Reduction of Manganese in Permanganate Ion

OBJECTIVES

- ***Demonstrate*** **proficiency in performing redox titrations and recognizing end points of a redox reaction.**
- ***Write*** **a balanced oxidation-reduction equation for a redox reaction.**
- ***Determine*** **the concentration of a solution by using stoichiometry and volume data from a titration.**

MATERIALS

- **0.0200 M $KMnO_4$**
- **1.0 M H_2SO_4**
- **100 mL graduated cylinder**
- **125 mL Erlenmeyer flasks, 4**
- **250 mL beakers, 2**
- **400 mL beaker**
- **burets, 2**
- **distilled water**
- **double buret clamp**
- **$FeSO_4$ solution**
- **ring stand**
- **wash bottle**

BACKGROUND

In Chapter 15, you studied acid-base titrations in which an unknown amount of acid is titrated with a carefully measured amount of base. In this procedure, a similar approach called a *redox titration* is used. In a redox titration, the reducing agent, Fe^{2+}, is oxidized to Fe^{3+} by the oxidizing agent, MnO_4^-. When this process occurs, the Mn in MnO_4^- changes from a +7 to a +2 oxidation state and has a noticeably different color. You can use this color change to signify a redox reaction "end point." When the reaction is complete, any excess MnO_4^- added to the reaction mixture will give the solution a pink or purple color. The volume data from the titration, the known molarity of the $KMnO_4$ solution, and the mole ratio from the balanced redox equation will give you the information you need to calculate the molarity of the $FeSO_4$ solution.

SAFETY

For review of safety, please see **Safety in the Chemistry Laboratory** in the front of your book.

PREPARATION

1. In your lab notebook, prepare a data table like the one shown on the next page.
2. Clean two 50 mL burets with a buret brush and distilled water. Rinse each buret at least three times with distilled water to remove contaminants.
3. Label one 250 mL beaker "0.0200 M $KMnO_4$" and the other "$FeSO_4$." Label three of the flasks "1," "2," and "3." Label the 400 mL beaker "Waste." Label one buret "$KMnO_4$" and the other "$FeSO_4$."