**Example 1**

Is the following chemical equation balanced?

\[ \text{Ca} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{H}_2 \]

1 Ca \hspace{1cm} 1 Ca
2 H \hspace{1cm} 4 H
1 O \hspace{1cm} 2 O

**Since the number of each element is not the same on both sides, the equation is NOT balanced**

* Start with O, it is unbalanced and occurs in the least number of places.

\[ \text{Ca} + 2\text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{H}_2 \] **Balanced**

1 Ca \hspace{1cm} 1 Ca
4 H \hspace{1cm} 4 H
2 O \hspace{1cm} 2 O

**Example 2**

Balance the following chemical equation.

\[ \text{C}_3\text{H}_8 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} \]

3 C \hspace{1cm} 1 C
8 H \hspace{1cm} 2 H
2 O \hspace{1cm} 3 O

**Start with H or C, since both are unbalanced and occur in the least number of places.**

I chose H:

\[ \text{C}_3\text{H}_8 + \text{O}_2 \rightarrow \text{CO}_2 + 4\text{H}_2\text{O} \]

3 C \hspace{1cm} 1 C
8 H \hspace{1cm} 8 H
2 O \hspace{1cm} 6 O
* Now, use C.

\[ C_3H_8 + O_2 \rightarrow 3CO_2 + 4H_2O \]

<table>
<thead>
<tr>
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<th>3 C</th>
<th>3 C</th>
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<tbody>
<tr>
<td>8</td>
<td>8 H</td>
<td>8 H</td>
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<tr>
<td>2</td>
<td>10 O</td>
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* Finally, balance O.

\[ C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O \quad \text{Balanced} \]

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<tbody>
<tr>
<td>8</td>
<td>8 H</td>
<td>8 H</td>
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<tr>
<td>10</td>
<td>10 O</td>
<td>10 O</td>
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</tbody>
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Now that all same number of elements occurs on each side, the chemical equation is balanced.