

東吳大學 107 學年度暑假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

Part A. Calculation. (Give the detail calculation processes. 寫出詳細計算過程) (total 60%)

1. A reaction at 298K is $\text{Cr}_2\text{O}_7^{2-}(\text{aq}) + 14\text{H}^+(\text{aq}) + 6\text{I}^-(\text{aq}) \rightarrow 2\text{Cr}^{3+}(\text{aq}) + 6\text{I}_2(\text{s}) + 7\text{H}_2\text{O}(\text{l})$ (20%, each 5%)



(a). Calculate E_{cell}^0 (in V) for the voltaic cell. (計算此伏打電池的標準電位值)

(b). Calculate equilibrium constant k . (計算此反應的平衡常數)

(c). Calculate ΔG^0 (in KJ) for the reaction. ($F = 96485\text{ C/mole}$)

(d). Calculate E_{cell} (V) at 298K when $[\text{Cr}_2\text{O}_7^{2-}] = 2.0\text{ M}$, $[\text{H}^+] = 1.0\text{ M}$, $[\text{I}^-] = 1.0\text{ M}$, $[\text{Cr}^{3+}] = 1.0 \times 10^{-5}\text{ M}$.

2. The following data were measured for the reaction of nitric oxide with hydrogen:



Experiment number	[NO] (M)	[H ₂] (M)	Initial Rate (M/S)
1	0.100	0.100	1.23×10^{-3}
2	0.100	0.200	2.46×10^{-3}
3	0.200	0.100	4.92×10^{-3}

(a). Determine the rate law for this reaction. (寫出反應速率與濃度關係的方程式)

(b). Calculate the rate constant with unit. (計算速率常數附上單位)

(c). Calculate the rate (with unit) when $[\text{NO}] = 0.0500\text{ M}$ and $[\text{H}_2] = 0.150\text{ M}$. (計算反應速率附上單位)

(d). Calculate $[\text{NO}]$ when initial rate is $3.94 \times 10^{-2}\text{ (M/S)}$ and $[\text{H}_2]$ is 0.200 M .

3. Calculate pH for the following titration. (計算下列滴定所形成溶液的酸鹼度) (20%, each 10%)

(a). Calculate the pH of the solution formed when 45.0 mL of 0.100 M NaOH is added to 50.0 mL of 0.100 M CH₃COOH ($K_a = 1.8 \times 10^{-5}$)

(b). Calculate the pH at the equivalence point in the titration of 50.0 mL of 0.100 M CH₃COOH with 0.100 M NaOH.

東吳大學 107 學年度暑假轉學生招生考試試題

第 2 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

Part B. Single choice.(單選題) (40%, each 4%)

1. Which of the following represents the largest mass?

- A) 2.0×10^2 mg B) 0.0010 kg C) 1.0×10^5 ng D) 2.0×10^2 cg E) 10.0 dg

2. An atom of the isotope chlorine-37 consists of how many protons, neutrons, and electrons?

(p = proton, n = neutron, e = electron)

- A) 17 p, 18 n, 17 e B) 17 p, 20 n, 17 e C) 17 p, 20 n, 7 e D) 17 p, 37 n, 17 e E) 20 p, 17 n, 20 e

3. Which is the correct formula for copper(II) phosphate?

- A) Cu_2PO_4 B) $\text{Cu}_3(\text{PO}_4)_2$ C) Cu_2PO_3 D) $\text{Cu}(\text{PO}_4)_2$ E) $\text{Cu}(\text{PO}_3)_2$

4. Based on the solubility rules, which one of the following should be soluble in water?

- A) AgBr B) AgCl C) Ag_2CO_3 D) AgNO_3 E) Ag_2S

5. Calculate the volume occupied by 25.2 g of CO_2 (F. W. = 44.011) at 0.84 atm and 25°C . $R = 0.08206$ L atm/K mol.

- A) 0.060 L B) 1.34 L C) 16.7 L D) 24.2 L E) 734 L

6. Calculate the wavelength of the light emitted by a hydrogen atom during a transition of its electron from the $n = 4$ to the $n = 1$ principal energy level. For hydrogen $E_n = -2.18 \times 10^{-18} \text{ J}(1/n^2)$, $C = 3 \times 10^8 \text{ m/s}$, $h = 6.626 \times 10^{-34} \text{ JS}$.

- A) 97.3 nm B) 82.6 nm C) 365 nm D) 0.612 nm E) 6.8 nm

7. The geometry of the SF_4 molecule is

- A) tetrahedral. B) trigonal pyramidal. C) trigonal planar. D) square planar. E) seesaw.

8. Platinum(A. W. = 195.1) has a face-centered cubic crystal structure and a density of 21.5 g/cm^3 .

What is the radius of the platinum atom? ($N_A = 6.02 \times 10^{23}$)

- A) 69 pm B) 98 pm C) 139 pm D) 196 pm E) 277 pm

9. Which of the following liquids would make a good solvent for iodine, I_2 ?

- A) HCl B) H_2O C) CH_3OH D) NH_3 E) CS_2

10. The best name for $\text{K}_4[\text{FeCl}_2(\text{CN})_4]$ is

- A) potassium dichlorotetracyanoferrate(II).
 B) potassium dichlorodicyanoiron(II).
 C) potassium dichlorodicyanoferrate(III).
 D) tetrapotassium dichlorobis(cyano)iron(III).
 E) tetrapotassium dichlorodicyanoiron(II).