

東吳大學 106 學年度轉學生(含進修學士班轉學生)招生考試試題

第 1 頁，共 2 頁

系級	化學系二年級	考試時間	100 分鐘
科目	普通化學	本科總分	100 分

第一部分:選擇題 (每題 4 分，共 60 分)

- How many significant figures are in the measurement, 0.0007790 g?
(A) 4 (B) 5 (C) 6 (D) 7 (E) 8
- Which of the following represent isotopes?
1: $^{32}_{15}\text{X}$ 2: $^{32}_{16}\text{X}$ 3: $^{31}_{15}\text{X}$ 4: $^{34}_{17}\text{X}$
(A) 1 and 3 (B) 3 and 4 (C) 1 and 4 (D) 1 and 2
- Which statement is true about kinetic molecular theory?
(A) A single particle does not move in a straight line.
(B) The size of the particle is large compared to the volume.
(C) The collisions of particles with one another is completely elastic.
(D) The average kinetic energy of a particle is not proportional to the temperature.
- Which of the following sets of quantum numbers is not allowed?
(A) (4, 2, -1, 1/2), (B) (8, 4, 0, -1/2), (C) (2, 1, 2, 1/2), (D) (3, 2, 1, -1/2)
- Order the following species from smallest to largest ionization energy. Ca, Ca⁺, Ca²⁺
(A) Ca⁺ < Ca < Ca²⁺ (B) Ca²⁺ < Ca⁺ < Ca (C) Ca < Ca⁺ < Ca²⁺ (D) Ca < Ca²⁺ < Ca⁺
- Using Lewis structures and formal charge, which of the following ions is most stable?
OCN⁻ ONC⁻ NOC⁻
(A) OCN⁻ (B) ONC⁻ (C) NOC⁻
(D) None of these ions are stable according to Lewis theory.
(E) All of these compounds are equally stable according to Lewis theory.
- Choose the bond below that is most polar.
(A) C-N (B) C-F (C) C-O (D) C-C (E) F-F
- Which of the following does not affect the shape of a molecule as per VSEPR model?
(A) electron groups on terminal atoms (B) electron groups on the central atom
(C) number of lone pairs on the central atom (D) any one of the above
- Determine the solubility of CO₂ in soda water at 25°C if the pressure of CO₂ is 5.2 atm. The Henry's law constant for carbon dioxide in water at this temperature is 3.4 × 10⁻² M/atm.
(A) 0.15 M (B) 0.57 M (C) 0.65 M (D) 0.18 M (E) 0.29 M
- Which is not a colligative property?
(A) freezing point depression in a solution (B) vapor pressure lowering in a solution
(C) boiling point elevation in a solution (D) boiling point of a solvent
- Place the following in order of increasing acid strength.
HBrO₂ HBrO₃ HBrO HBrO₄
(A) HBrO₂ < HBrO₄ < HBrO < HBrO₃ (B) HBrO < HBrO₂ < HBrO₃ < HBrO₄
(C) HBrO₂ < HBrO₃ < HBrO₄ < HBrO (D) HBrO₄ < HBrO₂ < HBrO₃ < HBrO

※一律作答於答案卷上
(題上作答不予計分)，並
務必標明題號，依序作答。

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第 2 頁，共 2 頁

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12. Calculate the pH of a buffer solution that is 0.050 M in benzoic acid ($\text{HC}_7\text{H}_5\text{O}_2$) and 0.150 M in sodium benzoate ($\text{NaC}_7\text{H}_5\text{O}_2$). For benzoic acid, $K_a = 6.5 \times 10^{-5}$.

- (A) 3.71 (B) 4.66 (C) 5.53 (D) 6.41

13. Which of the following compounds will have the highest molar solubility in pure water?

- (A) PbSO_4 , $K_{sp} = 1.82 \times 10^{-8}$ (B) MgCO_3 , $K_{sp} = 6.82 \times 10^{-6}$
 (C) AgI , $K_{sp} = 8.51 \times 10^{-17}$ (D) PbS , $K_{sp} = 9.04 \times 10^{-29}$

14. What mass of silver can be plated onto an object in 33.5 minutes at 8.70 A of current?



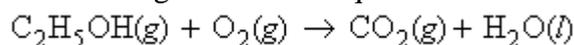
- (A) 19.6 g (B) 0.326 g (C) 9.78 g (D) 3.07 g

15. Which of the following statements is true concerning the two compounds 2,3-dimethylpentane and 2,4-dimethylpentane?

- (A) Because the two compounds are structural isomers, they should have the same molecular formula.
 (B) Because the two compounds are structural isomers, they should have identical chemical properties.
 (C) Because the two compounds are structural isomers, they should have identical physical properties.
 (D) Because the two compounds are enantiomers, they should rotate polarized light in opposite directions.

第二部分:問答題 (共 40 分)

1. Consider the following unbalanced equation:



If 1.86 g of ethanol reacts with 14.3 g of oxygen, how many moles of water are produced? (5points)

2. Write the "Correct" Lewis structure for the followings. (Including resonance structures if necessary). (10 points)

- (A) NO_2^- (B) ICl_5

3. An aqueous NaCl solution is made using 117 g of NaCl diluted to a total solution volume of 875 mL. Calculate the molarity, molality, and mass percent of the solution. (Assume a density of 1.06 g/mL for the solution.) (15points)

4. Calculate the $\Delta G^\circ_{\text{rxn}}$ using the following information. (5 points)



ΔH°_f (kJ/mol) -133.9 50.6 -285.8

S° (J/mol·K) 266.9 121.2 191.6 70.0