

# Chapter 9 : Chemical Reactions

## Section 3 Notes

Aqueous Solutions

## Section 9-3

An aqueous solution contains one or more dissolved substances (called solutes) in water.

The solvent is the most plentiful substance in a solution.

Aqueous Solutions (cont.)

## Section 9-3

Water is always the solvent in an aqueous solution.

There are many possible solutes—sugar and alcohol are molecular compounds that exist as molecules in aqueous solutions.

Compounds that produce hydrogen ions in aqueous solutions are acids.

Aqueous Solutions (cont.)

## Section 9-3

Ionic compounds can also be solutes in aqueous solutions.

When ionic compounds dissolve in water, their ions separate in a process called dissociation.

Types of Reactions in Aqueous Solutions

## Section 9-3

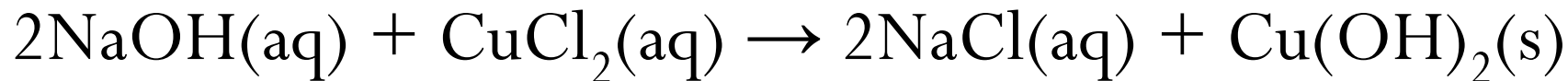
When two solutions that contain ions as solutes are combined, the ions might react.

If they react, it is always a double replacement reaction.

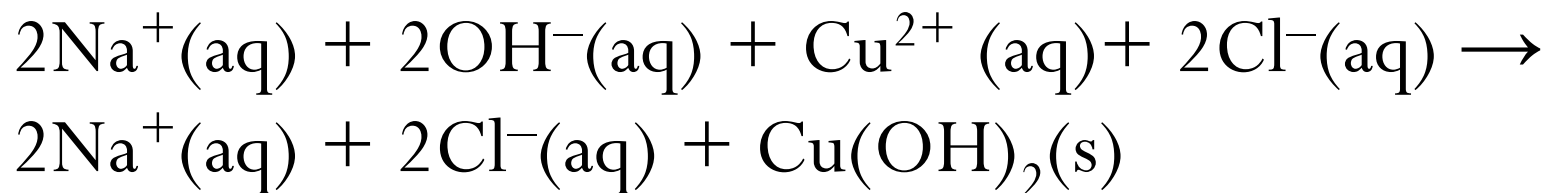
Three products can form: precipitates, water, or gases.

## Section 9-3

Aqueous solutions of sodium hydroxide and copper(II) chloride react to form the precipitate copper(II) hydroxide.



Ionic equations that show all of the particles in a solution as they actually exist are called complete ionic equations.

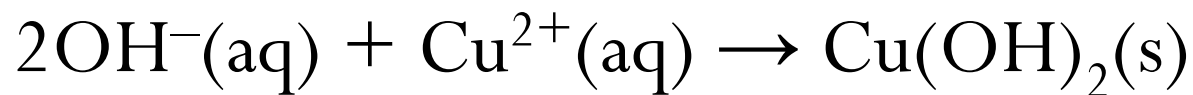


Types of Reactions in Aqueous Solutions (cont.)

## Section 9-3

Ions that do not participate in a reaction are called spectator ions and are not usually written in ionic equations.

Formulas that include only the particles that participate in reactions are called net ionic equations.

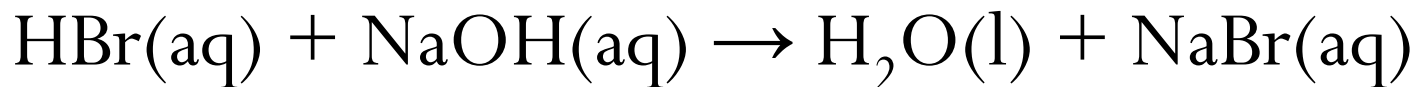


Types of Reactions in Aqueous Solutions (cont.)

