Topics for the Quiz on acids, bases. and pH. The quiz will be on Thursday, June 5th.

Study Worksheets 20.1 through 20.4, and the calculation parts of the cabbage lab and titration lab (page 1-3)

Single and Double Replacement Reactions involving acids and bases. (See WS 20.3 #2 for the 4 types of rxns)

Classify solutions as acidic, basic, or neutral, based on the pH value.

Classify inorganic substances as acids, bases, or neutral based on the formula of the compound, like #6 on WS 20.1. (acids contain H^{+1} ion, bases contain OH^{-1} ion, or CO_3^{-2} ion, and NH_3 is a base)

Write a reaction showing why carbonate ion is basic, and why ammonia is basic.
Know that ammonia is NH_3, and that carbonate ion is CO_3^{-2}.

Classify organic substances as acid, base, or neutral based on the formula or structure of the compound.
(like #6 on WS 20.2)

Formula Writing and Naming for acids and ionic compounds (like the front of WS 20.2)

Qualitative properties of acids and bases
(for example, acids are sour, bases are slippery... see WS 20.2, bottom of page 1)

Know (and be able to use) the three pH equations to calculate pH, $[H^{+1}]$, or $[OH^{-1}]$.
pH = $- \log[H^{+1}]$ $[H^{+1}] = 10^{-pH}$ $[H^{+1}][OH^{-1}] = Kw = 1.00 \times 10^{-14}$

Calculating pH of a solution based on mass or moles of solute, and a volume (so you have to start by calculating the molarity), like the front of WS 20.4.

Titration Problems: $M_aV_a = M_bV_b$. (when do you need a 2 or 3, and on which side?)
What is an indicator? What is a standard solution?

General pH stuff.. what does it mean to have low pH, high pH... why is it a "logarithmic" scale?
For example, what happens to the $[H^{+1}]$ if the pH drops by 3 points? (See WS 20.3 #1)

WS 20.6 This worksheet is optional, but has some good acid/base/pH practice.
Problems like 2c, and 3b will not be covered on the quiz, but could come up on the final exam.

1. Determine the pH of each solution

a) 1.00 grams of NaOH dissolved into 600. mL solution volume.

b) 2.00 grams of HCl dissolved into a total solution volume of 800. mL

c) A 0.000020 M solution of $Al(OH)_3$

2.a. Calcium carbonate, $CaCO_3$, is the active ingredient in TUMS, an antacid. Calcium carbonate is also the main compound found in limestone or marble statues, structures, etc. a. Write a balanced chemical equation for calcium carbonate reacting with acid rain (use nitric acid for the type of acid rain). Include subscripts.

b. Baking soda can also be used as an antacid. Write a balanced equation for sodium bicarbonate ($NaHCO_3$; baking soda) reacting with stomach acid (use HCl for the formula of stomach acid). Include subscripts.

c. As carbon dioxide levels in the atmosphere increase, global temperature increases, because carbon dioxide is transparent to visible light, but absorbs the _____ radiation leaving the earth.
Besides affecting the climate, the carbon dioxide also causes the ocean acidity to _____ (increase or decrease?)
This means the pH of the ocean water will _____ (increase or decrease?),
as the carbon dioxide reacts in the following reaction: $CO_{2(g)} + H_2O_{(l)} \text{ <-----> } H_2CO_{3(aq)}$

3. Potassium hydroxide is titrated with sulfuric acid and the following data is obtained.

Volume of KOH solution in beaker:	10.00 mL
Concentration of sulfuric acid (in buret):	0.24 M
Initial buret reading for H_2SO_4	25.62 mL
Final buret reading for H_2SO_4	42.72 mL

a. Determine the concentration of the potassium hydroxide.

b. If you take 150. mL of the sulfuric acid solution used in the titration, and then add water until the total volume of solution is 2.000 liters, what will be the new concentration of the acid solution, assuming that the solution is well mixed?

c. When you add water in step b, is the solution become more concentrated or more dilute? (which one?)

d. When you add water in step b, does the pH of the solution increase or decrease? (which one?)

4. A sample of acidic rain water has a pH of 3.4.
a. Calculate the concentration of hydrogen ion in this rain water.

b. Calculate the concentration of hydroxide ion in this rain water.

c. A sample of acidic stomach acid has a pH of 1.4.
Which has a higher concentration of hydrogen ion: the stomach acid, or the acid rain?_____ By what factor?___

5.a. A solution contains 3.0 grams of HBr per every 600.0 mL. Calculate the pH of the solution.
b. A solution contains 0.111 moles of Calcium hydroxide ($Ca(OH)_2$) per every 800.0 mL of solution. Calculate the pH.

6. Classify each substance as acidic, basic, or neutral.

KNO_3	Rb_2CO_3	HNO_2	C_2H_5COOH	C_4H_9OH	$Sr(OH)_2$	LiCl	C_3H_8O
$BaCO_3$	CH_3OH	NaBr	H_2O	H_2SO_3	CsOH	KI	NH_3

Answers:
1. a. 12.62 b. 1.16 c. 9.78
2. a. $CaCO_{3(s)} + 2\ HNO_{3(aq)} \text{----> } Ca(NO_3)_{2(aq)} + H_2O_{(l)} + CO_{2(g)}$
b. $NaHCO_{3(s)} + HCl_{(aq)} \text{ ----> } NaCl_{(aq)} + CO_{2(g)} + H_2O_{(l)}$
c. infrared, increase, decrease
3a. 0.82 M b. 0.018 M c. more dilute d. increase
4. a. 0.00040 M b. 2.5×10^{-11} M c. stomach acid has higher hydrogen ion concentration, by a factor of 100.
5. a. 0.86 b. 13.44
6. Row 1: neutral, base, acid, acid, neutral, base, neutral, neutral
Row 2: base, neutral, neutral, neutral, acid, base, neutral, base