

# Common Ion Effect Worksheet

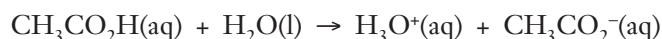
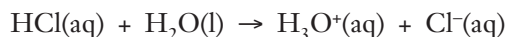
## Demonstration #1 — Colorful Acid Eruptions

The reaction that causes the foaming is



The greater the hydronium ion concentration, the faster the reaction.

Hydrochloric acid and acetic acid are Bronsted acids—they ionize in water to produce hydronium ions ( $\text{H}_3\text{O}^+$ ) and their conjugate bases, chloride ion and acetate ion, respectively (Equations 1 and 2).



The following table summarizes the observations and conclusions in this demonstration. The concentration of the acid and conjugate base components is 1 M in all cases.

	Hydrochloric Acid	Acetic Acid
“Rainbow Acid” Color		
pH		
Rate of Reaction with $\text{CaCO}_3$	Fast/Moderate/Weak	Fast/Moderate/Weak
Acid Strength	Strong/Weak	Strong/Weak

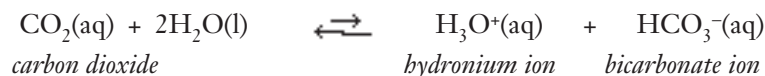
## Effect of Common Ion

pH		
Rate of Reaction with $\text{CaCO}_3$		

Based on these observations, are both reactions reversible? If not, why?

## Demonstration #2 — Carbon Dioxide and pH

Carbon dioxide dissolved in water is a weak acid, establishing equilibrium with its products, the hydronium ion and the bicarbonate ion. The solution is initially acidic. Bromthymol blue is yellow in an acidic solution, blue-green in a neutral solution, and blue in a basic solution.

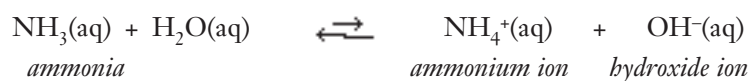


What is the color change when bubbles are blown into the solution? Why does it occur?

Explain the color change when powder, sodium bicarbonate is added to the solution.

## Demonstration #3 — Weak Base Color Cycle

“Ammonium hydroxide” is a concentrated solution of ammonia in water. Ammonia ( $\text{NH}_3$ ) is a weak base, reacting with water to form ammonium ions and hydroxide ions (Equation 1).



Explain why the solution changes color when the solid, ammonium chloride,  $\text{NH}_4\text{Cl}$ , is added to the beaker.