39. Analyzing Results In the lab, you run an experiment that appears to have a percentage yield of 115%. Propose reasons for this result. Can an actual yield ever exceed a theoretical yield? Explain your answer.

40. Relating Ideas Explain the stoichiometry of blowing air on a smoldering campfire to keep the coals burning.

USING THE HANDBOOK

41. The steel-making process described in the Transition Metal section of the *Elements Handbook* shows the equation for the formation of iron carbide. Use this equation to answer the following questions:

a. If 3.65×10^3 kg of iron is used in a steel-making process, what is the minimum mass of carbon needed to react with all of the iron?

b. What is the theoretical mass of iron carbide that is formed?

42. The reaction of aluminum with oxygen to produce a protective coating for the metal's surface is described in the discussion of aluminum in Group 13 of the *Elements Handbook*. Use this equation to answer the following questions:

a. What mass of aluminum oxide would theoretically be formed if a 30.0 g piece of aluminum foil reacted with excess oxygen?

b. Why would you expect the actual yield from this reaction to be far less than the mass you calculated in item (a)?

43. The reactions of oxide compounds to produce carbonates, phosphates, and sulfates are described in the section on oxides in Group 16 of the *Elements Handbook*. Use those equations to answer the following questions:

a. What mass of CO_2 is needed to react with 154.6 g MgO?

b. What mass of magnesium carbonate is produced?

c. When 45.7 g P_4O_{10} is reacted with an excess of calcium oxide, what mass of calcium phosphate is produced?

RESEARCH & WRITING

44. Research the history of the Haber process for the production of ammonia. What was the significance of this process in history? How is this process related to the discussion of reaction yields in this chapter?

ALTERNATIVE ASSESSMENT

45. Performance Just as reactants combine in certain proportions to form a product, colors can be combined to create other colors. Artists do this all the time to find just the right color for their paintings. Using poster paint, determine the proportions of primary pigments used to create the following colors. Your proportions should be such that anyone could mix the color perfectly.

46. Performance Write two of your own sample problems that are descriptions of how to solve a mass-mass problem. Assume that your sample problems will be used by other students to learn how to solve mass-mass problems.

extension

Graphing Calculator Limiting Reactants and Percentage Yield

Go to **go.hrw.com** for a graphing calculator exercise that asks you to use a theoretical yield graph to make predictions about limiting reactants and percentage yield.

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