Balancing Chemical Equations

Reactants: Zn + I_2 → **Product: Zn I_2**

Chemical Equations

$$Al_{(s)} + O_{2\,(g)} \longrightarrow Al_2O_{3\,(s)}$$

Chemical Equations

Because of the principle of the **conservation of matter**, an **equation must be balanced.**

$$4\,Al_{(s)} + 3\,O_{2\,(g)} \longrightarrow 2\,Al_2O_{3\,(s)}$$

It must have the same number of atoms of the same kind on both sides.

Balancing Equations

- To balance, you may add **coefficients** in front of the compounds

Do not change the **subscripts**.

Chemical Equations

$4\ Al + 3\ O_2 \rightarrow 2\ Al_2O_3$

This equation means

4 Al atoms

+ (combined with)

3 O_2 molecules

---produces or yields -->

2 molecules of Al_2O_3

Steps to Balancing Equations

1. Write the correct formula for the reactants and the products. (NO BALANCING YET)

2. Find the number of atoms for each element on the left side.

3. Compare those against the number of the atoms of the same element on the right side.

H_2	+	O_2	--->	H_2O
H		O		H O
2		2		2 1

3. Place a coefficients in front of formulas so that the left side has the same number of atoms as the right side for EACH element.

4. Check to see if the numbers of atoms on both sides of the equation are now balanced.

Balancing Equations

H_2	+	O_2	→	2	H_2O
H		O		H	O
2		2		2	1

Balancing Equations

$2\,H_2 + O_2 \rightarrow 2\,H_2O$

H	O
2	2
4	2

Hydrogen = 4

Oxygen = 2

H	O
2	1
4	2

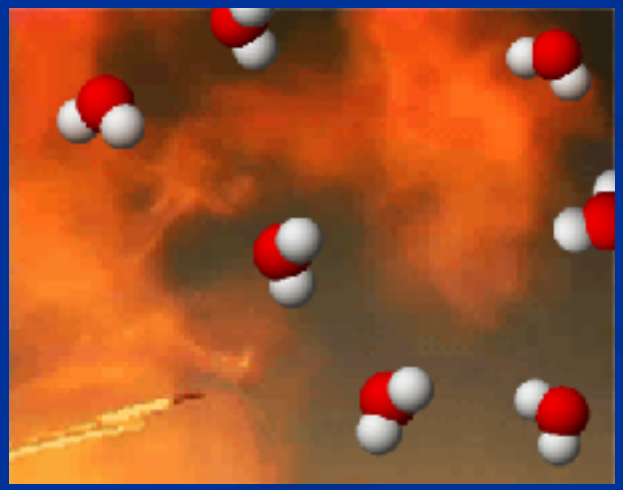
Hydrogen = 4

Oxygen = 2

THIS NOW A BALANCED EQUATION

Balancing Equations

$\underline{\;2\;}\ H_2(g) + \underline{\;\;\;}\ O_2(g) \rightarrow \underline{\;2\;}\ H_2O(l)$

