Name Key per___ date_____ mail box_____

NOTES BALANCING EQUATIONS

Method 1

Traditional balance

(unbalanced)

$$C_3H_8 + O \rightarrow H_2O + CO_2$$

$$C_3H_8 + \underline{5}O_2 \rightarrow \underline{4}H_2O + \underline{3}CO_2$$

(balanced)

Law of Conservation of Matter

Terms

$4H_2O$

Coefficient

Subscript

"neither are exponents"

wikiHow to Balance Chemical Equations

1 **Write down your given equation.** For this example, you will use:

- $C_3H_8 + O_2 \rightarrow H_2O + CO_2$
- This reaction occurs when propane (C_3H_8) is burned in the presence of oxygen to produce water and carbon dioxide.

1a. balance metals

1b. balance nonmetals

Name Key per___ date_____ mail box_____

NOTES BALANCING EQUATIONS

Method 1

Traditional balance

$$C_3H_8 + O_2 \rightarrow H_2O + CO_2$$

(2)

① Check for diatomic molecules

"diatomic means paired" (1)(2)

- hydrogen ← omit for balancing
- nitrogen "save them for last"
- oxygen
- fluorine
- iodine
- bromine

wikiHow to Balance Chemical Equations

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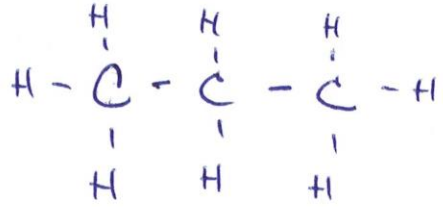
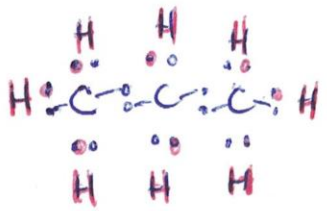
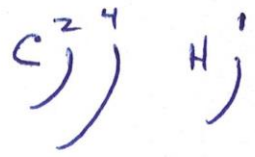
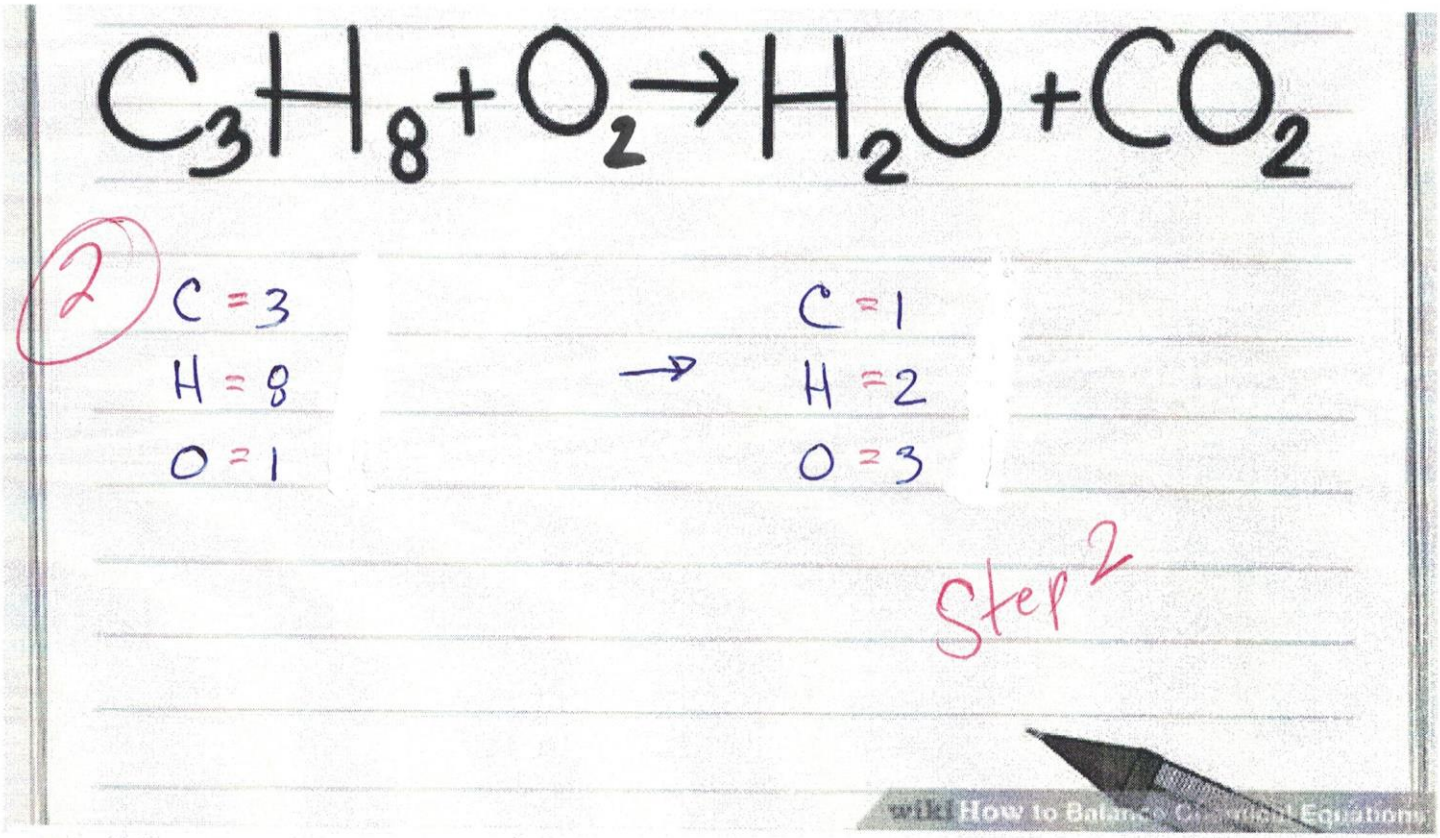


