Acids and Bases

Unit objectives

OBJECTIVES:

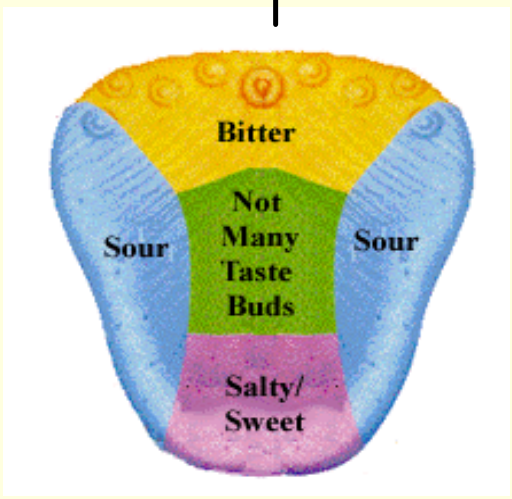
- I can define an acid and a base
- I can identify an acid and a base
- I can list properties of acids and bases
- I can name acids and bases
- I can compare strong and weak acids
- Describe the processes of ionization and neutralization
- I understand and use the pH system
- I can calculate concentration of $[H_3O^+]$ and $[OH^-]$ using water's self ionization constant
- I can calculate pH from $[H_3O^+]$, $[OH^-]$, pOH and vice versa
- I understand and can use an indicator and a pH meter
- I can explain, predict the products of, and balance a neutralization reactions

LABS: Cabbage Indicator

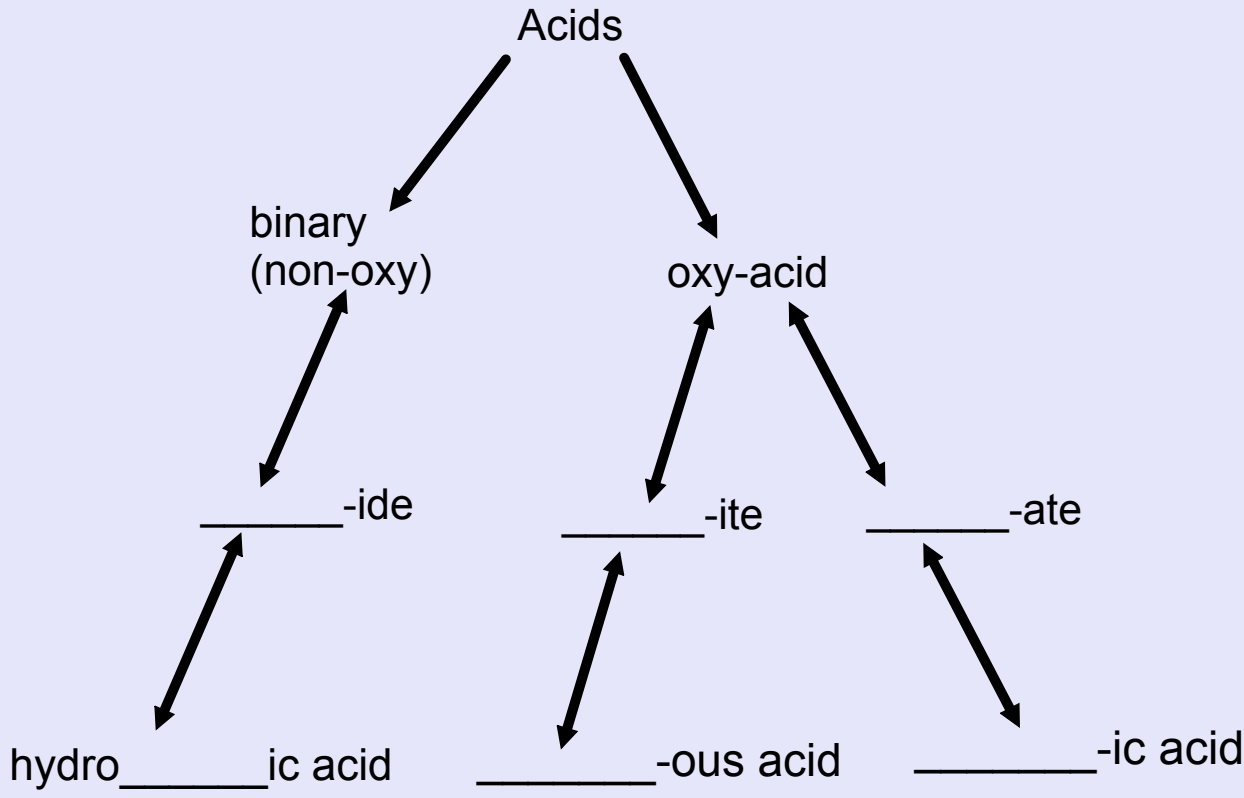
Apr 3-5:20 AM

What makes something acidic or basic?

