**Chemical Change Lab**

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**Introduction**

The purpose of this lab is to observe whether a chemical reaction has taken place when two various chemicals are combined. A chemical reaction occurs when two or more substances are combined and the result is one or more different substances. Although most substances can physically be combined, this doesn’t mean a true chemical reaction will occur. Basically without formation of a new substance there is no chemical reaction.

There are multiple types of chemical reactions that can take place, each requiring a different combination of reactants. Each type of chemical reaction also results in the formation of different products. For example a neutralization reaction requires at least one acid and one base. The result of reaction these two chemicals will always result in the formation of water and a salt. In this lab, multiple combinations of chemicals were prepared to observe whether a double replacement reaction would occur. A double replacement reaction takes place when two aqueous chemicals react to form an insoluble precipitate. When viewing this reaction, one will initially see two totally clear substances. When mixed together they will form a solid in the new solution making it very cloudy.

Using chemical equations is a way to represent the reactants and products involved in a chemical reaction. In order for the equation to be correct, both the reactants side and products side must contain the same amount of each element. This is called being balanced. Chemical equations can be written using three different breakdowns of the reaction. The first, the molecular equation, represents each chemical as a molecule. The second and third, the ionic and net ionic equations, show the compounds each in ion form. Substances are broken down into their ionic forms when they are aqueous. The only difference the net ionic equation has from the ionic is that it only displays the ions that, when reacted, form a new substance or substances.

In this lab, one can find the identity of the precipitate by using what is known as a solubility chart. When two ions are combined that when together are insoluble, this combination is the precipitate.

**Data**

|  |  |
| --- | --- |
| Chemicals Combined | Precipitate |
| BaCl2 + K2CO3 | precipitate formed |
| BaCl2 + CuSO4 | no reaction |
| BaCl2 + MgCl2 | no reaction |
| CuSO4 + K2CO3 | precipitate formed |
| CuSO4 + MgCl2 | no reaction |
| CaCl2 + K2CO3 | precipitate formed |
| K2CO3 + MgCl2 | precipitate formed |
| CaCl2 + MgCl2 | no reaction |

**Calculations**

The molecular, ionic, and net ionic equations for the combinations that produced a precipitate are as follows:

Molecular    BaCl2(aq) + K2CO3(aq) → BaCO3(s) + 2KCL(aq)

Ionic Ba2+(aq) + 2Cl-(aq) + 2K+(aq) + CO3-2(aq) → BaCO3(s) + 2K+(aq) + 2Cl-(aq)

Net Ionic Ba2+(aq) + CO3-2(aq) → BaCO3(s)

Molecular    CuSo4(aq) + K2CO3(aq) → BaSO4(s) + CuCl2(aq)

Ionic Cu2+(aq)+ SO4-2(aq)+ 2K+(aq) + CO3-2(aq) → CuSO3(s) + 2K+(aq) + SO4-2(aq)

Net Ionic Cu2+(aq) + CO3-2(aq) → CuSO3(s)

Molecular    CaCl­2(aq) + K2CO3­ → 2KCl(aq) + CaCO3(s)

Ionic 2K+(aq)­ + CO3-2(aq) + Ca2+(aq) + 2Cl-(aq) → 2K+(aq) + 2Cl-(aq) + CaCO3(s)

Net Ionic Ca2+(aq) + CO3-2(aq) → CaCO3(s)

Molecular K2CO3(aq) + MgCl2(aq) → MgCO3(s) + 2KCl(aq)

Ionic 2K+(aq)­ + CO3-2(aq) + Mg2+(aq) + 2Cl-(aq) → MgCO3(s) + 2K+(aq) + 2Cl-(aq)

Net Ionic Mg2+(aq) + CO3-2(aq) → MgCO3(s)