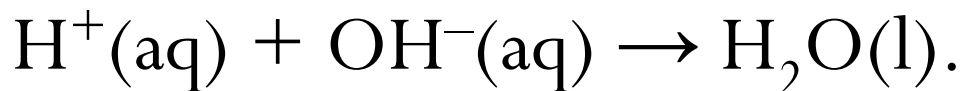
## Section 9-3

Some reactions produce more water molecules.

No evidence of a chemical reaction is observable.



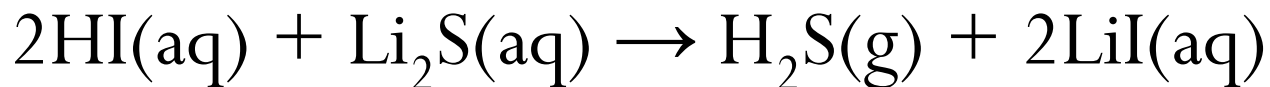
Without spectator ions



Types of Reactions in Aqueous Solutions (cont.)

## Section 9-3

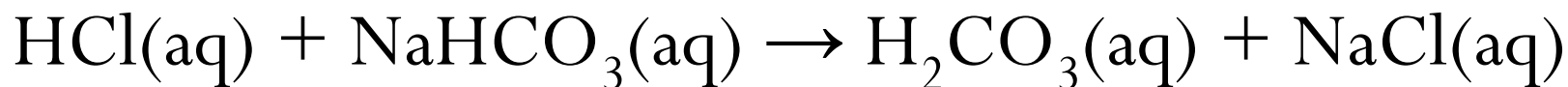
Gases that are commonly produced are carbon dioxide, hydrogen cyanide, and hydrogen sulfide.



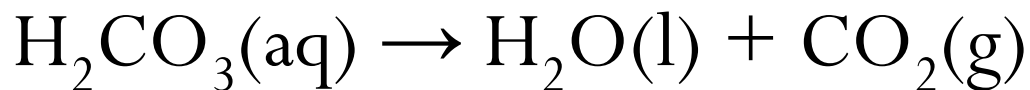
Types of Reactions in Aqueous Solutions (cont.)

## Section 9-3

Another example is mixing vinegar and baking soda, which produces carbon dioxide gas.



$\text{H}_2\text{CO}_3(\text{aq})$  decomposes immediately.

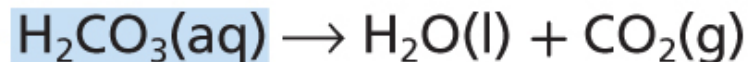
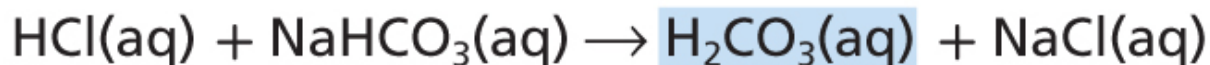
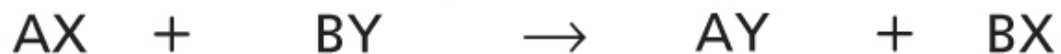


Types of Reactions in Aqueous Solutions (cont.)

## Section 9-3

Two reactions can be combined and represented by a single chemical reaction.

### Double-replacement reaction

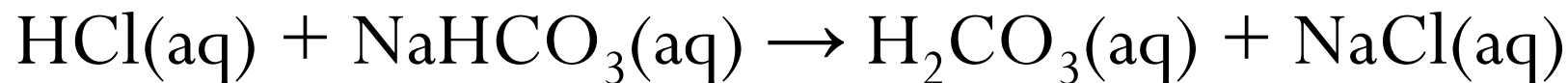


### Decomposition reaction

Types of Reactions in Aqueous Solutions (cont.)

## Section 9-3

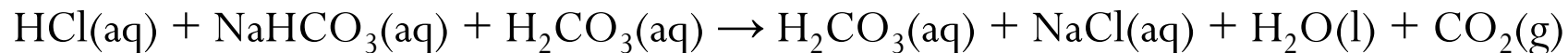
Reaction 1



Reaction 2



Combined equation



Overall equation

