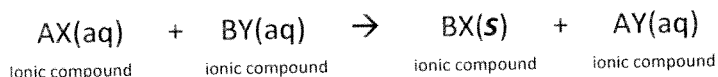


Double Replacement Predicting Products

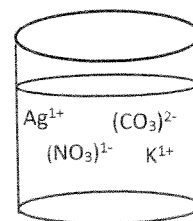
- Identify two reactants as being two ionic compounds.
(cation) **Metal/Ammonium** – bonded to – **Nonmetal/Polyatomic ion** (anion)
- Circle the metal/ammonium on the reactant side
- Metallic part of ionic compounds trade places



Do NOT carry subscriptsdetermine new ones by crisscrossing!!!

- Balance the reaction
- Write an parenthesis after each product

In solutions, the ions are free to move about the solution. So... all of the ions are in contact with each other. **To determine if a solid, a precipitate, will form when two of the ions "meet" look at solubility table.**



- Look at the solubility chart
 - If soluble, then place an (aq) for aqueous- dissolves in water
 - If insoluble, then place a (s) for solid, the precipitate – the new product
- If there is no insoluble product, no precipitate, then there is no reaction, no new products are made.

Example: What happens when K^{1+} meets $(\text{NO}_3)^{1-}$ & when Ag^{1+} meets $(\text{CO}_3)^{2-}$?

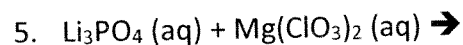
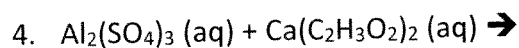
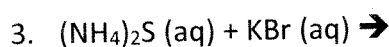
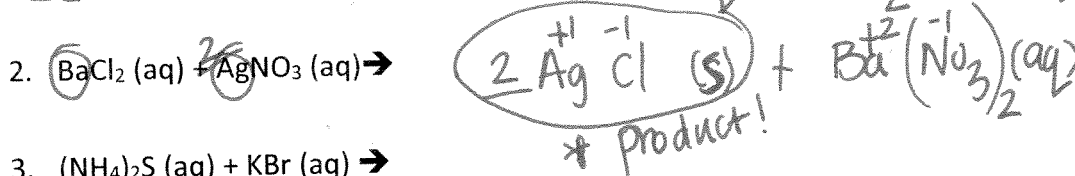
- aq = aqueous = **soluble** = dissolves in H_2O = ions break apart
- s = precipitate = **insoluble** = does not break apart = the new product

Practice:

Determine whether each of the following compounds is soluble or insoluble by using your solubility table.

- | | |
|---|--|
| 1. Lead (II) acetate <i>soluble = aq</i> | 6. Calcium sulfate <i>exception = insoluble = s</i> |
| 2. Copper (II) carbonate <i>insoluble = s</i> | 7. Nickel phosphate <i>insoluble = s</i> |
| 3. Ammonium sulfide <i>exception = soluble = aq</i> | 8. Mercury (I) chloride <i>exception = insoluble = s</i> |
| 4. Silver iodide <i>exception = insoluble = aq</i> | 9. Magnesium chromate <i>insoluble = s</i> |
| 5. Potassium nitrate <i>soluble = aq</i> | 10. Potassium hydroxide <i>exception = soluble = aq</i> |

Practice:



Reaction Rates: How to make a products faster

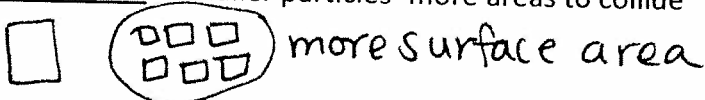
To **increase the rate** of a reaction,

- the number of collision needs to be increased
- OR
- the effectiveness of the collisions needs to be increased

Four ways to do this:

1. Increase Surface area = smaller particles = more areas to collide

Example:



2. Increase Temperature = increasing in movement = more collisions

Example: glow stick in Hot H₂O glows Brighter
glow stick in Cold H₂O glows ~~less~~ ~~more~~ Bright

3. Increase Concentration (Bigger M) = Increase amount of a substance per area = more collisions

Example: Which will cause a faster reaction 3M or 0.4M more particles

4. Catalyst: speeds up reaction without being used

- Less activation energy is needed
- lowers the activated complex

