

淡江大學九十學年度日間部轉學生招生考試試題

系別：化學系二年級

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科目：普通化學

本試題共 壹 頁

應按題序作答，每題十分，共計十題

1. Draw the structure formula for a) an amino acid; b) a chiral compound; c) polyester; d) chlorofluorocarbon(CFC)
2. Explain why aluminum, magnesium, and sodium metal are obtained by electrolysis instead by reduction with chemical reducing agents.
3. By using molecular orbital theory, determine whether O_2^+ or O_2^- should be expected to be more stable. Explain.
4. Why are CFC compounds considered harmful to the environment? Write the chemical equation to describe these corresponding reactions.
5. Express the first law, second law, and third law of thermodynamics in words.
6. Consider the following equilibrium:

$$N_2O_4(g) \rightleftharpoons 2 NO_2(g) \quad \Delta H^\circ = 58.0 \text{ kJ}$$
 In what direction will the equilibrium shift when each of the following changes is made to the system at equilibrium: a) add N_2O_4 ; b) remove NO_2 ; c) increase the volume; d) decrease the temperature.
7. A wooden object from an archeological site is subjected to radiocarbon dating. The activity of the sample due to ^{14}C is measured to be 3.8 disintegrations per second. The activity of a carbon sample of equal mass from fresh wood is 15.2 disintegrations per second. The half-life of ^{14}C is 5715 year. What is the age of the archeological sample?
8. Predict whether the Na_2HPO_4 will form an acidic or basic solution on dissolving in water. K_a for $H_2PO_4^- = 6.2 \times 10^{-8}$; K_a for $HPO_4^{2-} = 4.2 \times 10^{-13}$
9. Calculate the molar solubility of CaF_2 at $25^\circ C$ in a solution that is of 0.010 M in $Ca(NO_3)_2$. K_{sp} of $CaF_2 = 3.9 \times 10^{-11}$
10. Write the equilibrium chemical equation of the reaction of Fe^{2+} with $KMnO_4$ in acidic solution.