

Exchange Reactions

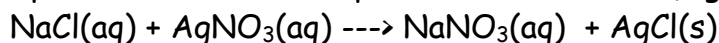
(See Chemistry The Molecular Science; 2nd ed.; Sections 5.1 & 5.2)

An exchange reaction occurs between compounds that, when written as a molecular equation, appear to involve the exchange of parts between the two reactants. An exchange reaction will occur when ions in solution form insoluble products, weak electrolytes, or nonelectrolytes.

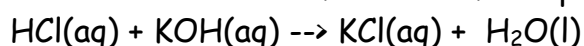
Exchange reactions have the general form $AB + CD \rightarrow AD + CB$.

Exchange reactions can be categorized as:

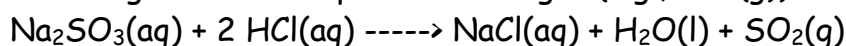
1. Precipitations: one of the products is insoluble (e.g., $AgCl(s)$).



2. Neutralizations: most often one of the products is water, $H_2O(l)$.



3. Gas-forming: one of the products is a gas (e.g., $SO_2(g)$).



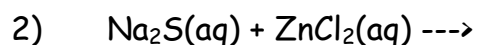
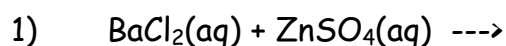
Precipitation Reactions

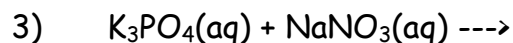
(See Chemistry The Molecular Science; 2nd ed.; p. 168)

A precipitate is an insoluble solid compound formed during a chemical reaction in solution (e.g., $CaCO_3(s)$, $AgCl(s)$, $BaSO_4(s)$). Precipitation reactions are a type of chemical reaction between ions that produce a precipitate.

Based upon the solubility rules (see the lab manual page 13), a reaction can be predicted as to whether it will take place or not. When solutions of electrolytes are mixed, a reaction will take place if one of the products is insoluble.

Reactions can be viewed as rearrangement of atoms. Therefore, swap cation and anions to determine what the possible products might be. If one of the products is insoluble a can be predicted to occur. If both predicted products are soluble then no reaction occurs.





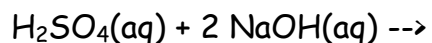
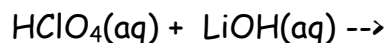
Acid-Base Reactions: Neutralizations

(See Chemistry The Molecular Science; 2nd ed.; p. 176)

A neutralization rxn is the reaction of an acid and a base to produce a salt.

In a neutralization rxn, the identifying characteristics of the acid and base cancel out, or in other words, are neutralized by each other.

ACID + BASE \rightarrow SALT + WATER

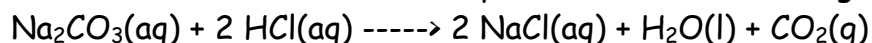


Gas-forming Exchange Reactions

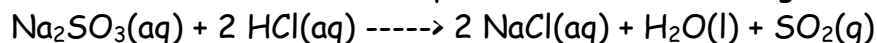
(See Chemistry The Molecular Science; 2nd ed.; p. 179)

Certain compounds such as carbonates (e.g., K_2CO_3), sulfites (e.g., K_2SO_3), and sulfides (e.g., K_2S), when mixed with acids, produce gases.

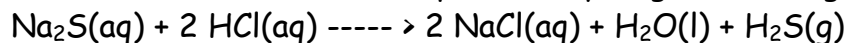
Carbonates react with acids to produce carbon dioxide gas,



Sulfites react with acids to produce sulfur dioxide gas.



Sulfides react with acids to produce hydrogen sulfide gas.



Ammonium salts (e.g., $(NH_4)_2SO_4$) react with strong bases to produce ammonia gas.

