

東吳大學 104 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	微生物學系二年級	考試時間	100 分鐘
科目	普通化學	本科總分	100 分

Part A: Calculation. (1---27, 2---25, total 52)

1. Describe the galvanic cell on the following half-reaction:



a. Give the overall galvanic cell reaction equation(label the state).

[寫出化學電池的總反應方程式，註明 s、l、g 狀態] (4%)

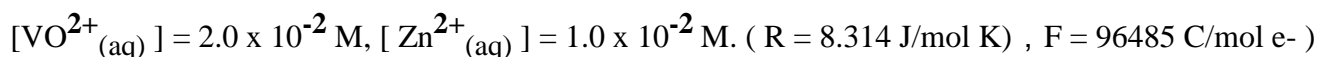
b. Calculate E°_{cell} .(unit:V) [計算本電池在標準狀態時的電位值，以伏特為單位] (4%)

c. Calculate ΔG° (KJ). ($F = 96485 \text{ C/mol e}^-$)

[計算標準狀態的自由能變化值，以千焦耳為單位] (4%)

d. Calculate K. [計算平衡常數] (5%)

e. Give the Nernst equation, and calculate E_{cell} at 25°C , as $[\text{VO}_2^+(\text{aq})] = 2.0 \text{ M}$, $[\text{H}^+(\text{aq})] = 0.10 \text{ M}$,



[寫出能斯特方程式並計算本電池各物質在此濃度下的電位值] (10%)

2. We will consider the titration of 60.0 mL of 0.10 M acetic acid($\text{HC}_2\text{H}_3\text{O}_2$, $K_a = 1.0 \times 10^{-5}$) with 0.20 M NaOH. Calculate the pH at various points representing volumes of added NaOH.

[計算醋酸溶液及在醋酸溶液中滴入下列毫升數氫氧化鈉時，溶液的酸鹼度值]

a. No NaOH has been added, $V_{\text{NaOH}} = 0.00 \text{ ml}$, calculate the pH of the solution. (5%)

b. 15.0 mL of 0.20 M NaOH has been added, $V_{\text{NaOH}} = 15.00 \text{ ml}$, calculate the pH of the solution. (10%)

c. 30.0 mL of 0.20 M NaOH has been added, $V_{\text{NaOH}} = 30.00 \text{ ml}$, calculate the pH of the solution. (10%)

東吳大學 104 學年度轉學生(含進修學士班轉學生)招生考試試題

第 2 頁，共 2 頁

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

Part B. Single choice. (each 4, total 48)

- The SI prefixes *nano* and *deci* represent, respectively:
A) 10^{-9} and 10^{-6} . B) 10^6 and 10^{-3} . C) 10^3 and 10^{-3} . D) 10^9 and 10^{-6} . E) 10^{-9} and 10^{-1} .
- The Stock system name for $\text{Co}_2(\text{SO}_3)_3$ is:
A) cobalt sulfate B) cobalt(II) sulfite C) cobalt(II) sulfate D) cobalt(III) sulfite E) cobalt(III) sulfate
- Based on the solubility rules, which one of the following should be *soluble* in water?
A) CaSO_4 B) BaSO_4 C) K_2SO_4 D) PbSO_4 E) AgCl
- Calculate the number of moles of gas contained in a 10.0 L tank at 22°C and 105 atm. ($R = 0.08206 \text{ L}\cdot\text{atm}/\text{K}\cdot\text{mol}$)
A) $1.71 \times 10^{-3} \text{ mol}$ B) 43.4 mol C) 1.03 mol D) 0.0231 mol E) 582 mol
- If 325 g of water at 4.2°C absorbs 12.28 kJ, what is the final temperature of the water? The specific heat of water is $4.184 \text{ J}/\text{g}\cdot^\circ\text{C}$.
A) 13.2°C B) 4.8°C C) 9.0°C D) 4.21°C E) $2,938^\circ\text{C}$
- Electrons in an orbital with $l = 3$ are in a/an
A) *f* orbital. B) *d* orbital. C) *g* orbital. D) *p* orbital. E) *s* orbital.
- How many *valence electrons* does a tin (Sn) atom have?
A) 2 B) 4 C) 14 D) 36 E) 50
- The only true hydrocarbon polymer found in nature is
A) Tyvek. B) nylon. C) rubber. D) polystyrene. E) neoprene.
- In the coordination compound $[\text{Cr}(\text{NH}_3)(\text{en})_2\text{Cl}]\text{Br}_2$, the coordination number (C.N.) and oxidation number (O.N.) of the metal atom are, respectively,
A) C.N. = 6; O.N. = +4. B) C.N. = 4; O.N. = +2. C) C.N. = 5; O.N. = +2.
D) C.N. = 6; O.N. = +3. E) C.N. = 4; O.N. = +3.
- At 1500°C the equilibrium constant for the reaction $\text{CO}(\text{g}) + 2\text{H}_2(\text{g}) \rightarrow \text{CH}_3\text{OH}(\text{g})$ has the value $K_p = 1.4 \times 10^{-7}$. Calculate ΔG° for this reaction at 1500°C . ($R = 8.314 \text{ J}/\text{mol K}$)
A) 105 kJ/mol B) 1.07 kJ/mol C) -233 kJ/mol D) -105 kJ/mol E) 233 kJ/mol
- The reaction $\text{A} + 2\text{B} \rightarrow \text{products}$ has the rate law, $\text{rate} = k[\text{A}][\text{B}]^3$. If the concentration of B is doubled while that of A is unchanged, by what factor will the rate of reaction increase?
A) 2 B) 4 C) 6 D) 8 E) 9
- The geometry of the ClF_3 molecule is best described as
A) distorted tetrahedron. B) trigonal planar. C) tetrahedral. D) T-shaped. E) trigonal pyramidal.