Chemistry

Name _____
Period _____

Balancing Equations

Before we begin balancing equations, we must look at one important chemistry Law that we can't forget:

Law of Conservation of Mass: Mass cannot be created nor destroyed

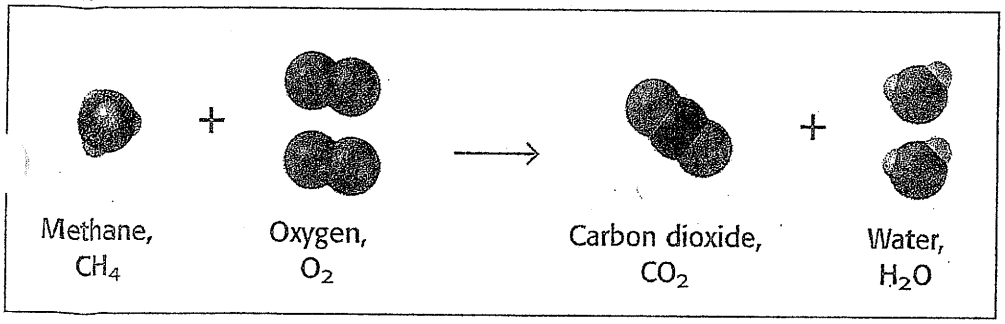
This means that every single atom that goes into a reaction, must come out. They must all be accounted for!

Look at the following chemical equation:

$$CH_4 + O_2 \rightarrow CO_2 + H_2O$$

Add up the total number of carbon atoms on the right of the arrow and on the left. Right_____ Left _____
Is there the same amount of carbon atoms? _____
Is there the same amount of oxygen atoms? _____
Is there the same number of hydrogen atoms? _____

To balance the equation, we need the same number of C, O, and H on both sides. Observe following illustrations:



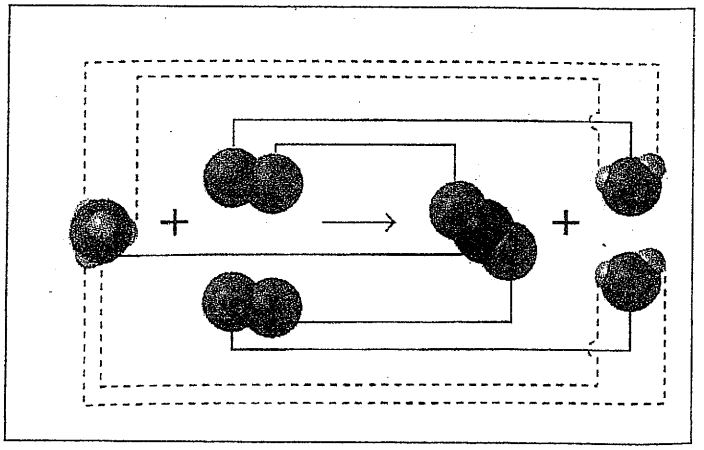
Count the atoms
Same # of hydrogens? _____
Same # of Carbons? _____
Same # of Oxygens? _____

If all are the same, the equation is balanced.
Is this equation balanced? _____

As shown in the example, each atom on the left of the "→" has a place on the right side. When an equation accurately follows the Law of Conservation of mass, we say that it is balanced.

To balance an equation, we can change the number of compounds/atoms on either side of the →, but we can't change the formula of the compounds.

We place large numbers, called coefficients in front of the compound/atom, to show how many we need to balance the equation.



For example: $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

The coefficients show that there are 2 oxygen molecules and 2 water molecules needed to balance the equation. If the coefficient is 1, we leave it blank.

Balance the following equations. Place the coefficients in the blanks to balance the equation. If the coefficient is 1 leave it blank.

1. _____ N_2 + _____ O_2 → _____ NO
2. _____ Na + _____ H_2O → _____ NaOH + _____ H_2
3. _____ K + _____ H_2O → _____ KOH + _____ H_2
4. _____ NaOH + _____ HCl → _____ NaCl + _____ H_2O
5. _____ Fe_2O_3 + _____ H_2O → _____ $Fe(OH)_3$
6. _____ Na_2CO_3 + _____ H_2O → _____ NaOH + _____ H_2CO_3
7. _____ B + _____ O_2 → _____ B_2O_3
8. _____ $SbCl_3$ + _____ H_2S → _____ Sb_2S_3 + _____ HCl
9. _____ H_2O + _____ P_2O_5 → _____ H_3PO_4
10. _____ NaOH + _____ H_2S → _____ Na_2S + _____ H_2O
11. _____ Fe + _____ H_2O → _____ Fe_2O_3 + _____ H_2
12. _____ K_3PO_4 + _____ $MgCl_2$ → _____ $Mg_3(PO_4)_2$ + _____ KCl
13. _____ $CrCl_3$ + _____ H_2SO_4 → _____ $Cr_2(SO_4)_3$ + _____ HCl
14. _____ CuO + _____ NH_3 → _____ Cu + _____ H_2O + _____ N_2
15. _____ $Pb(NO_3)_2$ → _____ PbO + _____ NO_2 + _____ O_2
16. _____ Al_2O_3 + _____ C + _____ Cl_2 → _____ CO + _____ $AlCl_3$
17. _____ Al + _____ H_3PO_4 → _____ H_2 + _____ $AlPO_4$
18. _____ $Al_2(SO_4)_3$ + _____ NH_4Br → _____ $AlBr_3$ + _____ $(NH_4)_2SO_4$
19. _____ $Ca_3(PO_4)_2$ + _____ H_2SO_4 → _____ $CaSO_4$ + _____ H_3PO_4
20. _____ $BaBr_2$ + _____ Na_3PO_4 → _____ $Ba_3(PO_4)_2$ + _____ NaBr
21. _____ $Ca_3(PO_4)_2$ + _____ SiO_2 + _____ C → _____ P + _____ $CaSiO_3$ + _____ CO
22. _____ $Hg(OH)_2$ + _____ H_3PO_4 → _____ $Hg_3(PO_4)_2$ + _____ H_2O
23. _____ Na_2CO_3 + _____ HCl → _____ NaCl + _____ H_2O + _____ CO_2
24. _____ P + _____ O_2 → _____ P_2O_5