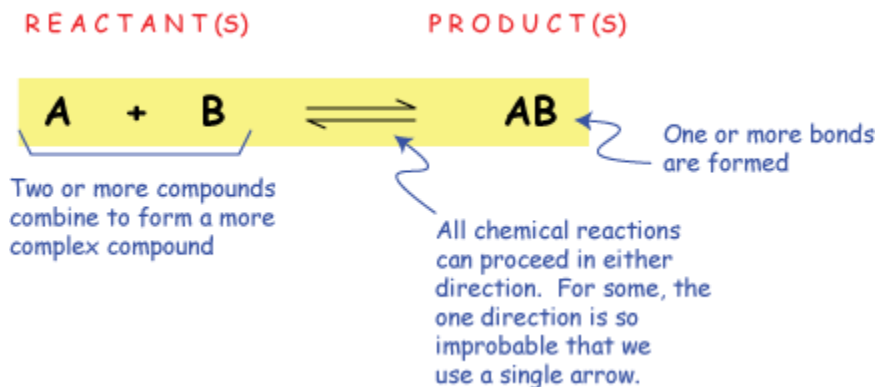


SYNTHESIS REACTIONS

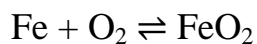
The reaction below is a prototype (that means A's and B's stand for elements) of a typical **synthesis reaction**, a reaction in which atoms or smaller molecules **combine** to form one or more larger or more complicated compound(s).

Before we go on to some examples, let's use this reaction to take care of some basic reaction terminology. The compound(s) on the left are called **reactant(s)**. Those on the right are **product(s)**. We separate different sets of reactants and products with + signs. We generally only use a **single arrow** (\rightarrow) to indicate a few reactions where the reverse reaction is very improbable, like the dissociation of a strong acid. More often we use a **double arrow** (\rightleftharpoons) to show that the reaction actually proceeds in both directions at the same time. There will be more to say about that in the section on **equilibrium**, but for now, you should start using the double arrow to write most reactions.

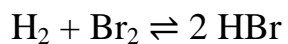


Examples of synthesis reactions

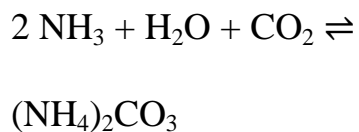
Here are a few examples of synthesis reactions. Compare them to the model reaction above to make sure you get the idea. For each I'll write the reaction in an English sentence so you might be able to pick up on the meaning more easily:



Iron combines with oxygen to form iron oxide



Diatomic hydrogen combines with diatomic bromine to form two molecules of hydrogen bromide



Two molecules of ammonia, a water and a carbon dioxide combine to form a molecule of ammonium carbonate.

Writing State Information

Often we write the state (**solid, liquid, gas, aqueous**) of a compound in a reaction using parenthesis and the letters (s), (l), (g) & (aq). Aqueous solutions are solutions in which water is the solvent. They are so ubiquitous in our chemistry that they get the special designation (aq). Here's that table again, but with the added state information:

$\text{Fe}_{(s)} + \text{O}_{2(g)} \rightleftharpoons \text{FeO}_{2(s)}$ solid Iron combines with oxygen gas to form solid iron oxide

$\text{H}_{2(g)} + \text{Br}_{2(g)} \rightleftharpoons 2 \text{HBr}_{(g)}$ Hydrogen gas combines with bromine gas to form two molecules of gaseous hydrogen bromide

$2 \text{NH}_{3(g)} + \text{H}_2\text{O}_{(l)} + \text{CO}_{2(g)} \rightleftharpoons (\text{NH}_4)_2\text{CO}_{3(aq)}$ Two molecules of gaseous ammonia, a liquid water molecule and a molecule of carbon dioxide gas combine to form a molecule of aqueous ammonium carbonate.

Notice that in all of these examples, simpler compounds were put together into more complicated ones. That's **synthesis**.

Source: http://www.dracruz.com/Chemistry_Reactions.html