Balance the chemical reaction of the combustion of ethanol with oxygen:

$$C_2H_5OH(l) + O_2(g) \longrightarrow CO_2(g) + H_2O(g)$$

which can be represented by the following molecular models:



$$C_2H_5OH(l) + O_2(g) \rightarrow 2CO_2(g) + H_2O(g)$$

2 C atoms 2 C atoms

Since C_2H_5OH contains six hydrogen atoms, the hydrogen atoms can be balanced by placing a 3 before the H_2O :

$$C_2H_5OH(l) + O_2(g) \rightarrow 2CO_2(g) + 3H_2O(g)$$

(5 + 1) H (3 × 2) H

Last, we balance the oxygen atoms. Note that the right side of the preceding equation contains seven oxygen atoms, whereas the left side has only three. We can correct this by putting a 3 before the O_2 to produce the balanced equation:

$$\begin{array}{ccc}
C_2H_5OH(l) + 3O_2(g) \to & 2CO_2(g) + 3H_2O(g) \\
1 & 0 & 6 & 0 \\
\hline
& 7 & 0 & 7 & 0
\end{array}$$

Now we check:

$$C_2H_5OH(l) + 3O_2(g) \rightarrow 2CO_2(g) + 3H_2O(g)$$

2 C atoms 2 C atoms
6 H atoms 6 H atoms
7 O atoms 7 O atoms

The equation is balanced.

The balanced equation can be represented as follows:

