

Acids and Bases

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Acids

- * The word acid is derived from the Latin word "acidus" meaning sour and an acid is an aqueous compound that usually has a sour taste

Acids

- * Are proton donors
- * React with bases or electron donors, and neutralize to form a salt.
- * Have a pH of less than 7
- * React with active metals to produce hydrogen gas
- * React with carbonates to produce carbon dioxide

Bases

- * An aqueous compound that has a slippery feeling and a bitter taste
- * Accept hydrogen ions
- * All bases have a pH of more than 7

Arrhenius Acids and Bases

- * In 1884, the Swedish chemist Svante Arrhenius proposed two specific classifications of compounds, termed acids and bases.



- * **Ionization: The process of forming ions.**
- * **Acids are held together by covalent bonds. When dissolved in water they form ions.**
- * **Therefore acids are said to undergo ionization.**

- * **Dissociation: the process by which ions break apart when dissolved in solution.**
- * **Bases are ionic compounds, and when dissolved in water the ions break apart.**
- * **Therefore bases are said to dissociate.**

Arrhenius Acids and Bases

A base is a substance that dissociates in water in water to form one or more hydroxide ions, OH^- (aq).

Example:



Arrhenius Acids and Bases

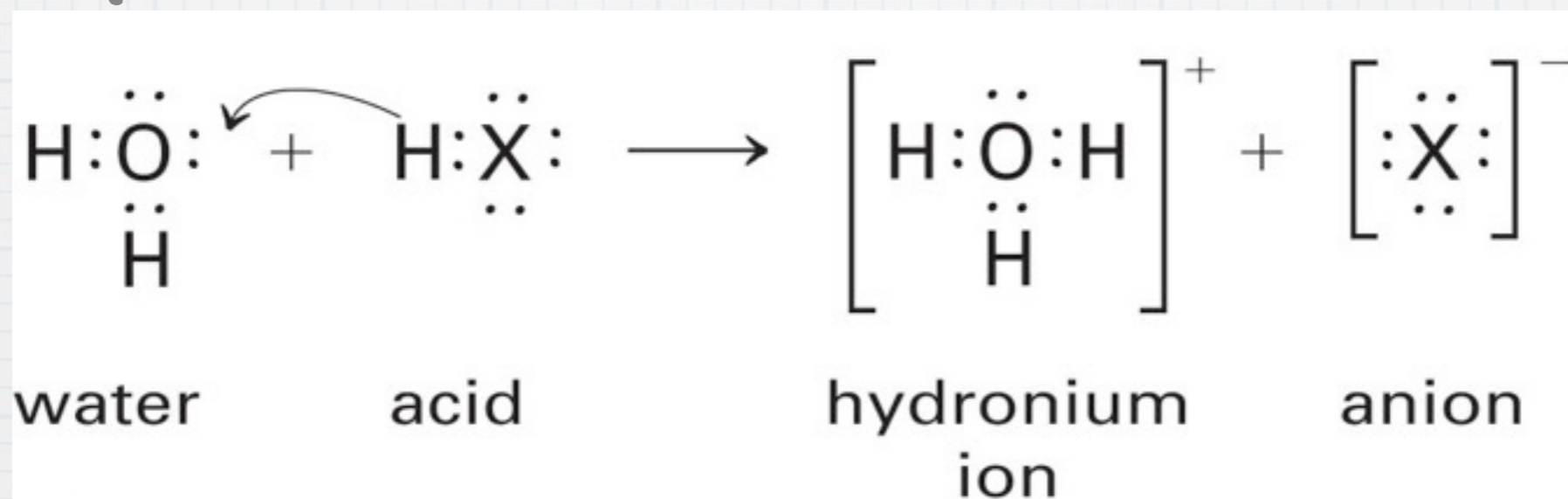
An acid is substance that ionizes in water to produce one or more hydrogen ions, $H^+(aq)$.

Example:



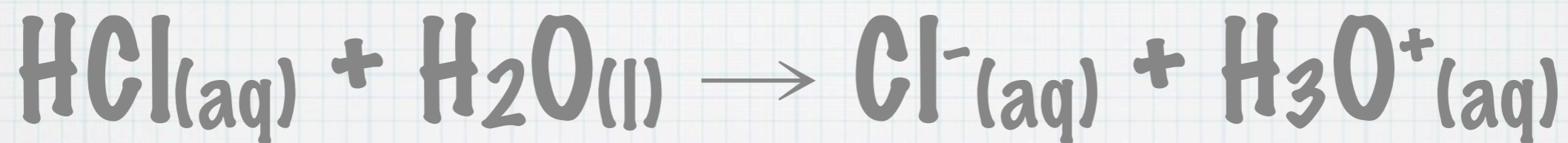
Hydronium Ion

- * Lone hydrogen ions do not exist by themselves in solution. H^+ is always bound to a water molecule to form a hydronium ion.



