

4 moles Na metal: 2 moles chlorine gas

(a) *We will need 2 moles of chlorine gas for 92 grams of sodium metal.*

Finally, we know that 2 moles of sodium metal give 2 moles of sodium chloride salt. So, if we have 4 moles of sodium metal, we will make 4 moles of sodium chloride salt.

2 moles Na metal: 2 moles sodium chloride salt

4 moles Na metal: 4 moles sodium chloride salt

Now we need to find out how many grams of sodium chloride salt equals 4 moles:

$$\begin{aligned} 4 \text{ moles NaCl} &= 4 \times 1 \text{ mole NaCl} = 4 \times [23 \text{ grams Na} + 35 \text{ grams Cl}] \\ &= 232 \text{ grams} \end{aligned}$$

(b) *We will get 232 grams of sodium chloride salt.*

### 3.2.3 Decomposition reaction

In the previous examples, we calculated the masses in grams needed for the acid-base reaction between acetic acid and sodium bicarbonate, and for the combination reaction between sodium metal and chlorine gas. However, we can calculate values for any kind of reaction.

For example the **decomposition reaction** for water is the following:

