

### 3.2.2 Combination reaction

We can use balanced chemical reactions to calculate the amount (in grams) of reactants and products for any chemical reaction. For example, in the **combination reaction** between sodium and chlorine, we find that 2 moles of sodium metal react with 1 mole of chlorine gas to give 2 moles of sodium chloride salt. Recall that a combination reaction occurs when two or more molecules combine to form a single product.

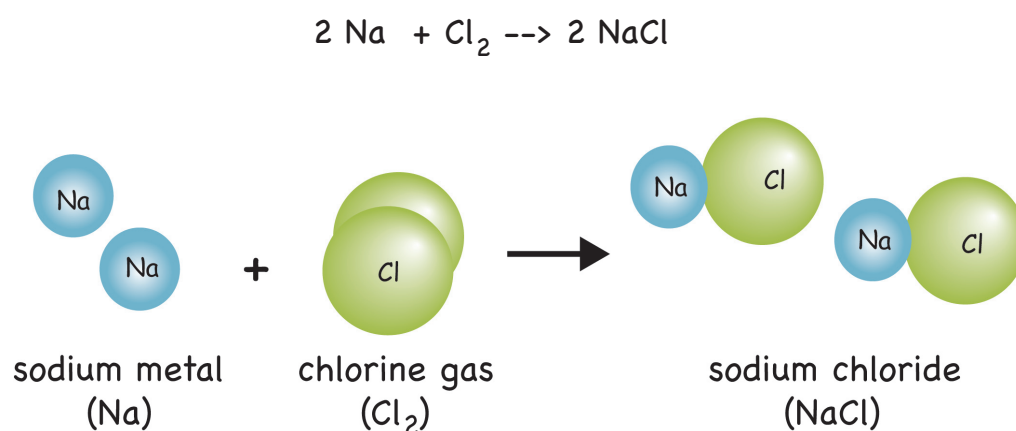


Figure 3.10: The **combination reaction** of sodium metal and chlorine gas to produce sodium chloride.

#### Sample Problem 3.1

(a) If we started with 2 moles of sodium metal, how many grams of chlorine gas would we need? (b) How many grams of sodium chloride salt will be made?

#### Answer

We know from the chemical equation that 2 moles of sodium metal react with 1 mole of chlorine gas to make 2 moles of sodium chloride. Since we need 1 mole of chlorine gas, we can calculate how many grams that is:

$$1 \text{ mole Cl}_2 = 2 \times 35 \text{ grams Cl} = \mathbf{70 \text{ grams Cl}_2}$$