

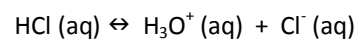
Pre-AP Chemistry/Chemistry/AP Chemistry

Unit #12—Acids and Bases

Properties of Acids and Bases

Acids	Bases
<ul style="list-style-type: none"> ✦ Industries use 30 to 40 billion kilograms of H_2SO_4 each year ✦ H_2CO_3 and H_3PO_4 give carbonated drinks their sharp taste ✦ Citric and Ascorbic acids give lemons and grapefruit their tartness ✦ Acetic acid makes vinegar sour ✦ Can be identified with their reactions to metals to typically produce a gas <ul style="list-style-type: none"> ○ Aluminum, magnesium, and zinc react with aqueous solutions of acids to produce hydrogen gas ○ Metal carbonates/hydrogen carbonates also react with solutions of acids to produce carbon dioxide gas ✦ Litmus paper test turns blue litmus paper to pink for acids ✦ Ability to conduct electricity ✦ Acidic solution contains more hydrogen ions than hydroxide ions ✦ $\text{pH} < 7$ ✦ Monoprotic Acids that can only donate one hydrogen ion. <ul style="list-style-type: none"> ○ One dissociation step <ul style="list-style-type: none"> ▪ Hydrochloric Acid ▪ Hydrofluoric acid ▪ Nitric Acid ✦ Polyprotic Acids that can furnish more than one proton. ✦ Dissociates in a stepwise manner ✦ One proton at a time ✦ Diprotic Acids <ul style="list-style-type: none"> ○ Sulfuric Acid ○ Sulfurous Acid ✦ Carbonic Acid ✦ Triprotic Acids <ul style="list-style-type: none"> ○ Phosphoric Acid ○ Arsenic Acid ✦ Strong acids are acids that completely dissociates to produce H^+ and the conjugate base ✦ Equilibrium lies far to the right for the reaction ✦ Strong Acid yields a weak conjugate base ✦ Also described as an acid whose conjugate base is much weaker than water ✦ Excellent conductors of electricity <ul style="list-style-type: none"> ○ Hydrochloric Acid 	<ul style="list-style-type: none"> ✦ Taste bitter ✦ Very slippery ✦ Ability to conduct electricity ✦ Sodium hydroxide, NaOH, is the most common base ✦ Litmus paper test turns red litmus paper to blue for base ✦ Basic solution contains more hydroxide ions than hydrogen ions ✦ $\text{pH} > 7$ ✦ A strong base is a base that completely dissociates to produce OH^- and the conjugate acid. <ul style="list-style-type: none"> ✦ All Group 1 metals are strong bases with hydroxide ions ✦ All Group 2 metals are strong bases with hydroxide ions ✦ Conducts electricity <div style="text-align: center; margin: 10px 0;"> $\text{NaOH (s)} \leftrightarrow \text{Na}^+ \text{ (aq)} + \text{OH}^- \text{ (aq)}$ </div> ✦ A weak base is a base that ionizes only partially in dilute aqueous solution to form the conjugate acid of the base an hydroxide ion <ul style="list-style-type: none"> ○ Equilibrium lies far to the left ○ Conjugate bases are extremely strong ○ Hydroxide ion has greater attraction to hydrogen ions ○ <div style="text-align: center; margin: 10px 0;"> $\text{CN}_3\text{NH}_2 \text{ (aq)} \leftrightarrow \text{CH}_3\text{NH}_3^+ \text{ (aq)} \text{ OH}^- \text{ (aq)}$ </div>

- Perchloric Acid
- Nitric Acid



- ✦ Acid that dissociates only slightly in aqueous solution
- ✦ Equilibrium lies far to the left for the reaction
- ✦ Most of acid placed into solution is still present as HA at equilibrium
- ✦ Weak acid has a conjugate base that is much stronger base than water where the weaker the acid, the stronger the conjugate base
- ✦ Cannot conduct electricity as strongly
 - Hydrofluoric Acid
 - Carbonic Acid
 - Boric Acid

