

科目：基礎化學

系所組：化學系碩士班乙組

- 1、 Give common name of the following ions: (1) H^- (2) Cl^- (3) O^{2-} (4) CH_3COO^- (5) CO_3^{2-} (10 pts)
- 2、 Give common name of the following ions: (1) Cu^+ (2) Cu^{2+} (3) Fe^{2+} (4) Fe^{3+} (5) Sn^{2+} (10 pts)
- 3、 Argon has three naturally occurring isotopes, ^{36}Ar , ^{38}Ar , and ^{40}Ar . What is the mass number of each one? How many protons, neutrons, and electrons are present in each? (10 pts)
- 4、 Explain the basis to the following separation techniques. (a).filtration (b).crystallization (c).distillation (d).extraction (e).chromatography (10 pts)
- 5、 What volume of H_2 at 765 torr and 225°C is needed to reduce 35.5 g of copper(II) oxide to form pure copper and water? (10 pts)
- 6、 (a) What are the 4 basic quantum numbers of an atomic orbital? (4 pts)
(b) How are the 4 basic quantum numbers related to the atomic orbital? (4 pts)
(c) What are the n , l , and possible m_l for the $2p$ orbital (2 pts)
- 7、 Rank in order of *decreasing* IE_1 (ionization energy) for Kr, He, and Ar atoms and explain your ranking (10 pts)
- 8、 (a) Draw the Lewis structures of CH_4 , NH_3 , H_2O . (b) Compare bond angles in CH_4 , NH_3 , H_2O . (10 pts)
- 9、 (a) Prove that $\text{pH} + \text{pOH} = 14$ (5 pts) (b) Prove that $K_a \times K_b = K_w$ (5 pts)
- 10、 Balance redox reaction of $\text{Cr}_2\text{O}_7^{2-}(\text{aq}) + \text{I}^-(\text{aq}) \rightarrow \text{Cr}^{3+}(\text{aq}) + \text{I}_2(\text{aq})$ by way of half-reactions in (a) acidic solution (5 pts) (b) basic solution (5 pts)

※ 注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部分可當稿紙使用。

※ 3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。