

國立高雄師範大學九十九學年度轉學生招生考試試題

系所別：化學系、生技系二年級

(以鉛筆作答者不予計分)

科 目：普通化學 (第一頁，共四頁)

※注意：不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上，
於本試題上作答者，不予計分。

一、單選題，每題 5 分，答錯不倒扣。

1. A piece of copper with a mass of 218 g has a heat capacity of $83.9 \text{ J/}^\circ\text{C}$. What is the specific heat of copper?
(A) $0.385 \text{ J/g}\cdot^\circ\text{C}$ (B) $1.83 \times 10^4 \text{ J/g}\cdot^\circ\text{C}$
(C) $2.60 \text{ J/g}\cdot^\circ\text{C}$ (D) $1.32 \text{ J/g}\cdot^\circ\text{C}$
(E) $24.5 \text{ J/g}\cdot^\circ\text{C}$
2. For the reaction $2\text{NOCl(g)} \rightleftharpoons 2\text{NO(g)} + \text{Cl}_2\text{(g)}$, $K_c = 8.0$ at a certain temperature. What concentration of NOCl must be put into an empty 4.00 L reaction vessel in order that the equilibrium concentration of NOCl be 1.00 M?
(A) 1.26 M (B) 2.25 M
(C) 2.50 M (D) 3.52 M
(E) 11.0 M
3. Calculate the energy change for the reaction
 $\text{K(g)} + \text{Br(g)} \rightarrow \text{K}^+\text{(g)} + \text{Br}^-\text{(g)}$
given the following ionization energy (IE) and electron affinity (EA) values

	IE	EA
K:	419 kJ/mol	48 kJ/mol
Br:	1140 kJ/mol	324 kJ/mol

(A) -1,092 kJ/mol (B) -95 kJ/mol
(C) 95 kJ/mol (D) 1,092 kJ/mol
(E) 1,187 kJ/mol

(背面有題 續翻背面)

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科 目：普通化學（第二頁，共四頁）

4. How many cubic centimeters of ore containing 0.22% by mass gold must be processed to obtain \$100 worth of gold? The density of the ore is 8.0 g/cm^3 and the price of gold is \$418 per troy ounce. (14.6 troy oz = 1.0 ordinary pound, called an avoirdupois pound; 1 lb = 454 g)
- (A) 42 cm^3 (B) $2.7 \times 10^4 \text{ cm}^3$
(C) $4.2 \times 10^2 \text{ cm}^3$ (D) $6,200 \text{ cm}^3$
(E) $9.3 \times 10^{-1} \text{ cm}^3$
5. Which should have the longer bond, B_2 or B_2^- ?
- (A) B_2 (B) B_2^-
6. A single pulse of a laser yields an average of 5.00×10^{18} photons with $\lambda = 633 \text{ nm}$. If melting ice to water at 0°C requires 6.01 kJ/mol , what is the fewest number of laser pulses need to melt 10.0 g of ice?
- (A) 3830 (B) 3340
(C) 38300 (D) 2120
(E) 212
7. When active metals such as magnesium are immersed in acid solution, hydrogen gas is evolved. Calculate the volume of $\text{H}_2(\text{g})$ at 30.1°C and 0.85 atm that can be formed when 275 mL of 0.725 M HCl solution reacts with excess Mg to give hydrogen gas and aqueous magnesium chloride.
- (A) $3.4 \times 10^{-3} \text{ L}$ (B) 2.2 L
(C) 2.9 L (D) 5.8 L
(E) 11.7 L
8. Will a precipitate of magnesium fluoride form when 200 mL of $1.9 \times 10^{-3} \text{ M MgCl}_2$ are added to 300 mL of $1.4 \times 10^{-2} \text{ M NaF}$? ($K_{\text{sp}}(\text{MgF}_2) = 6.9 \times 10^{-9}$)
- (A) Yes, $Q > K_{\text{sp}}$ (B) No, $Q < K_{\text{sp}}$
(C) No, $Q = K_{\text{sp}}$ (D) Yes, $Q < K_{\text{sp}}$
9. An endothermic reaction causes the surroundings to
- (A) warm up (B) become acidic
(C) condense (D) decrease in temperature
(E) release CO_2

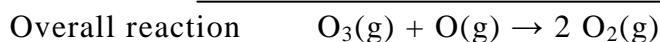
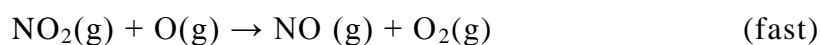
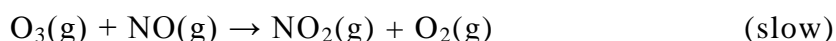
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科 目：普通化學 (第四頁，共四頁)

4. If the human eye has an osmotic pressure of 8.00 atm at 25°C, what concentration of solute particles in water will provide an isotonic eyedrop solution? (5%)

5. One mechanism for the destruction of ozone in the upper atmosphere is



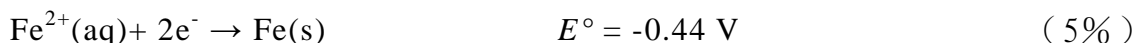
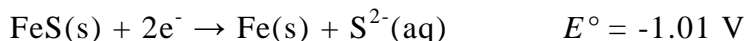
a. Which species is a catalyst?

b. Which species is an intermediate?

c. E_a for the uncatalyzed reaction $\text{O}_3(\text{g}) + \text{O}(\text{g}) \rightarrow 2 \text{O}_2(\text{g})$ is 140. kJ. E_a for the same reaction when catalyzed is 11.9kJ. What is the ratio of the rate constant for the catalyzed reaction to that for the uncatalyzed reaction at 25°C? (Assume that the frequency factor A is the same for each reaction.) (6%)

6. Calculate the solubility of solid $\text{Ca}_3(\text{PO}_4)_2$ ($K_{sp}=1.3 \times 10^{-32}$) in a 0.20M Na_3PO_4 solution. (5%)

7. Calculate K_{sp} for iron(II) sulfide given the following data:



8. Use the molecular orbital model to predict the magnetism and bond order of the N_2^{2-} and O_2^{2+} ions. (10%)