**How to write out a NET IONIC EQUATION**

To write out a NET IONIC EQUATION, first you must learn about **DISSOCIATION**.

Dissociation is the process by which an ionic compound dissolves in water and breaks up into IONS. Note that some ions are POLYATOMIC. Regardless, you must always look up the charges (oxidation numbers) of each ion; and when writing a DISSOCIATION EQUATION, both the number of atoms and the charges must be balanced.

EXAMPLE:

Ca3(PO4) 2 ----(H2O)-----> **3** Ca**+2** (aq) +  **2** PO4**-3**(aq)

Not only is the equation balanced, but the charges equal out to zero. ( **3 (+2) + 2 (-3) = 0** ).

Now that you know how to write a **DISSOCIATION EQUATION**, let’s learn how to write a

**DOUBLE REPLACEMENT REACTION**.

Let’s say You were reacting a solution of AgNO3 and BaCl2.

There are **six** steps to follow:

**STEP 1)** Find the “preliminary” Products of the reaction, but not the “actual” Products.

AgNO3 (aq) + BaCl2 (aq) 🡪 **What are the products?**

In a double replacement reaction, you switch the two positive ends (usually the metals).

AgNO3 (aq) + BaCl2 (aq) 🡪 Ag Cl + Ba NO3

Notice, I left a space between the compounds because we don’t know the “actual” Products yet.

This leads us to...

**STEP 2)** Check the charges (oxidation #s), then write the “actual” Products.

AgNO3 (aq) + BaCl2 (aq) 🡪 Ag**+1** Cl**-1** + Ba**+2** NO3**-1**

AgNO3 (aq) + BaCl2 (aq) 🡪 AgCl + Ba(NO3)2

Now we move on to...

**STEP 3)** Balance the equation.

**2** AgNO3 (aq) + BaCl2 (aq) 🡪 **2** AgCl + Ba(NO3)2

**STEP 4)** Find the **PRECIPITATE** (if there is one) using the **Solubility Guidelines** Table.

The PRECIPITATE is the ***Insoluble*** compound. To find this compound, you must use the **Solubility Guidelines** Table and look for either an ion from the **“Ions That Form *Insoluble* Compounds,”** or an ion that is an **Exception**to the “**Ions that form *Soluble* Compounds.”**

**2** AgNO3 (aq) + BaCl2 (aq) 🡪 **2** AgCl (s) + Ba(NO3)2 (aq)

The **PRECIPITATE**

(Note AgCl is the precipitate because even though Cl- is generally soluble, it is insoluble when combined with Ag+. See the **Exceptions** column)

CONGRATULATIONS! You have just written a **DOUBLE REPLACEMENT REACTION**.

Now let’s write this equation as a **TOTAL IONIC EQUATION** (remember to DISSOCIATE)

**STEP 5)** Turn the DOUBLE REPLACEMENT REACTION into a TOTAL IONIC EQUATION using what you learned about DISSOCIATION, but leave the precipitate alone.

**2** AgNO3 (aq) + BaCl2 (aq) 🡪 **2** AgCl (s) + Ba(NO3)2 (aq) becomes...

**2** Ag**+1**(aq) + **2** NO3**-1**(aq) + Ba**+2**(aq)  + **2** Cl**-1**(aq) 🡪 **2** AgCl (s) + Ba**+2**(aq) + **2** NO3**-1**(aq)

This is a **TOTAL IONIC EQUATION**.

Now the only thing left is to write out the **NET IONIC EQUATION**.

**STEP 6)** Cancel the SPECTATOR IONS (those are the ones that are the same on both sides of the equation). Whatever you have left is the **NET IONIC EQUATION**.

**2** Ag**+1**(aq) + **~~2~~** ~~NO3~~**~~-1~~**~~(aq)~~ + ~~Ba~~**~~+2~~**~~(aq)~~  + **2** Cl**-1**(aq) 🡪 **2** AgCl (s) + ~~Ba~~**~~+2~~**~~(aq)~~  + **~~2~~** ~~NO3~~**~~-1~~**~~(aq)~~

Ag**+1**(aq) + Cl**-1**(aq) 🡪 AgCl (s) (Note that all of the coefficients cancelled out too.)

This is a **NET IONIC EQUATION**.

**Solubility Guidelines**

