

# 東海大學 104 學年度碩士班招生考試試題

考試科目：普通化學

應考系組：化學化學、化學化生 科目代碼：22011

考試日期：104 年 03 月 8 日 第 1 節

使用計算機：可

共 3 頁，第 1 頁

I. Choose the most appropriate answer (60%; 3% for each one)

- Which of the following compounds is a *strong electrolyte*?  
A)  $\text{H}_2\text{O}$                       B)  $\text{O}_2$                       C)  $\text{H}_2\text{SO}_4$                       D)  $\text{C}_6\text{H}_{12}\text{O}_6$
- The SI prefixes *milli* and *mega* represent, respectively:  
A)  $10^6$  and  $10^{-6}$ .              B)  $10^{-3}$  and  $10^6$ .              C)  $10^3$  and  $10^{-6}$ .              D)  $10^{-3}$  and  $10^9$ .
- Based on the solubility rules, which one of the following compounds should be *insoluble* in water?  
A)  $\text{NaCl}$                       B)  $\text{MgBr}_2$                       C)  $\text{FeCl}_2$                       D)  $\text{AgBr}$
- The mass and atomic number of magnesium is 24 and 12, respectively. A  $\text{Mg}^{2+}$  ion has  
A) 12 protons and 10 electrons.              B) 24 protons and 26 electrons.  
C) 12 protons and 13 electrons.              D) 12 protons and 14 electrons.
- What is the formula for the ionic compound formed by calcium ions and nitrate ions?  
A)  $\text{Ca}_3\text{N}_2$                       B)  $\text{Ca}(\text{NO}_3)_2$                       C)  $\text{Ca}_2\text{NO}_3$                       D)  $\text{CaNO}_3$
- The correct name for  $\text{NH}_4\text{NO}_3$  is  
A) ammonium nitrate.                      B) ammonium nitrogen trioxide.  
C) ammonia nitrogen oxide.                      D) hydrogen nitrogen oxide.
- Balance the following equation using the smallest set of whole numbers, then add together the coefficients. Don't forget to count coefficients of one. The sum of the coefficients is  
$$\underline{\hspace{1cm}} \text{Cr} + \underline{\hspace{1cm}} \text{H}_2\text{SO}_4 \rightarrow \underline{\hspace{1cm}} \text{Cr}_2(\text{SO}_4)_3 + \underline{\hspace{1cm}} \text{H}_2$$
  
A) 4.                      B) 9.                      C) 11.                      D) 13.
- Which of the following is the best reducing agent?  
$$\text{Cl}_2 + 2\text{e}^- \rightarrow 2\text{Cl}^- \quad E^\circ = 1.36 \text{ V}$$
$$\text{Mg}^{2+} + 2\text{e}^- \rightarrow \text{Mg} \quad E^\circ = -2.37 \text{ V}$$
$$2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2 \quad E^\circ = 0.00 \text{ V}$$
  
A)  $\text{Cl}_2$                       B)  $\text{H}_2$                       C)  $\text{Mg}$                       D)  $\text{Mg}^{2+}$

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共 3 頁，第 2 頁

9. Identify the *oxidizing agent* in the following chemical reaction.



- A)  $\text{MnO}_4^-$       B)  $\text{H}_2\text{SO}_3$       C)  $\text{Mn}^{2+}$       D)  $\text{SO}_4^{2-}$

10. Which of the following is an example of a *disproportionation reaction*?

- A)  $2\text{C}_2\text{H}_6(\text{g}) + 7\text{O}_2(\text{g}) \rightarrow 4\text{CO}_2(\text{g}) + 6\text{H}_2\text{O}(\text{l})$       B)  $2\text{KBr}(\text{aq}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{KCl}(\text{aq}) + \text{Br}_2(\text{l})$   
C)  $2\text{H}_2\text{O}_2(\text{aq}) \rightarrow 2\text{H}_2\text{O}(\text{l}) + \text{O}_2(\text{g})$       D)  $\text{CaBr}_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{CaSO}_4(\text{s}) + 2\text{HBr}(\text{g})$

11. Define the following term: *endothermic process*.

- A) The study of heat change in chemical reactions  
B) The process of transferring thermal energy from a system to the surroundings.  
C) The process of transferring thermal energy from the surroundings to a system.  
D) The transfer of thermal energy between two bodies that are at different temperatures.

12. Which of the following represents a *precipitation reaction*?

- A)  $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l})$       B)  $2\text{KBr}(\text{aq}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{KCl}(\text{aq}) + \text{Br}_2(\text{l})$   
C)  $2\text{KNO}_3(\text{s}) \rightarrow 2\text{KNO}_2(\text{s}) + \text{O}_2(\text{g})$       D)  $\text{CaBr}_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{CaSO}_4(\text{s}) + 2\text{HBr}(\text{g})$

13. Give the values of the quantum numbers associated with the *5d* subshell.

- A)  $n = 5, l = 0, m_l = 0$       B)  $n = 5, l = 1, m_l = -1, 0, 1$   
C)  $n = 5, l = 2, m_l = -2, -1, 0, 1, 2$       D)  $n = 5, l = 3, m_l = -3, -2, -1, 0, 1, 2, 3$

14.  $\text{O}^{2-}$  is isoelectronic with \_\_\_\_\_

- A)  $\text{F}^-$       B)  $\text{K}^+$       C)  $\text{Cl}^-$       D) Ar

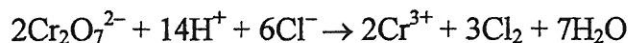
15. Which of the following compounds contains a lone pair of electrons?

- A)  $\text{BH}_3$       B)  $\text{NH}_3$       C)  $\text{CH}_4$       D)  $\text{AlH}_3$

16. Consider the process  $\text{A}(\text{l}) \rightleftharpoons \text{A}(\text{s})$ . An increase in temperature favors which direction?

- A) neither      B) More information is needed.      C) to the right      D) to the left

17. How many electrons are transferred in the following reaction?



- A) 2      B) 4      C) 6      D) 8