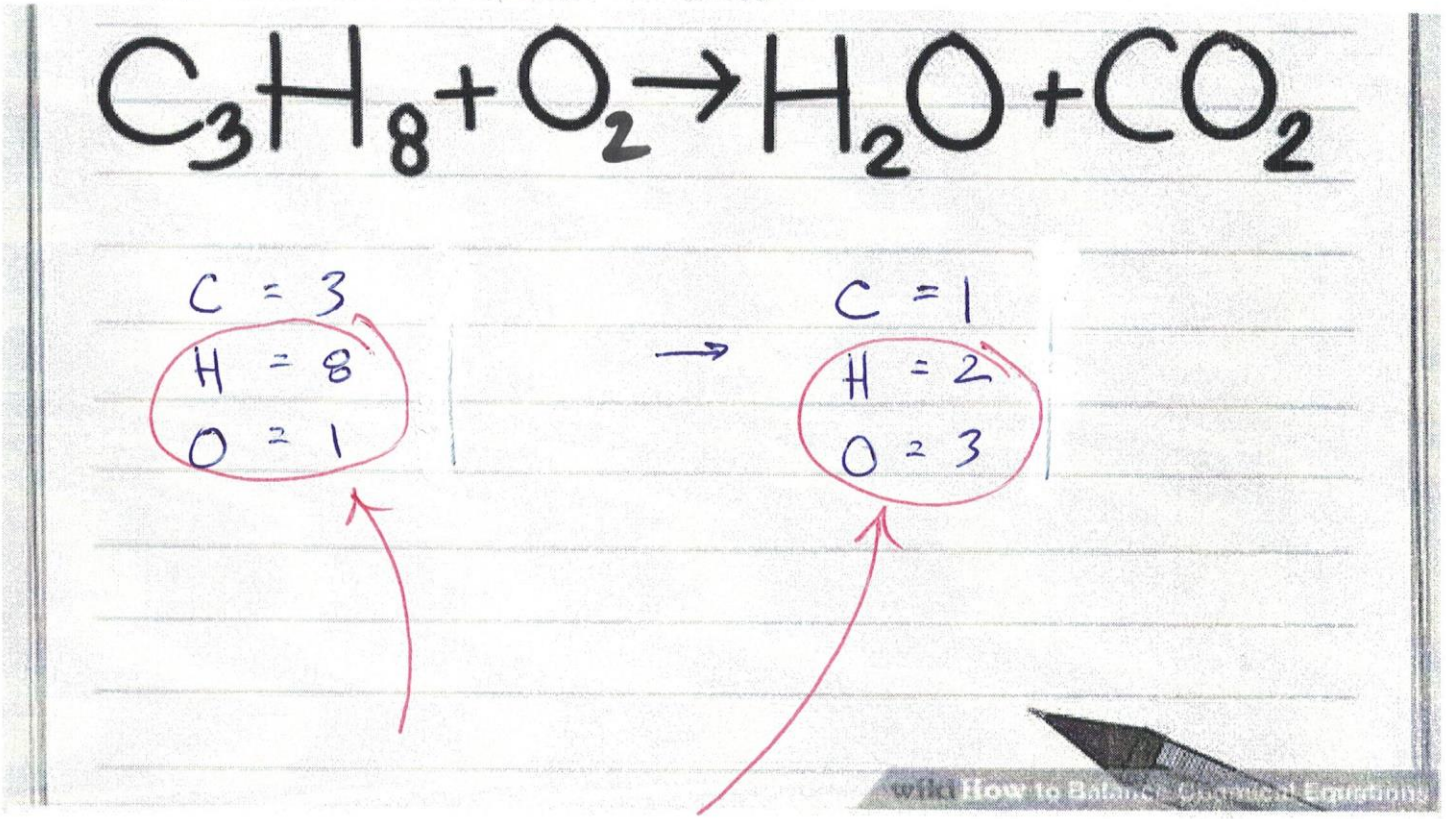




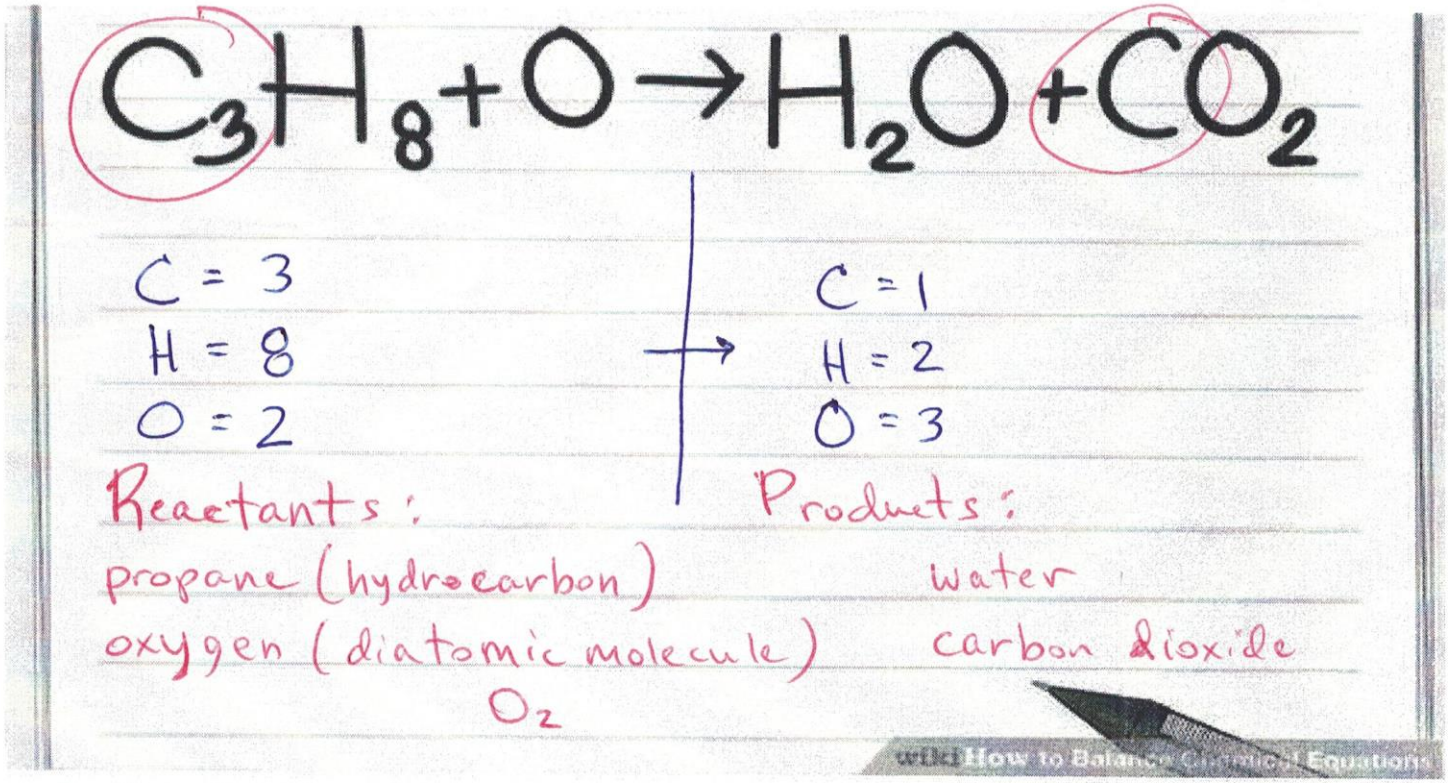


2 **Write down the number of atoms per each element that you have on each side of the equation.** Look at the subscripts next to each atom to find the number of atoms in the equation.

