Types of Chemical Reactions

General formula

- Synthesis - combining $A + B \rightarrow AB$
- Decomposition - breaking down $AB \rightarrow A + B$
- Combustion - burning $C_xH_y(O_z) + O_2 \rightarrow CO_2 + O_2$
- Single replacement - one swap $A + BC \rightarrow B + AC$
- Double replacement - swap partners $AB + CD \rightarrow AD + CB$

Section 1: Identify the type of reaction

For the following reactions, indicate whether the following are examples of synthesis, decomposition, combustion, single displacement, double displacement, ~~or acid-base reactions~~:

1) $Na_3PO_4 + 3\ KOH \rightarrow 3\ NaOH + K_3PO_4$ double replacement

2) $MgCl_2 + Li_2CO_3 \rightarrow MgCO_3 + 2\ LiCl$ double replacement

3) $C_6H_{12} + 9\ O_2 \rightarrow 6\ CO_2 + 6\ H_2O$ combustion

4) $Pb + FeSO_4 \rightarrow PbSO_4 + Fe$ single replacement

5) $CaCO_3 \rightarrow CaO + CO_2$ decomposition

6) $P_4 + 3\ O_2 \rightarrow 2\ P_2O_3$ synthesis

7) $2\ RbNO_3 + BeF_2 \rightarrow Be(NO_3)_2 + 2\ RbF$ double replacement

8) $2\ AgNO_3 + Cu \rightarrow Cu(NO_3)_2 + 2\ Ag$ $Cu + 2AgNO_3 \rightarrow 2Ag + Cu(NO_3)_2$ single replacement

9) $C_3H_6O + 4\ O_2 \rightarrow 3\ CO_2 + 3\ H_2O$ combustion

10) $2\ C_5H_5 + Fe \rightarrow Fe(C_5H_5)_2$ synthesis

11) $SeCl_6 + O_2 \rightarrow SeO_2 + 3Cl_2$ single replacement

12) $2\ MgI_2 + Mn(SO_3)_2 \rightarrow 2\ MgSO_3 + MnI_4$ double replacement

13) $O_3 \rightarrow O^{\cdot} + O_2$ decomposition

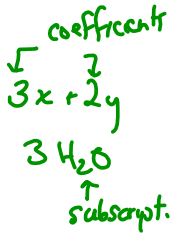
14) $2\ NO_2 \rightarrow 2\ O_2 + N_2$ decomposition

Balancing Equations

1. Count each type of atom in reactants and products. Does the same number of each atom appear on both sides of the arrow? If not, the equation is not balanced, and you need to go to step 2.

2. Place coefficients, as needed, in front of the symbols or formulas to increase the number of atoms or molecules of the substances. Use the smallest coefficients possible. Warning! Never change the subscripts in chemical formulas. Changing subscripts changes the substances involved in the reaction. Change only the coefficients.

3. Repeat steps 1 and 2 until the equation is balanced.



Examples

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

H - 4 | H - 4
O - 2 | O - 2

all match so balanced ∴

$H_2O + H_2O$

$N_2 + 3\,H_2 \rightarrow 2\,NH_3$

N - 2 | N - 2
H - 6 | H - 6

∴

usually try to balance atoms that aren't H or O first.

$2\,C_2H_4O + 5\,O_2 \rightarrow 4\,CO_2 + 4\,H_2O$

C - 4 | C - 4
H - 8 | H - 8
O - 6 12 | O - 10 12

∴

Balanced.

balance C first

$CO_2 + CO_2 + H_2O + H_2O$

2½ O would balance the equation
BUT I can't have half a molecule ∴

We can double EVERYTHING!

Note: This is about as tricky as it gets.

Homework:
Balance the 1st 3 equations in section 2 of the worksheet.