PRACTICE

Answers in Appendix E

1. Ammonia, NH_3, is widely used as a fertilizer and in many household cleaners. How many moles of ammonia are produced when 6 mol of hydrogen gas react with an excess of nitrogen gas?
2. The decomposition of potassium chlorate, $KClO_3$, is used as a source of oxygen in the laboratory. How many moles of potassium chlorate are needed to produce 15 mol of oxygen gas?

extension

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

Keyword: HC6STCX

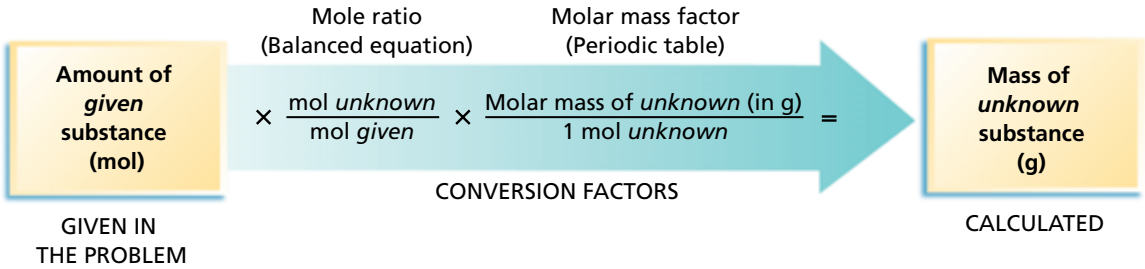
Conversions of Amounts in Moles to Mass

In these stoichiometric calculations, you are asked to calculate the mass (usually in grams) of a substance that will react with or be produced from a given amount in moles of a second substance. The plan for these mole-to-gram conversions is

amount of *given* substance (mol) ⟶ amount of *unknown* substance (mol) ⟶ mass of *unknown* substance (g)

This plan requires two conversion factors—the mole ratio of the *unknown* substance to the *given* substance and the molar mass of the *unknown* substance for the mass conversion. To solve this kind of problem, you simply multiply the known quantity, which is the amount in moles, by the appropriate conversion factors.

FIGURE 2 This is a solution plan for problems in which the given quantity is expressed in moles and the unknown quantity is expressed in grams.



SAMPLE PROBLEM B

For more help, go to the Math Tutor at the end of this chapter.

In photosynthesis, plants use energy from the sun to produce glucose, $C_6H_{12}O_6$, and oxygen from the reaction of carbon dioxide and water. What mass, in grams, of glucose is produced when 3.00 mol of water react with carbon dioxide?

SOLUTION

1 ANALYZE

Given: amount of H_2O = 3.00 mol

Unknown: mass of $C_6H_{12}O_6$ produced (g)