Using quantitative information from balanced reactions to SOLVE PROBLEMS

Chemical equation:	$2\,H_2(g)$	$+$	$O_2(g)$	$\longrightarrow$	$2\,H_2O(l)$
Molecular interpretation:	2 molecules H_2		1 molecule O_2		2 molecules H_2O
Mole-level interpretation:	2 mol H_2		1 mol O_2		2 mol H_2O

Convert to grams (using molar masses)

4.0 g H_2 32.0 g O_2 36.0 g H_2O

Notice the conservation of mass
(4.0 g + 32.0 g = 36.0 g)
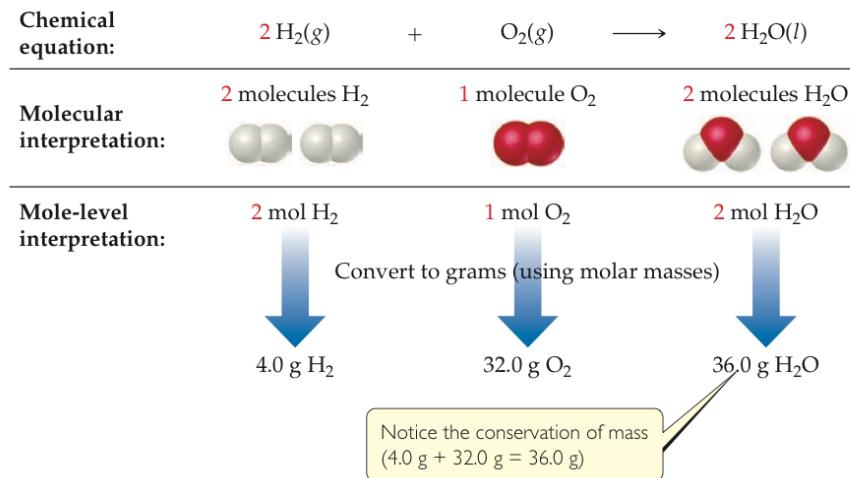
Determine how many grams of water are produced in the oxidation of 1.00 g of glucose: $C_6H_{12}O_6$

$$C_6H_{12}O_6\,_{(s)} \quad + \quad O_2{}_{(g)} \quad \rightarrow \quad CO_2(g) \quad + \quad H_2O\,(l)$$

Before

Change
_____
After

Limiting Reactants and Excess Reactants

Before reaction   After reaction

10 H$_2$ and 7 O$_2$ 10 H$_2$O and 2 O$_2$ (no H$_2$ molecules)
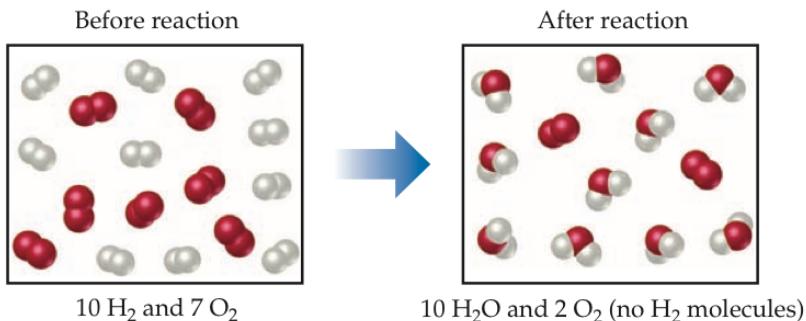
▲ Figure 3.17 **Limiting reactant.** Because H$_2$ is completely consumed, it is the limiting reactant. Because some O$_2$ is left over after the reaction is complete, it is the excess reactant. The amount of H$_2$O formed depends on the amount of limiting reactant, H$_2$.

When given the amounts of two reactants in a problem or in a lab, one reactant is the "limiting reactant." ***Look for which reactant will run out and which will have leftovers.***

Limiting Reactant Definition:

| How can you tell this is a limiting reactant problem? |

Excess Reactant Definition:

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A solution containing 18.0 g of silver (I) nitrate was mixed with a solution containing 32.4g of iron (III) chloride. A double replacement reaction occurred, forming silver (I) chloride and iron (III) nitrate. How many grams of excess reactant remain?
  How many grams of silver (I) chloride are formed?

Equation:

Before

Change

_____

After