Strong vs Weak Acids

- * The strength of an acid refers to its ability to ionize in solution.
- * **Strong acid:** An acid that ionizes completely in water.

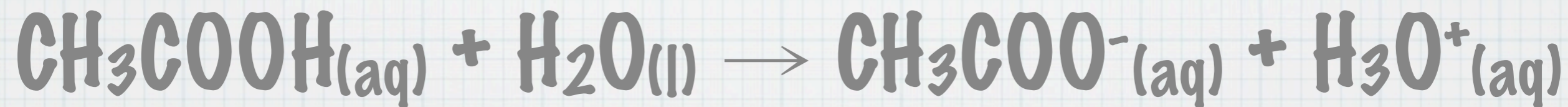


All binary acids bound to a halogen are considered to be a strong acid (except for HF)

Most Common Strong Acids

Name	Formula
hydrochloric acid	$\text{HCl}_{(\text{aq})}$
hydrobromic acid	$\text{HBr}_{(\text{aq})}$
hydroiodic acid	$\text{HI}_{(\text{aq})}$
perchloric acid	$\text{HClO}_4_{(\text{aq})}$
nitric acid	$\text{HNO}_3_{(\text{aq})}$
sulfuric acid	$\text{H}_2\text{SO}_4_{(\text{aq})}$

*** Weak acid:** An acid that ionizes very slightly in a water solution.



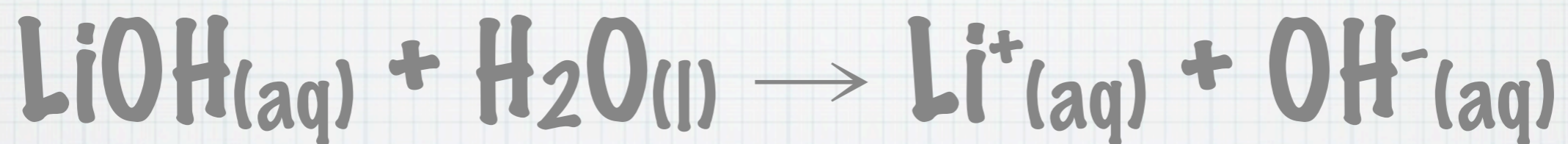
Challenge Question

- * What does the work monoprotic, diprotic, and triprotic refer to?

Challenge Question

- * What does the work monoprotic, diprotic, and triprotic refer to?
- * Monoprotic: Contains one hydrogen atom that can ionize.
- * Diprotic: Contains two hydrogen atoms that can ionize.
- * Triprotic: Contains three hydrogen atoms that can ionize.

- * The strength of an acid refers to its ability to dissociate in solution.
- * **Strong acid:** An base that dissociates completely in water.

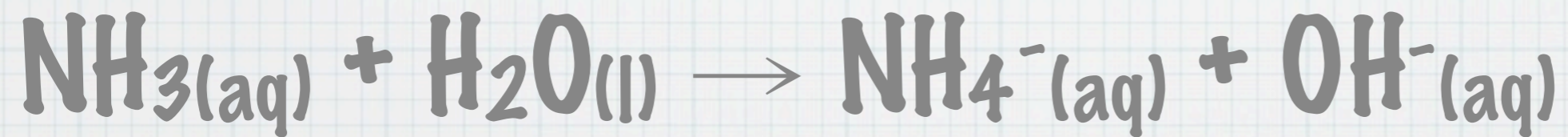


All hydroxides of alkali metals are strong bases

Most Common Strong Bases

Name	Formula
lithium hydroxide	$\text{LiOH}_{(aq)}$
sodium hydroxide	$\text{NaOH}_{(aq)}$
potassium hydroxide	$\text{KOH}_{(aq)}$
calcium hydroxide	$\text{Ca(OH)}_{2(aq)}$
barium hydroxide	$\text{Ba(OH)}_{2(aq)}$

*** Weak base: A base that produces relatively few hydroxide ions in water.**



Homework

* p. 462 # 7, 8

* p. 463 #1, 7