Acids	Bases
all need to be in water (aq) (aqueous)	alkaline (another name)
electrolytes	electrolytes
turn litmus **red**	turn litmus **blue**
caustic	corrosive, caustic
ex: vinegar, milk, soda, apples, citrus fruits	ex: ammonia, lye, antacid, baking soda
react with metals to form H_2 gas	
have "H" in 1st part of formula	formula often ends with "OH"
(always) produces H_3O^{+1} hydronium ion (Arrhenius)	produce OH^{-1}
consumes OH^{-1}	consumes H^{+1} or H_3O^{+1}
Proton (H+) donor (Bronsed Lowry)	Proton (H+) acceptor
acids have sour taste	slippery feel bases have bitter taste



acid nomenclature: (review)



Hydrogens will balance the overall charge to zero...
(like ionic)

H^{+1} PO_4^{-3}

H_3PO_4

IO_4^{-1} periodate

HIO_4 periodatic acid

Apr 9-8:13 PM

Naming bases

end in -OH -usually

OH^{-1} is hydroxide ion

follow normal naming rules

$CuOH$

$Cu(OH)_2$

silver hydroxide

NH_4OH

NH_3

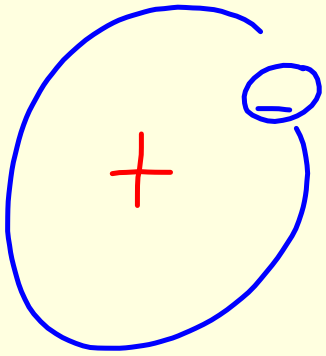
iron (II) hydroxide

nickel (III) hydroxide

Apr 8-10:00 AM

Why is the H^+ so important?

Draw a hydrogen atom:
one proton and one electron



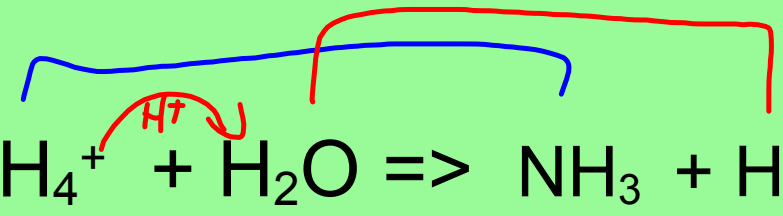
Draw an hydrogen ion:

A Hydrogen ion is just a proton!

Apr 4-7:51 AM

Every acid base reaction is an exchange of an H^+ (a proton)

So each reaction contains an acid and a base.



$NH_4^+ + H_2O \Rightarrow NH_3 + H_3O^+$

Acid — H^+ donor

Base — H^+ acceptor

the presence of H_3O^{+1} makes it acidic

Which reactant is the acid?

NH_4^+ (the one donating H^+)

Which reactant is the base?

H_2O (the one accepting the H^+)

Apr 3-11:32 AM

3. $HCO_3^- + H_2O \rightarrow H_2CO_3 + OH^-$

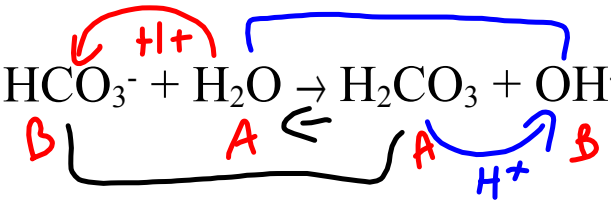
4. $HNO_2 + H_2O \rightarrow NO_2^- + H_3O^+$

5. $HCO_3^- + H_2O \rightarrow CO_3^{-2} + H_3O^+$

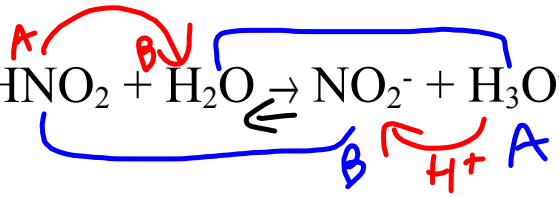
6. $NH_3 + H_2O \rightarrow OH^- + NH_4^+$

Apr 3-1:56 PM

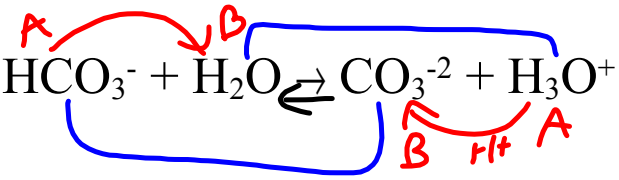
3. $HCO_3^- + H_2O \rightarrow H_2CO_3 + OH^-$



4. $HNO_2 + H_2O \rightarrow NO_2^- + H_3O^+$



5. $HCO_3^- + H_2O \rightarrow CO_3^{-2} + H_3O^+$



6. $NH_3 + H_2O \rightarrow OH^- + NH_4^+$