

## 淡江大學九十四學年度轉學生招生考試試題

系別：化學學系二年級

科目：普通化學

准帶項目請打「V」

V 簡單型計算機

節次：7月12日第3節

本試題共3頁

本試題雙面印製

\*\*\*\*\*請按題序作答並標示清楚答案之題號\*\*\*\*\*

## 第一部分：選擇題(每題5分,共45分)

1. The enthalpy change is the heat absorbed or given off during a chemical reaction that occurs at constant \_\_\_\_\_

- a. Temperature      b. Volume      c. Pressure      d. Reaction Rate

2. Consider an electrochemical cell where the following reaction takes place.



Which of the following is the correct cell notation for this cell? \_\_\_\_\_

- a.  $\text{Au} | \text{Au}^{3+} || \text{Zn}^{2+} | \text{Zn}$       b.  $\text{Zn} | \text{Zn}^{2+} || \text{Au}^{3+} | \text{Au}$

3. The standard state of an element or compounds is determined at a pressure of \_\_\_\_\_ and a temperature \_\_\_\_\_

- a. 760 mmHg 0°C      b. 1 atm 298 °C

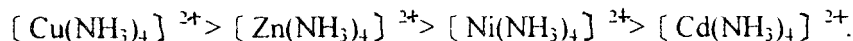
4. Which of the following is a state function that is a change in this quantity depends only on the initial and final states of the system being discussed? \_\_\_\_\_

- a. Enthalpy      b. Work      c. Power

5. According to the molecular orbital theory, which of the following correctly list is these helium species in terms of increase bond order? \_\_\_\_\_

- a.  $\text{He}_2 < \text{He}_2^+ < \text{He}_2^{2+}$       b.  $\text{He}_2 > \text{He}_2^+ > \text{He}_2^{2+}$

6. We place 0.0001 mole of  $\text{NiCl}_2$ ,  $\text{CdCl}_2$ ,  $\text{ZnCl}_2$  and  $\text{CuCl}_2$  in a 1 L of a 0.1 M  $\text{NH}_3$  solution.  $K_f$  of the metal complex ions show in decreasing order as the following



Which of the following ion would exist at the least concentration in the solution?

- a.  $\text{Ni}^{2+}$       b.  $\text{Zn}^{2+}$       c.  $\text{Cd}^{2+}$       d.  $\text{Cu}^{2+}$

◀ 注意背面尚有試題 ▶

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7. How is sodium currently produced in industry? \_\_\_\_\_

a. By reduction of  $\text{Na}^+$  in  $\text{NaCl}$  with  $\text{Al}$

b. Electrolysis of pure  $\text{NaCl}(\text{aq})$

c. Electrolysis of molten  $\text{NaCl}$

8. What hybrid orbital is used by the underlined carbon in the allene molecule? \_\_\_\_\_

$\text{CH}_2=\underline{\text{C}}=\text{CH}_2$  \_\_\_\_\_ a.  $\text{sp}^3$                       b.  $\text{sp}$                       c.  $\text{sp}^2$

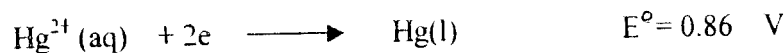
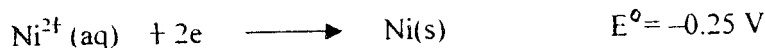
9.  $10^\circ\text{C}$  the water ionization constant  $K_w$  is  $2.9 \times 10^{-15}$ , what is  $(\text{H}_3\text{O}^+)$  in neutral

water at  $10^\circ\text{C}$ ? \_\_\_\_\_

a.  $4.4 \times 10^{-6} \text{ M}$                       b.  $1.0 \times 10^{-7} \text{ M}$                       c.  $5.39 \times 10^{-8} \text{ M}$

第二部份：填充題(每格 3 分，共 39 分)

1. Given the two following half reactions



What is the value of  $E^\circ$  for the following reaction \_\_\_\_\_



2. What is the value of the standard enthalpy of formation for any element under standard condition? \_\_\_\_\_

3. Consider the simple molecule  $\text{NO}$ , nitrogen oxide

(a). How many sigma ( $\sigma$ ) bonds are there? \_\_\_\_\_

(b). How many pi ( $\pi$ ) bond are there? \_\_\_\_\_

(c). What is the N-O bond order? \_\_\_\_\_

(d). If the molecule is oxidized to the nitrosonium ion,  $\text{NO}^+$ , and this

N-O bond length is \_\_\_\_\_ (longer or shorter) and it is \_\_\_\_\_ (stronger or weaker) than  $\text{NO}$ .

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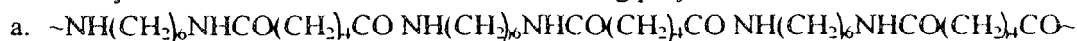
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4. Complete the following table.

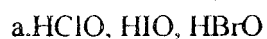
	0.001 M HCl	10 M NaOH
pH	?A	?B
pOH	?C	?D

5. Identify the monomers from which the following polymers are made.



第三部份：問答題(共 16 分)

1. Choose the strongest acid from each group. (4 分)

2. Draw the Lewis structure and resonance structure for N<sub>2</sub>O (6 分)

3. Sketch the geometry of the following compounds. (6 分)

