Monday Dec 19
Answers Counting Atoms Worksheet
Balancing Chemical Equations

Warm - Up

- How many of each atom are in the following?

  a) $Ca(OH)_2$
  b) $2NaCl$
  e) $3Al(HCO_3)_3$
  f) $Mg(NO_3)_2$

Counting Atoms Sheet

Na_2CO_3

Type of Atom	# of atoms
sodium (Na_	2
carbon (C)	1
oxygen (O)	3

$Ca_3(PO_4)_2$
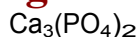
Type of Atom	# of atoms
calcium (Ca)	3
phosphourous (P)	2
oxygen (O)	8

K_2CrO_4

Type of Atom	# of atoms
potassium (K)	2
chromium (Cr)	1
oxygen (O)	4

$3BaCl_2$

Type of Atom	# of atoms
barium (Ba)	3
chlorine (Cl)	6

$NH_4C_2H_3O_2$
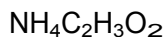
type of atom	#of atoms
nitrogen (N)	1
hydrogen (H)	7
carbon (C)	2
oxygen (O)	2

$4Al_2(CO_3)_3$
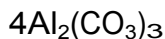
Type of Atom	# of atoms
aluminum (Al)	8
carbon (C)	12
oxygen (O)	36

$Pb(NO_3)_2$
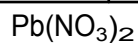
Type of Atom	# of atoms
lead (Pb)	1
nitrogen(N)	2
oxygen (O)	6

$2(NH_4)_2Cr_2O_7$
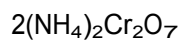
type of atom	# of atoms
nitrogen (N)	4
hydrogen (H)	16
chromium (Cr)	4
oxygen (O)	14

Why must equations be balanced???

The Law of Conservation of Mass states:

that matter is neither lost nor gained in chemical reactions; it simply changes form.

so when you look at a chemical reaction it must have the same number of atoms of each element in the reactants and in the products.

As well as the same mass of reactants and products.

Examples with mass

A solid has a mass of 20g. When it is mixed with a solution a chemical reaction occurs in which a gas is produced. If the final total mass of the products is 55g, what was the mass of the solution?

    20 g + solution = 55g
      55g – 20g = mass of solution
        35g = mass of solution

Example with Chemical Equations

i.e. H_2 + O_2 $\Rightarrow$ H_2O is correctly written as
      $2H_2$ + O_2 $\Rightarrow$ $2H_2O$

We add coefficients (numbers in front of the formulas) to create more atoms and follow the law!!

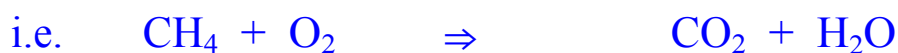Based on the Law of Conservation of mass, what is wrong with the following equation?

$$Zn + HCl \longrightarrow ZnCl_2 + H_2$$
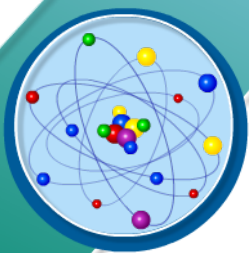
How can I make it right?

Tips for
Balancing Chemical Reactions

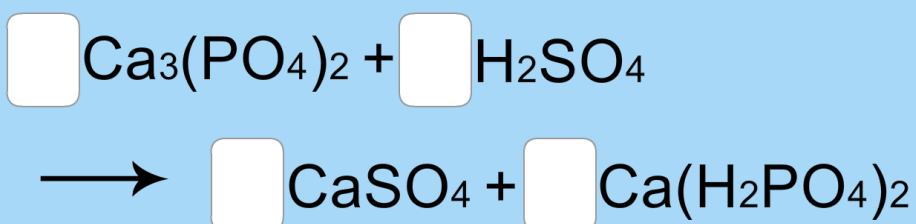- Create a chart to help Count the Atoms! and see what you need to balance.

i.e. $CH_4 + O_2 \Rightarrow CO_2 + H_2O$

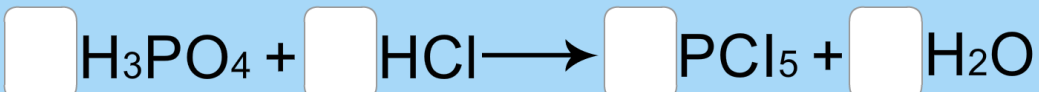| ATOM	REACTANTS	PRODUCTS

- **You can only add coefficients (number in front of formula)**

- **Balance each atom individually, unless it appears to be a polyatomic compound (SO_4, CO_3, PO_4 etc)**

Practice Balancing Equations

ⓘ Write the correct coefficient next to each molecule to balance the equation.

[ ] Al + [ ] $HCl \longrightarrow$ [ ] $AlCl_3$ + [ ] H_2

[ ] H_3PO_4 + [ ] $HCl \longrightarrow$ [ ] PCl_5 + [ ] H_2O

[ ] $Ca_3(PO_4)_2$ + [ ] H_2SO_4

$\longrightarrow$ [ ] $CaSO_4$ + [ ] $Ca(H_2PO_4)_2$

Check Answer