

(a) *We will need 70 grams of Cl_2 .*

We also know from the chemical equation that we will make 2 moles of sodium chloride. We can calculate the amount of sodium chloride in grams.

$$2 \text{ moles NaCl} = (2 \times 23 \text{ grams Na}) + (2 \times 35 \text{ grams Cl}) = 116 \text{ grams NaCl}$$

(b) *We will make 116 grams of NaCl.*

So far, we have been converting moles to grams, but it is also possible to convert grams to moles. For example, we can also use chemical equations to calculate how many moles will be made from a given number of grams. Essentially, we do the calculation in the opposite order. Looking at Sample Problem 3.2, we see that grams of reactants can be converted to moles. From this we can calculate how many grams of product the reaction will produce.

Sample Problem 3.2

(a) If we have 92 grams of sodium metal, how many moles of chlorine gas do we need? (b) How many grams of sodium chloride salt will this make?

Answer

First we need to find out how many moles of sodium metal equals 92 grams.

$$\begin{aligned} \text{moles Na metal} &= 92 \text{ grams Na metal} / 23 \text{ grams [mass of one Na]} \\ &= 4 \text{ moles} \end{aligned}$$

$$92 \text{ grams Na metal} = 4 \text{ moles}$$

Next, 1 mole of chlorine gas is needed for every 2 moles of sodium metal. We have 4 moles of sodium metal, so we will need 2 moles of chlorine gas.

$$2 \text{ moles Na metal: 1 mole chlorine gas} \rightarrow$$