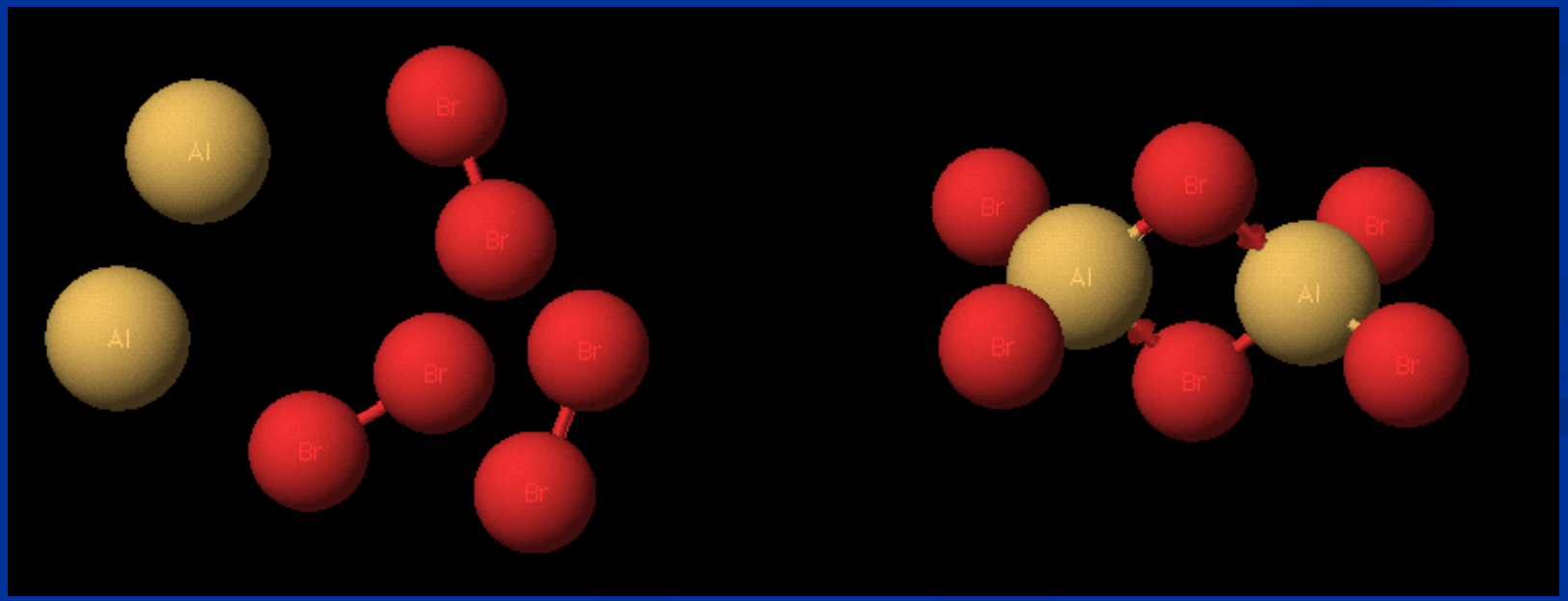


Balancing Equations

___ Al(s) + ___ Br_2(l) ---> ___ Al_2Br_6(s)

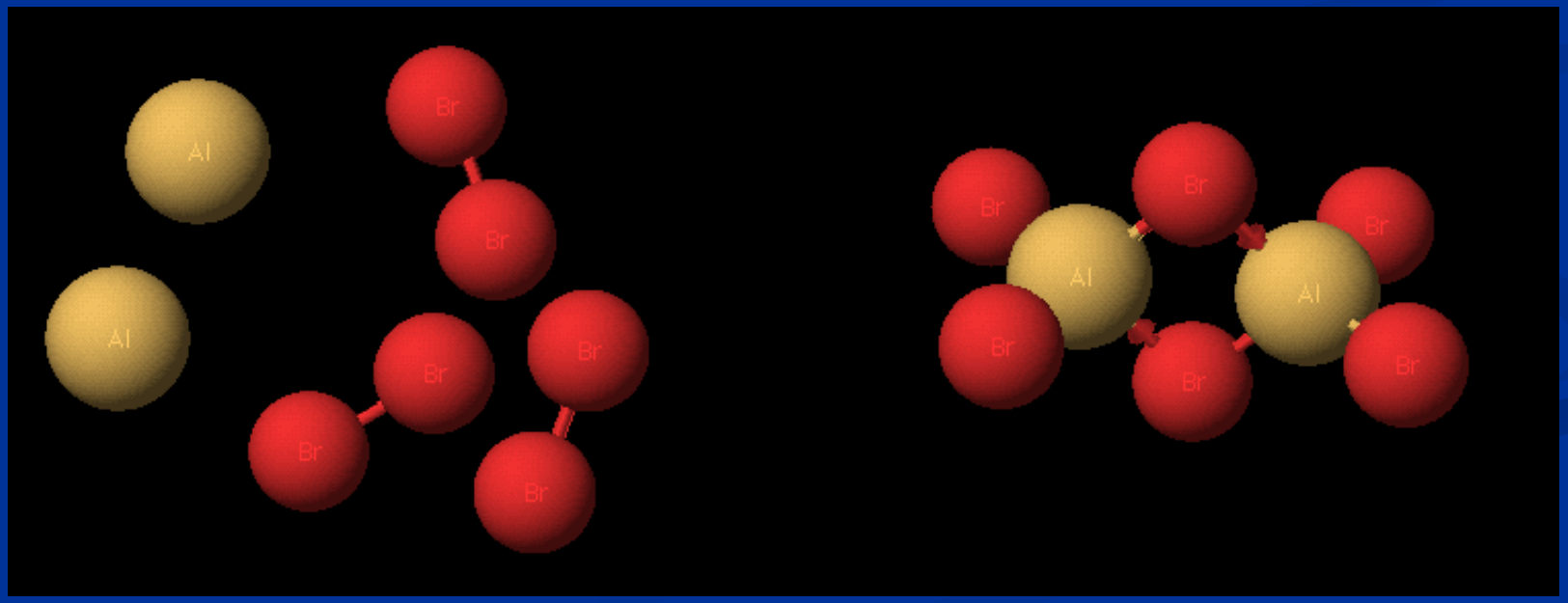
Balancing Equations

_2_ Al(s) + _3_ Br_2(l) ---> ___ Al_2Br_6(s)



Balancing Equations

Now Let us try some more.



___ Zn + ___ HCl ---> ___$ZnCl_2$ + ___H_2

___ Cu + ___ $AgNO_3$ ---> ___$Cu(NO_3)_2$ + ___Ag

___ Fe + ___ Cl_2 ---> ___ $FeCl_3$