

## Acids & Bases Notes #1

### General Properties of Acids:

Sour taste

Examples: Vinegar (acetic acid), Citric Acid

### General Properties of Bases:

Bitter taste

Feel slippery

Examples: Bleach (sodium hypochlorite), Drain Cleaner (sodium hydroxide)

### **Arrhenius Definitions of Acids and Bases:**

Arrhenius Acids: when dissolved in water, these increase the concentration of  $H^{1+}$  ions

Arrhenius Bases: when dissolved in water, these increase the concentration of  $OH^{1-}$  ions

$HCl(g)$  bubbled into water produces  $H^{1+}(aq)$  and  $Cl^{1-}(aq)$

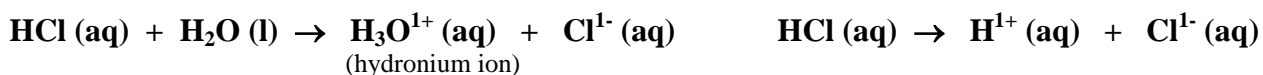
$NaOH(s)$  dissolved in water produces  $Na^{1+}(aq)$  and  $OH^{1-}(aq)$

**Arrhenius definitions work great for aqueous solutions  
but the aqueous aspect limits the usefulness of this definition.**

### **Bronsted-Lowry Definitions of Acids and Bases**

Bronsted-Lowry Acids: proton ( $H^{1+}$ ) donors

Bronsted-Lowry Bases: proton acceptors



$H_3O^{1+}(aq)$  and  $H^{1+}(aq)$  represent the same thing.

Many think the  $H_3O^{1+}$  is closer to reality, but the  $H^{1+}$  is more convenient.

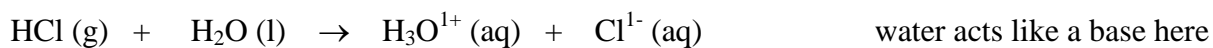
### **Bronsted-Lowry Definitions allow for non-aqueous chemical reactions**



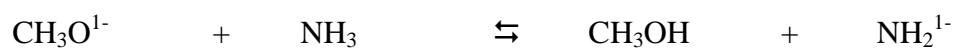
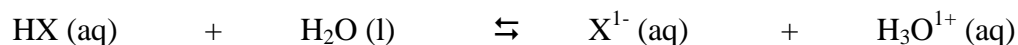
Acids and Bases always work together to transfer a proton. You cannot have an acid unless something else will accept the proton.

Some substances can act as an acid or as a base, depending on the reaction. These are called **amphoteric substances**.

Consider H<sub>2</sub>O:



**Conjugate Acid – Base Pairs** (Conjugate means “joined as a pair”)



### **Polyprotic Acids:**

Contain more than one ionizable hydrogen

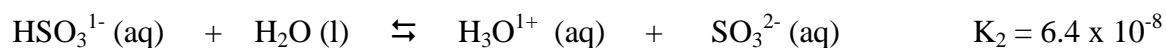
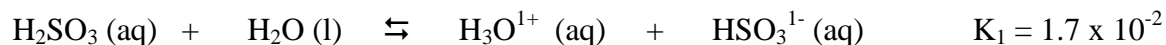
Examples:

**H<sub>2</sub>SO<sub>3</sub>** has two protons that can be donated..... a “Diprotic Acid”

**H<sub>3</sub>PO<sub>4</sub>** has three protons that can be donated..... a “Triprotic Acid”

Big Ideas:

Protons do not come off at the same time!



Always easier to remove the first proton than the second (or third). **K<sub>1</sub> > K<sub>2</sub>**