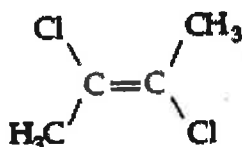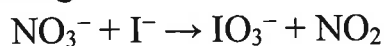自然科學教育學系　　　化學　科試題

每題皆為 10 分。可使用計算機。

1. Calculate $[H^+]$ in a solution that has a pH of 9.4.

2. Name the following:



3. The following reaction occurs in aqueous acid solution:

$$NO_3^- + I^- \rightarrow IO_3^- + NO_2$$

   What is the oxidation state of iodine in $IO_3^-$?

4. Which intermolecular force is the strongest?

   a. London dispersion forces

   b. hydrogen bonding

   c. ionic bonding

   d. dipole-dipole interactions

   e. polar covalent bonds

5. Write the formula for: (a) iron (III) oxide; (b) acetic acid

6. The unknown compound contains 56.79% C, 6.56% H, 28.37% O, and 8.28% N by mass. What is the empirical formula of the unknown compound?

7. A 6.50-g sample of a diprotic acid requires 137.5 mL of a 0.750 M NaOH solution for complete neutralization. What is the molar mass of the acid?

8. A 0.15 $M$ solution of a weak acid is 3.0% dissociated. What is the $Ka$?

9. Consider a sample containing 5.00 moles of a monatomic ideal gas at 25.0°C and an initial pressure of 10.0 atm. Suppose the external pressure is lowered to 1.00 atm in a reversible manner. What is the final pressure?

10. What volumes of $H_2(g)$ and $O_2(g)$ at STP are produced from the electrolysis of water by a current of 2.50 A in 15.0 min?