Acids and Bases Notes (Ch. 15)

A. Acids Vs. Bases

Acids	Bases
* _____ *Conduct electricity well *React with _____ (mostly produce _____) *pH _____ *Turns blue litmus paper _____. Ex. Lemon juice, citrus, stomach juice, vinegar, yogurt	* _____ * _____ * _____ *pH _____ *Turns red litmus paper _____. Ex. Drano, soap, ammonia, cleaning agent

Acid = pH _____ [H+]
Base = pH _____ [OH-]
Neutral = pH ____(water)

B. Neutralization

Acid + Base ---> _____ + _____

When equal amount of acid and base (equal strength) are added together, _____ and _____ are formed.

Example: HCl + NaOH ---> _____ + _____

C. Naming Acids

Anion

_____ide (Chloride, Cl-)	_____ate (Nitrate, NO_3-)	_____ite (Nitrite, NO_2-)
↓	↓	↓
Hydro__ic acid (hydrochloric acid)	_____ic acid (nitric acid)	_____ous acid (nitrous acid)

Learning Check (Naming Acids)

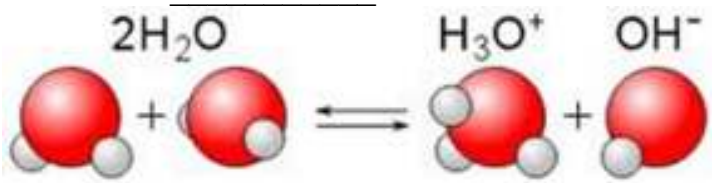
Write the names/formulas.

1. H_3PO_4
2. H_3PO_3
3. H_2SO_4
4. H_2SO_3
5. Carbonic acid
6. Hydrochloric acid
7. Nitric acid

D. The meaning of pH
The power of _____

Self-ionization of water (1L of water)
$[H_3O^+] = [OH^-] =$ _____

H_2O (l) <-> H_3O^+ (aq) + OH^- (aq)
_____ ion



$Kw = [H_3O^+] [OH^-] =$ _____

E. How is pH measured?
1. _____ paper
2. _____ paper
3. _____

F. How is pH calculated?
pH = pOH =

pH + pOH = _____

What is the pH for 0.001M of H_2CO_3?
pH =
If the pH is 3, what is pOH?

G. The strength of acids

Strong Acids	Weak Acids
*_____ *_____. (usu. 1 step) Ex. HCl, HNO_3, HBr, HI, H_2SO_4 HCl -> H+ + Cl-	*_____ *_____; takes more than one step. Ex. H_2CO_3, H_3PO_4 H_2CO_3 <-> $H^+ + HCO_3^-$ HCO_3^- <-> $H^+ + CO_3^-$

H. The strength of bases

Strong Bases	Weak Bases
*Contain _____ ions (_____) *Dissociates completely.	*Do not contain _____ ions. *Do not dissociate completely.

NaOH -> Na+ + OH- *Mostly contains _____ _____ such as Na, K. Ex. NaOH, KOH, LiOH	*Gains _____. Ex. NH_3 (ammonia)

I. Two different definitions of acids and bases

Arrhenius acids = donates _____	Arrhenius bases = donates _____
Bronstead-Lowry acids = donates _____	Bronstead-Lowry bases = receives _____

J. Conjugate Pairs

H2O + NH3 <-> OH- + NH4+

____ _____ _____ _____

_____ becomes _____
after giving away H+ b/c it has no H+ to donate.
_____ becomes _____
after receiving H+ b/c now it has ability to donate H+

K. Amphoteric
It can both _____ and _____ which means it could be both
_____ ____ and _____.
Ex. Water

$HCO_3^- + NH_3 <-> CO_3^{-2} + NH_4^+$
Acid base
$HCO_3^- + H_3O^+ <-> H_2CO_3 + H_2O$
Base acid

L. Indicators
dyes that change _____ to indicate the _____ of a solution.
Ex. red cabbage juice

Phenolthalein
Acid/neutral = _____ Base = _____

Bromthymol Blue
Acid = _____ Base = _____

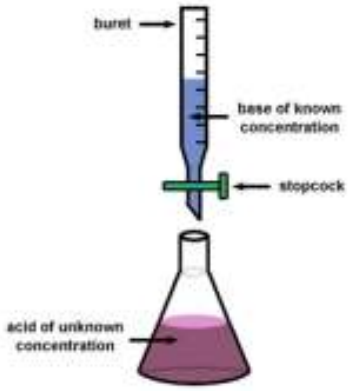
M. Buffers
Consists of a conjugate pair of a _____
Resists _____ due to equilibrium
Maintains homeostasis.

$H_3PO_4 <-> H_2PO_4^- + H^+$
$H_2PO_4^- <-> HPO_4^{-2} + H^+$

Adding acid (H+ inc.) – shifts to the _____
Removing acid (H+ dec.) – shifts to the _____
B/c the conc. of H+ stays the same, the pH remains the same.

N. Why are buffers important to human body?
Enzymes (proteins that speed up chemical rxns in living things) are sensitive to ____ and __ level.
When temp or pH is out of their optimal range, enzymes become denatured (out of shape) and they lose their function.
Structure determines function.

O. Titrations
Why do we use this lab technique?
To determine the _____ of an acid or a base.
To determine whether an unknown acid/base is _____ or _____.



P. How to determine concentration of the unknown using titration
If a _____ amount of _____ in the buret is used to neutralize the unknown conc. of acid in the flask, there must have been a _____ in the flask.
If a _____ amount of _____ in the buret is used to neutralize the unknown conc. of acid in the flask, there must have been a _____ in the flask.

Q. Titration Calculation
MA x VA = MB x VB
MA = _____ VA = _____
MB = _____ VB = _____
Ex. The following data were collected by a student performing an acid-base

titration.
Volume of the acid (HCl) = 20 mL
Molarity of the acid (HCl) = 0.5 M
Volume of the base (NaOH) = 40 mL

What is the concentration of the base?

R. Equivalence point vs. End point
At _____, you have added enough titrant (base/acid) to just neutralize all of the unknown in a flask.

At _____ = color changes