



## USING THE HANDBOOK

49. Common reactions for Group 13 elements are found in the *Elements Handbook*. Review this material, and answer the following:
  - a. Write net ionic equations for each of the example reactions shown on page 809.
  - b. Which reactions did not change when written in net ionic form? Why?
50. Common reactions for Group 14 elements are found in the *Elements Handbook*. Review this material, and answer the following:
  - a. Write net ionic equations for each of the example reactions shown on page 813.
  - b. Which reactions did not change when written in net ionic form? Why?

## RESEARCH & WRITING

51. Find out how much salt a large northern city, such as New York City or Chicago, uses on its streets in a typical winter. What environmental problems result from this use of salt? What substitutes for salt are being used to melt ice and snow?
52. Research the role of electrolytes and electrolytic solutions in your body. Find out how electrolytes work in the functioning of nerves and muscles. What are some of the health problems that can arise from an imbalance of electrolytes in body fluids?

## ALTERNATIVE ASSESSMENT

53. **Performance** Determine the freezing point of four different mixtures of water and ethylene glycol (use commercial antifreeze). What mixture has the lowest freezing point?
54. **Performance** Find the optimum mixture of salt and ice for reducing the temperature of the chilling bath for an ice-cream freezer. Use your data to write a set of instructions on how to prepare the chilling bath for making ice cream.
55. **Performance** Using a low-voltage dry cell, assemble a conductivity apparatus. Secure several unknown aqueous solutions of equal molality from your instructor, and use the apparatus to distinguish the electrolytes from the nonelectrolytes. Among those identified as electrolytes, rank their relative strengths as conductors from good to poor.
56. **Performance** Using equal volumes of the unknown solutions from the preceding activity, explain how you could use the freezing-point depression concept to distinguish the electrolytes from the nonelectrolytes. Explain how you could determine the number of ions contained per molecule among the solutes identified as electrolytes. Design and conduct an experiment to test your theories.