOCl > HOI (B) H₂SeO₄ > H₂SeO₃ (C) NaCN > FeCl₃ (D) PH₃ > NH₃ (E) HI > HCl

2. The pressures and temperatures of the following substances are indicated in the corresponding parentheses.

He(750 torr, 0 °C), N₂O(14.5 psi, 0 K), H₂O(1atm, 300 K), NaCl(1 bar, 100 °C)

Which of the following is the correct order of entropies for the above substances?

- (A) H₂O > NaCl > He > N₂O
(B) N₂O > H₂O > NaCl > He
(C) He > N₂O > H₂O > NaCl
(D) NaCl > N₂O > He > H₂O
(E) He > H₂O > NaCl > N₂O

3. The following reactions proceed to the right, as written.



Choose the correct order of the strength for the oxidizing agents in the above reactions.

- (A) Ag > H₂ > Cd > Zn
(B) Ag⁺ > H⁺ > Cd²⁺ > Zn²⁺
(C) Zn²⁺ > Cd²⁺ > H⁺ > Ag⁺
(D) Zn > Cd > H₂ > Ag
(E) Ag⁺ > H₂ > Cd²⁺ > Zn
4. Which of the following molecules contains the shortest carbon-carbon bond?
(A) C₂H₂
(B) C₂H₄
(C) C₂H₆
(D) C₂Cl₄
(E) (B) and (D)
5. The ionic strength of an aqueous solution of 0.010 M Al(NO₃)₃ is
(A) 0.010 M (B) 0.020 M (C) 0.030 M (D) 0.060 M (E) 0.120 M

◀ 注意背面尚有試題 ▶

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第二部份：問答題（共80分）

1. For the following second-order chemical reaction,



where a, b, and c are the stoichiometric coefficients of A, B, and C, respectively.

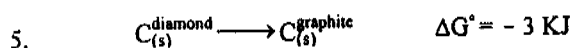
- (a) Derive the integrated rate law to express the reactant concentration [A] as a function of time. (Use k as the rate constant and [A]₀ as the initial concentration of A in your derivations.) (12%)
- (b) Derive t_{1/2}, the reaction half-life of A, in terms of k and [A]₀. (8%)

2. Describe the best way to prepare a buffer solution with high buffer capacity. Derive the expression of pH value for the buffer solution you prepared. Define all the terms used in your derivation. (15%)

3. Describe the physical meanings of the four quantum numbers. (12%)

4. For the following species, write the hybridizations for the central atoms and draw the Lewis structures to show their molecular shapes and indicate the locations of the nonbonding electrons.

- (a) I₃⁻ (b) H₃O⁺ (20%)



Describe and explain the stability of diamond at 25°C and 1 atm. (8%)

6. Describe the change of cell potential for a galvanic cell from non-equilibrium state to equilibrium state. (5%)