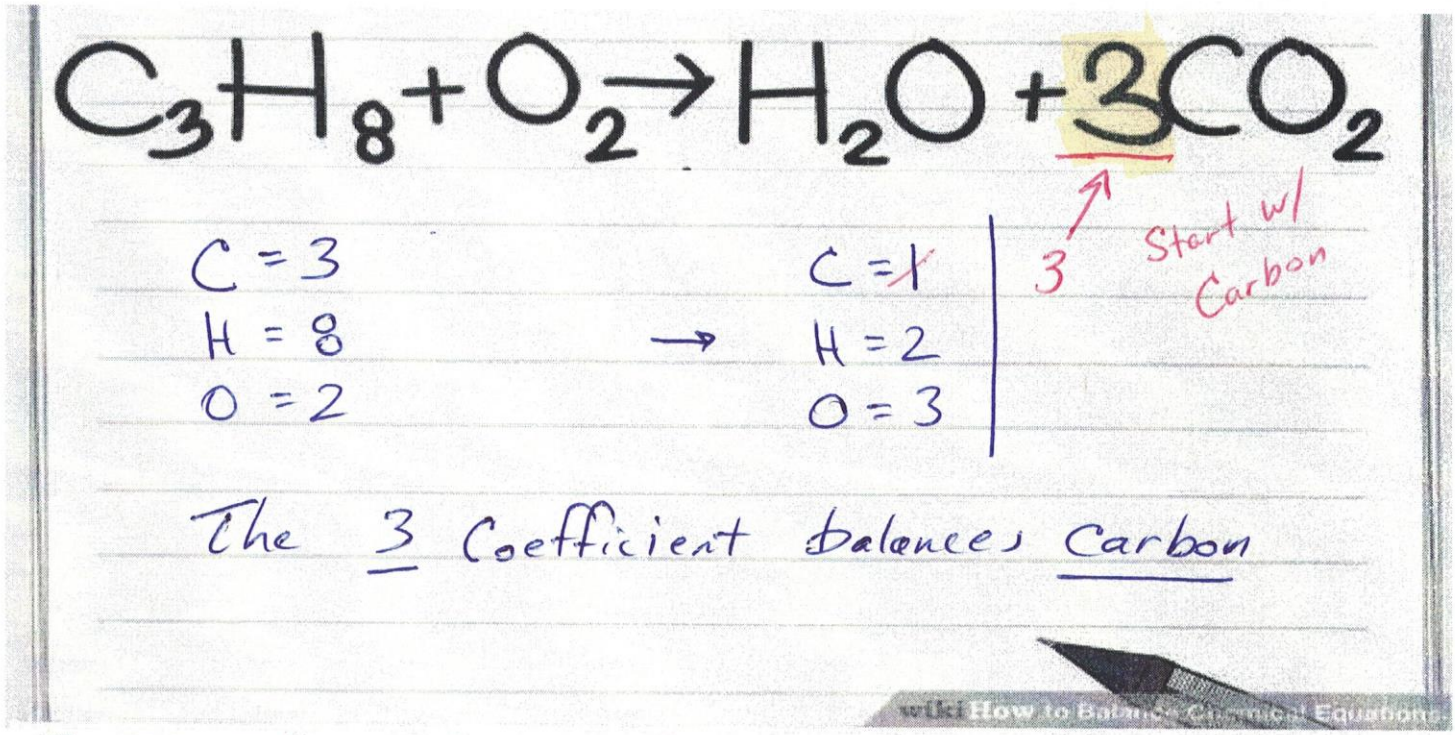
- Left side: 3 carbon, 8 hydrogen and 2 oxygen.
- Right side: 1 carbon, 2 hydrogen and 3 oxygen.



