

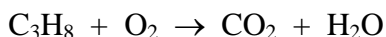
## 4 • Chemical Equations and Stoichiometry

### COMBUSTION EQUATIONS

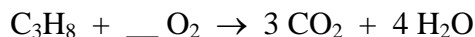
For burning to occur, you need a fuel, an oxidizer, and heat. When hydrocarbons are the fuel and O<sub>2</sub> in the air is the oxidizer, then CO<sub>2</sub> and H<sub>2</sub>O are the products.

**Example:** Write the balanced equation for the complete combustion of propane, C<sub>3</sub>H<sub>8</sub>, in air.

**Solution:** First, set up the basic equation. You memorize the “+ O<sub>2</sub> → CO<sub>2</sub> + H<sub>2</sub>O” part.



Next, balance. 3 C's in C<sub>3</sub>H<sub>8</sub> result in 3CO<sub>2</sub>'s; 8 H's in C<sub>3</sub>H<sub>8</sub> result in 4 H<sub>2</sub>O's;



Total O's on the product side = 10 [(3 x 2) + (4 x 1)] = total O's on the reactant side.

This would mean that 5 O<sub>2</sub>'s were involved.

Tip: If an UNEVEN number of O's need to be represented, a fraction should be used. 7 O's =  $\frac{7}{2}$  O<sub>2</sub>

Tip: Take into account fuels that contain oxygen. Subtract the O's from that represented as O<sub>2</sub>'s

**Practice:** Write the balanced combustion equations for the following substances.

1. CH<sub>4</sub>
2. C<sub>5</sub>H<sub>12</sub>
3. C<sub>9</sub>H<sub>20</sub>
4. C<sub>2</sub>H<sub>6</sub>
5. C<sub>8</sub>H<sub>18</sub>
6. C<sub>4</sub>H<sub>10</sub>
7. C<sub>2</sub>H<sub>5</sub>OH
8. C<sub>3</sub>H<sub>7</sub>OH
9. HC<sub>2</sub>H<sub>3</sub>O<sub>2</sub>
10. CH<sub>3</sub>COCH<sub>3</sub>