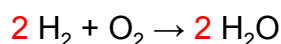


FOUR STEPS TO SOLVE STOICHIOMETRIC PROBLEMS

1. Balance the equation
2. Convert units of given substance to moles
3. Find moles of wanted substance using mole ratio
4. Convert moles of wanted substance to desired units

EXAMPLE: Hydrogen gas combines with oxygen gas to form water. $\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}$. How many grams of water can be prepared from 10.1 grams of hydrogen gas?

STEP 1: Balance the Equation



In English, this means: **Two moles of hydrogen gas combine with one mole of oxygen gas to yield two moles of water.**

STEP 2: Convert units of given substance to moles.

What is given: grams of H_2 . You need to multiply this by the molar mass of H_2 to convert it to moles. It is very important that you include your units {ex) *grams H_2* or *moles H_2* }

$$10.1 \text{ grams } \text{H}_2 \quad \times \quad \frac{1 \text{ mol } \text{H}_2}{2.02 \text{ grams } \text{H}_2} = 5 \text{ mol } \text{H}_2$$

The grams H_2 cancel out.

STEP 3: Find moles of wanted substance using mole ratio

The mole ratio is the ratio of moles of the wanted substance to moles of the given substance. In this case, according to the balanced equation, there are 2 moles of H_2O produced for 2 moles of H_2 gas.

$$5 \text{ mol } \text{H}_2 \quad \times \quad \frac{2 \text{ mol } \text{H}_2\text{O}}{2 \text{ mol } \text{H}_2} = 5 \text{ mol } \text{H}_2\text{O}$$

The moles of H_2 cancel out.

STEP 4. Convert moles of wanted substance to desired units.

The desired units are grams of H_2O . We have moles of H_2O , so we need to multiply by the molar mass of water.

$$5 \text{ mol } \text{H}_2\text{O} \quad \times \quad \frac{18.02 \text{ grams } \text{H}_2\text{O}}{1 \text{ mol } \text{H}_2\text{O}} = 90.1 \text{ grams of } \text{H}_2\text{O}$$

The moles of H_2O cancel out.