3 **Always leave hydrogen and oxygen for last.**

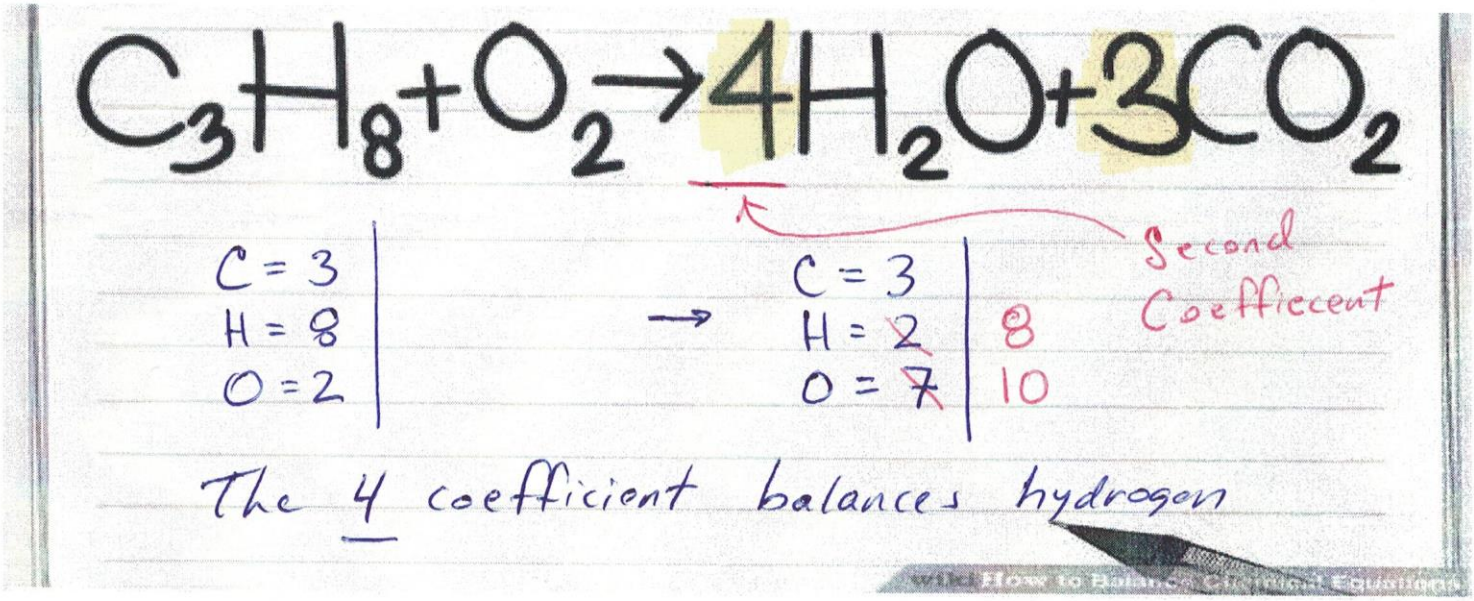


4 **If you have more than one element left to balance:** select the element that appears in only a single molecule of reactants and in only a single molecule of products. This means that you will need to balance the carbon atoms first.



