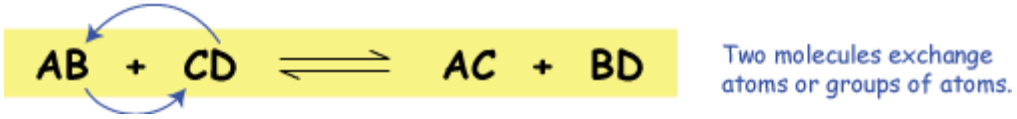
DOUBLE DISPLACEMENT REACTIONS AND ACID-BASE NEUTRALIZATION

The **double displacement** reaction is a pretty obvious extension of single displacement. It requires two **binary** compounds, each of which exchanges one of its parts with the other. Here it is:



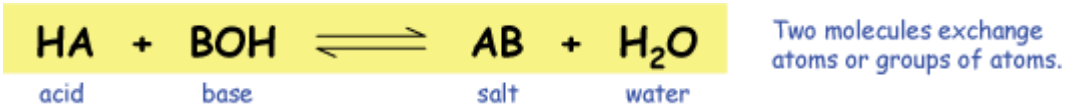
Examples of double-displacement reactions

$Pb(NO_3)_{2\,(aq)}$+ $2NaCl_{\,(aq)} \rightleftharpoons$ $2NaNO_{3(aq)}$+ $PbCl_{2(s)}$	Lead (II) nitrate reacts with the salt sodium chloride to produce sodium nitrate and lead (II) chloride.
$H_2SO_{4(aq)}$ + $2LiOH_{\,(aq)} \rightleftharpoons$ $Li_2SO_{4(aq)}$ + $2H_2O_{(l)}$	Aqueous sulfuric acid reacts with lithium hydroxide to produce lithium sulfate and water.
$AgNO_{3\,(aq)}$ + $HCl_{\,(g)} \rightleftharpoons$ $AgCl_{(s)}$ + $HNO_{3(aq)}$	Aqueous silver nitrate reacts with hydrochloric acid to produce a solid precipitate of silver chloride and aqueous nitric acid.

Acid-Base neutralization

Acids and bases are covered in another section, so this kind of reaction might seem a little fuzzy. You can come back to it later. For now, consider an **acid** to be an ionic compound that yields **H+** ions and a **base** to be an ionic compound that yields **OH^-** ions. Excess H^+ ions are what make a solution **acidic** and excess OH^- ions are what makes it **basic**. OH^- and H^+ can react to form H_2O, which is (exactly) neither acidic nor basic—water is, by definition, **neutral**.

The products of neutralization are always a salt (a non-acidic, non-basic ionic compound) and water. Here's what it looks like:



Examples of acid-base neutralization reactions

$HCl_{(aq)} + NaOH_{(aq)} \rightleftharpoons NaCl_{(aq)} + H_2O_{(l)}$

Hydrochloric acid is neutralized with an equimolar amount of sodium hydroxide in aqueous solution, forming the salt NaCl and liquid water at pH 7.

$H_3PO_{4(aq)} + 3KOH_{(aq)} \rightleftharpoons K_3PO_{4(aq)} + 3H_2O_{(l)}$	Phosphoric acid is completely neutralized with potassium hydroxide to form potassium phosphate and liquid water.
$2HCOOH_{(aq)} + Ba(OH)_{2(aq)} \rightleftharpoons 2HCOOBa_{2(aq)} + 2H_2O_{(l)}$	Formic acid (HCOOH) is neutralized with barium hydroxide to yield barium formate (a salt) and water.

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