3 COMPUTE Use the periodic table to compute the molar masses of HF and SnF_2.

$$1 \text{ mol HF} = 20.01 \text{ g}$$
$$1 \text{ mol } SnF_2 = 156.71 \text{ g}$$

$$30.00 \text{ g } \cancel{\text{HF}} \times \frac{1 \text{ } \cancel{\text{mol HF}}}{20.01 \text{ } \cancel{\text{g HF}}} \times \frac{1 \text{ } \cancel{\text{mol } SnF_2}}{2 \text{ } \cancel{\text{mol HF}}} \times \frac{156.71 \text{ g } SnF_2}{1 \text{ } \cancel{\text{mol } SnF_2}} = 117.5 \text{ g } SnF_2$$

4 EVALUATE The answer is correctly rounded to four significant figures. The units cancel to leave g SnF_2, which matches the unknown. The answer is close to an estimated value of 120.

PRACTICE

Answers in Appendix E

1. Laughing gas (nitrous oxide, N_2O) is sometimes used as an anesthetic in dentistry. It is produced when ammonium nitrate is decomposed according to the following reaction.

$$NH_4NO_3(s) \longrightarrow N_2O(g) + 2H_2O(l)$$

   a. How many grams of NH_4NO_3 are required to produce 33.0 g N_2O?

   b. How many grams of water are produced in this reaction?

2. When copper metal is added to silver nitrate in solution, silver metal and copper(II) nitrate are produced. What mass of silver is produced from 100. g Cu?

3. What mass of aluminum is produced by the decomposition of 5.0 kg Al_2O_3?

extension
Go to **go.hrw.com** for more practice problems that ask you to calculate unknown quantities by using mole ratios.
Keyword: HC6STCX

SECTION REVIEW

1. Balance the following equation. Then, given the moles of reactant or product below, determine the corresponding amount in moles of each of the other reactants and products.

$$NH_3 + O_2 \longrightarrow N_2 + H_2O$$

   a. 4 mol NH_3 **b.** 4 mol N_2 **c.** 4.5 mol O_2

2. One reaction that produces hydrogen gas can be represented by the following unbalanced chemical equation:

$$Mg(s) + HCl(aq) \longrightarrow MgCl_2(aq) + H_2(g)$$

   a. What mass of HCl is consumed by the reaction of 2.50 moles of magnesium?

   b. What mass of each product is produced in part (a)?

3. Acetylene gas, C_2H_2, is produced as a result of the following reaction:

$$CaC_2(s) + 2H_2O(l) \longrightarrow C_2H_2(g) + Ca(OH)_2(aq)$$

   a. If 32.0 g CaC_2 are consumed in this reaction, how many moles of H_2O are needed?

   b. How many moles of each product would form?

4. When sodium chloride reacts with silver nitrate, silver chloride precipitates. What mass of AgCl is produced from 75.0 g $AgNO_3$?

Critical Thinking

5. **RELATING IDEAS** Carbon and oxygen react to form carbon monoxide: $2C + O_2 \longrightarrow 2CO$. What masses of carbon and oxygen are needed to make 56.0 g CO? Which law does this illustrate?