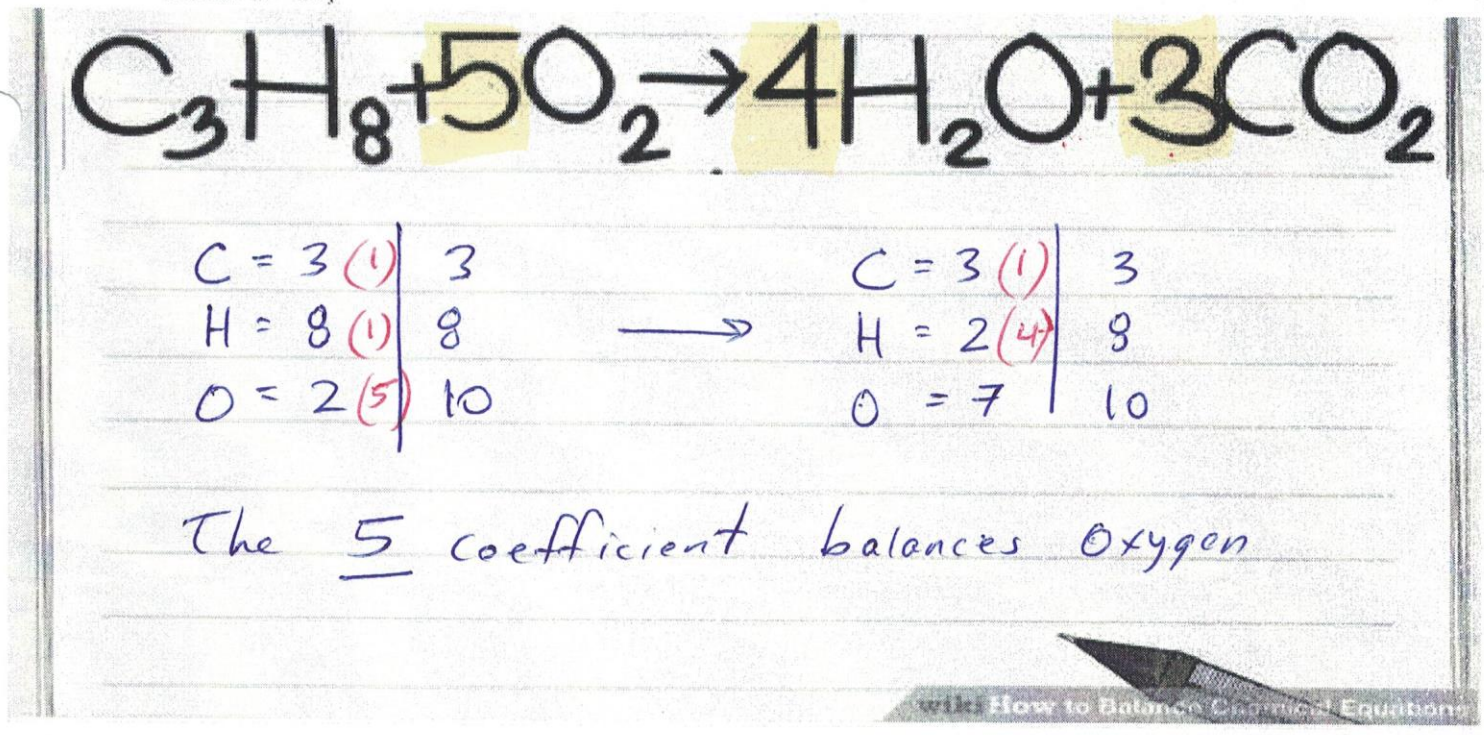
5 **Add a coefficient to the single carbon atom on the right of the equation to balance it with the 3 carbon atoms on the left of the equation.**

- $C_3H_8 + O_2 \rightarrow H_2O + 3CO_2$
- The coefficient 3 in front of carbon on the right side indicates 3 carbon atoms just as the subscript 3 on the left side indicates 3 carbon atoms.
- In a chemical equation, you can change coefficients, but you must never alter the subscripts.



6 **Balance the hydrogen atoms next.** You have 8 on the left side. So you'll need 8 on the right side.

- $C_3H_8 + O_2 \dashrightarrow 4H_2O + 3CO_2$
- On the right side, you now added a 4 as the coefficient because the subscript showed that you already had 2 hydrogen atoms.
- When you multiply the coefficient 4 times by the subscript 2, you end up with 8.
- The other 6 atoms of Oxygen come from $3CO_2$. (3x2=6 atoms of oxygen+ the other 4=10)



7 **Balance the oxygen atoms.**

- Because you've added coefficients to the molecules on the right side of the equation, the number of oxygen atoms has changed. You now have 4 oxygen atoms in the water molecule and 6 oxygen atoms in the carbon dioxide molecule. That makes a total of 10 oxygen atoms.
- Add a coefficient of 5 to the oxygen molecule on the left side of the equation. You now have 10 oxygen molecules on each side.
- $C_3H_8 + 5O_2 \dashrightarrow 4H_2O + 3CO_2$.

Balance equations "by inspection" with these steps:

1. Check for diatomic molecules. (See below)
2. Balance the metals (not Hydrogen).
3. Balance the nonmetals (not Oxygen).
4. Balance oxygen.
5. Balance hydrogen.
6. The equation should now be balanced, but recount all atoms to be sure.
7. Reduce coefficients (if needed).

Common diatomic molecules:
Hydrogen (H_2
Nitrogen (N_2
Oxygen (O_2)
Fluorine (F_2)
Chlorine (Cl_2)
Iodine (I_2)
Bromine (Br_2)

If after balancing O or H your metal or others are unbalanced, go back and rebalance those one at a time again sequencially.

Then rebalance O & H

Then step 6, 7