CHEMICAL CHANGE

Chemical changes have three main features:

•*New substances are made*

•There is an energy change between the reacting system and its surroundings

•There is a fixed relationship between the masses of the reactants and products — this is called the *stoichiometry* of the reaction

Stoichiometry is the name given to the property of pure substances to react together in *whole number ratios of particles.*

Chemical changes are nearly always written as equations showing the reactants and products symbolically in the form of some kind of *formula*.

CHEMICAL EQUATIONS

Reactants are normally written on the left.

Products are normally written on the right.

The arrow –> between them means *reacts to give* and sometimes has the conditions written above or below it.

e.g

heat

$CuCO_3$ ----------> $CuO + CO_2$

There are two different kinds of equation and although they are often used interchangeably, they really have different uses depending on which feature of the reaction is being studied:

IONIC EQUATIONS

These are used when we think about how one lot of substances is changed into another.

They are concerned with the bonding, structure, shape , or size of the particles and the mechanism of the reaction.

When writing particle equations state symbols are used,

e.g

$Cu^{2}+(aq) + 2OH-(aq)$ ----> $Cu(OH)_2(s)$

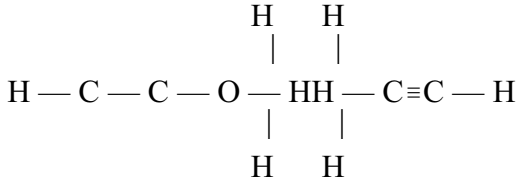
This equation tells us that a copper aquo ion reacts with two hydroxide ions to make an insoluble product.

DIFFERENT KINDS OF FORMULAS

Empirical formula shows the simplest whole number ratio atoms in the particles of the substance. e.g. C_2H_6O and CH.

Molecular formula shows the actual number of atoms in a particle of the substance, e.g. C_2H_6O and C_2H_2.

Structural formula shows the arrangement of atoms in the particle either written as, e.g. CH_3CH_2OH and HCCH or drawn as



Some people call the drawn formulas displayed formulas, but this is not common.

FULL EQUATIONS

These are used when the stoichiometry of the reaction is being studied. They are concerned with the relative amounts of the reactants used and products made.

State symbols are usually not essential here, although greater credit is given for their use

e.g.

$2Mg + O_2 \longrightarrow 2MgO$

This equation tells us that 2 moles of magnesium react with 1 mole of oxygen molecules to make 1 mole of magnesium oxide.