PRACTICE *Answers in Appendix E*

1. When magnesium burns in air, it combines with oxygen to form magnesium oxide according to the following equation.

$$2Mg(s) + O_2(g) \longrightarrow 2MgO(s)$$

What mass in grams of magnesium oxide is produced from 2.00 mol of magnesium?

2. What mass of glucose can be produced from a photosynthesis reaction that occurs using 10 mol CO_2?

$$6CO_2(g) + 6H_2O(l) \longrightarrow C_6H_{12}O_6(aq) + 6O_2(g)$$

extension

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

Keyword: HC6STCX

Conversions of Mass to Amounts in Moles

In these stoichiometric calculations, you are asked to calculate the amount in moles of one substance that will react with or be produced from a given mass of another substance. In this type of problem, you are starting with a mass (probably in grams) of some substance. The plan for this conversion is

$$\begin{matrix}\text{mass of} \\ \textit{given}\ \text{substance} \\ \text{(g)}\end{matrix} \longrightarrow \begin{matrix}\text{amount of} \\ \textit{given}\ \text{substance} \\ \text{(mol)}\end{matrix} \longrightarrow \begin{matrix}\text{amount of} \\ \textit{unknown}\ \text{substance} \\ \text{(mol)}\end{matrix}$$

This route requires two additional pieces of data: the molar mass of the *given* substance and the mole ratio. The molar mass is determined by using masses from the periodic table. We will follow a procedure much like the one used previously by using the units of the molar mass conversion factor to guide our mathematical operations. Because the known quantity is a mass, the conversion factor will need to be 1 mol divided by molar mass. This conversion factor cancels units of grams and leaves units of moles.

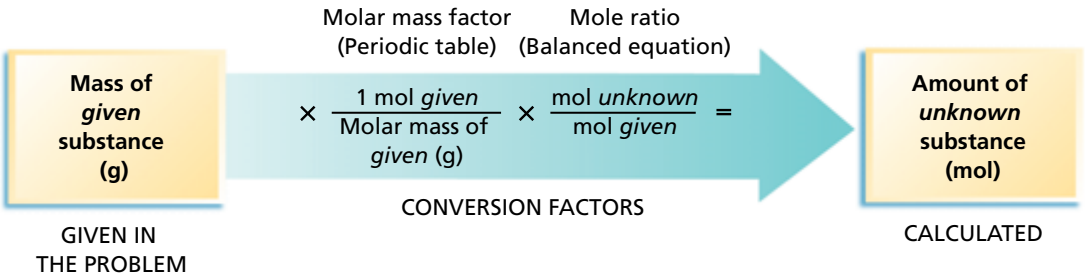

FIGURE 3 This is a solution plan for problems in which the given quantity is expressed in grams and the unknown quantity is expressed in moles.