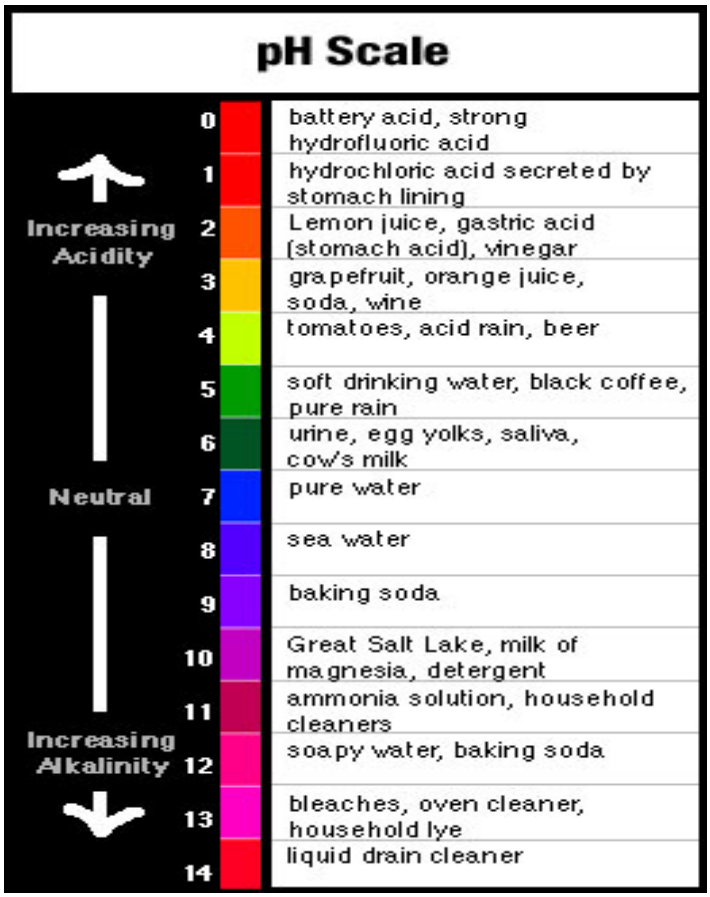
Science 1206

Acids and Bases

Acids (p. 10 notes)

- **ACIDS**
- Hydrogen is a special element capable of many things
- Hydrogen will bond to other nonmetallic elements to form a special conducting solution called an acid
- *Properties of acids:*
- Conduct electricity
- Turn blue litmus paper red
- Taste sour
- React with many metals to produce hydrogen gas, $H_2(g)$
- Have a pH value of less than 7
- Neutralize or partially neutralize bases


pH Scale
Increasing Acidity
Neutral
Increasing Alkalinity
0 battery acid, strong hydrofluoric acid
1 hydrochloric acid secreted by stomach lining
2 Lemon juice, gastric acid (stomach acid), vinegar
3 grapefruit, orange juice, soda, wine
4 tomatoes, acid rain, beer
5 soft drinking water, black coffee, pure rain
6 urine, egg yolks, saliva, cow's milk
7 pure water
8 sea water
9 baking soda
10 Great Salt Lake, milk of magnesia, detergent
11 ammonia solution, household cleaners
12 soapy water, baking soda
13 bleaches, oven cleaner, household lye
14 liquid drain cleaner

Acids

- General Formula:

H____ (aq) or ____COOH (aq)

- *Note:* not all hydrogen containing compounds are acids - (aq) indicates an acid
- Eg: NH_3 CH_4 CH_3OH C_2H_5OH

Naming Acids

- ***General Rules***
- Name the hydrogen compound like an ionic compound
- Then convert the ionic name to the acid name

hydrogen _____ide becomes **hydro_____ic acid**
hydrogen_____ite becomes **_____ous acid**
hydrogen_____ate becomes **_____ic acid**

Naming Acids

hydrogen _____ide becomes **hydro_____ic acid**
hydrogen_____ite becomes **_____ous acid**
hydrogen_____ate becomes **_____ic acid**

Acid Formula	Ionic Name	Acid Name
HCN(aq)		
HNO2(aq)		
H2SO3(aq)		
HNO3(aq)		
H2SO4(aq)		
H3PO4(aq)		
CH3COOH(aq)		

Writing Acid Formulas

General Rules:

1. Translate acid name into ionic name:
   hydro___ic acid → hydrogen ___ide
   ___ous acid → hydrogen ___ite
   ___ic acid → hydrogen ___ate

2. Write chemical formulas for each ion, using rules for writing formulas for ionic compounds.
3. Hydrogen symbol is written first (cation), except for carboxylic acids (those with COO group), in which case hydrogen is placed at the end eg: CH_3COOH
4. Give the state as aqueous = (aq).

Writing Formulas

hydro___ic acid ✹ hydrogen ___ide

___ous acid ✹ hydrogen ___ite

___ic acid ✹ hydrogen ___ate

Acid Name	Ionic Name	Formula
Hydroiodic acid		
Chlorous acid		
Chloric acid		
Boric acid		
Benzoic acid		

hydrogen _____ide becomes
hydro_____ic acid
hydrogen_____ite becomes
_____ous acid
hydrogen_____ate becomes
_____ic acid

	HCl(aq)	H+ Cl- hydrogen chloride	Hydrochloric acid
1	HBr(aq)	Hydrogen bromide	Hydrobromic acid
2	H2CO3(aq)	Hydrogen carbonate	Carbonic acid
3			
4	H2CrO4(aq)	Hydrogen chromate	Chromic acid
5			Chlorous acid
6	H2S(aq)	Hydrogen sulfide	Hydrosulfuric acid
7	H3BO3(aq)	Hydrogen bromate	bromic acid
8	HI(aq)	Hydrogen iodide	Hydroiodic acid
9			Oxalic acid
10	HClO4(aq)	Hydrogen chlorate	Chloric acid

hydrogen _____ide becomes hydro_____ic acid
hydrogen_____ite becomes _____ous acid
hydrogen_____ate becomes _____ic acid

11			Nitrous acid
12			Benzoic acid
13	$H_2SO_3(aq)$	Hydrogen sufite	Sulfurous acid
11			Chloric acid
15	$H_2S_2O_3(aq)$	Hydrogen thiosulfate	Thiosulfuric acid
16			Permanganic acid
17			Hydrofluoric acid
18		Hydrogen cyanide	Hydrocyanic acid
19			Thiocyanic acid
20			Sulphuric acid

Base

- Most are ionic compounds with OH^- and (aq)
- *Properties of bases:*
- Conduct electricity
- Turn red litmus paper blue
- Taste bitter
- Feel slippery
- Have a pH value greater than 7
- Neutralize or partially neutralize acids

Bases

- **Naming Bases**
- Follow the general rules given for ionic compounds

$NaOH_{(aq)}$

$NH_4OH_{(aq)}$

- **Writing Base Formulas**
- follow the general rules given for ionic compounds

lithium hydroxide

Calcium hydroxide