**Writing Net Ionic Equations**

**Net Ionic Equations**

* indicate only the species that are reacting
* not all species in a BCE react
* some species are present but just "watch" the other species react

**Information you are to memorize:**

**Some** substances when dissolved in water **(aqueous solutions)** break up into ions 100 % of the time.

e.g. **AlCl3(aq) → \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

The substances that break up 100 % of the time are:

1) **ionic compounds** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ e.g. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2) **strong acids** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| **HCl** | **HNO3** |
| **HBr** | **HClO3** |
| **HI** | **HClO4** |
|  | **H2SO4** |

3) **strong bases** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| **LiOH** | **Ca(OH)2** |
| **NaOH** | **Sr(OH)2** |
| **KOH** | **Ba(OH)2** |
| **RbOH** |  |
| **CsOH** |  |

Any other soluble (aqueous) ionic, acidic or basic substances **DO NOT** split up 100 % of the time.

Any soluble (aqueous) covalent substances **DO NOT** split up ever in water.

e.g. I2(aq), C2H5OH(aq), C12H22O11(aq) etc

**Solids, Liquids and Gases DO NOT split up!** They are **NOT** aqueous.

*Certain products are unstable and break apart upon formation. Two important ones that you must remember are H2CO3, a weak acid that breaks up into H2O(l) and CO2(g) and NH4OH, a weak base that breaks up into H2O(l) and NH3(g). There is absolutely no experimental evidence for the EXISTENCE of discrete molecules of either carbonic acid or ammonium hydroxide. They cannot be isolated and crystallized.*

**Rules for writing Net Ionic Equations**

1) Write the **BCE** with the proper subjects.

\_**BCE**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2) Eliminate any species that is not aqueous.

3) Determine whether each aqueous species is a **strong acid** (SA) or **strong base** (SB) or a **salt/ionic compound** (I).

4) Separate all the compounds checked in Step 3 into ions.

This is the **Ionic Equation** (IE).

\_**IE**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5) Cross out any species that is common to both sides. The species must be **identical**!!!!

This is the **Net Ionic Equation** (NIE).

\_NIE\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**The NIE indicates the species which are reacting.**

The crossed out species are **SPECTATORS** -- they are present but do not react.

**Examples of Spectators**: