

Acid-Base Review Worksheet - CHEMISTRY

Name: KEY Per: _____

Complete the following. Show all of your work for any calculations. Box or circle your answer.

1. Compare and contrast the following:

a. Acid properties and base properties

Acid:

- tastes sour
- reacts w/ metals
- H^+ as cation
- $pH < 7$

Base

- tastes bitter
- slippery
- OH^- as anion
- $pH > 7$

b. Arrhenius acid and base.

Arrhenius acid: H^+ as cation

Arrhenius base: OH^- as anion

c. Bronsted-Lowry acid and base

Bronsted-Lowry acid: H^+ donor

Bronsted-Lowry base: H^+ acceptor

d. Conjugate acid and conjugate base

Conj. acid: reverse rxn H^+ donor

Conj. base: reverse rxn H^+ acceptor

e. Monoprotic acid and polyprotic acid

monoprotic acid: has 1 H^+

polyprotic acid: has more than 1 H^+

f. Binary acid and ternary acid

binary acid - 2 elements in acid

ternary acid - more than 2 elements in acid

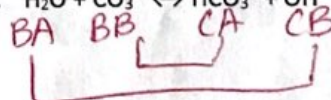
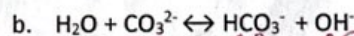
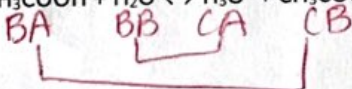
g. Strong acid and weak acid (Include a list of strong acids)

Strong acids completely ionize, weak acids do not
 HCl , HBr , HI , H_2SO_4 , HNO_3 , $HClO_4$

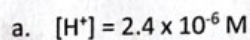
h. Strong base and weak base (include a list of strong bases)

Strong bases completely ionize, weak bases do not
 $LiOH$, $NaOH$, KOH , $RbOH$, $Ca(OH)_2$, $Sr(OH)_2$, $Ba(OH)_2$

6. Identify the acid/base pairs (use BA, BB, CA and CB):

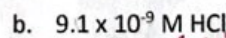


7. What are the pH values for the following? Determine if the solution is acidic or basic.



$$pH = -\log [H^+] = -\log (2.4 \times 10^{-6})$$

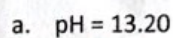
$$= 5.62$$



$$pH = -\log [H^+] = -\log (9.1 \times 10^{-9})$$

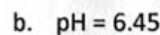
$$= 8.04$$

8. Calculate the $[H^+]$ for the following.



$$[H^+] = 10^{-pH} = 10^{-13.20}$$

$$= 6.31 \times 10^{-14} M$$



$$[H^+] = 10^{-pH} = 10^{-6.45}$$

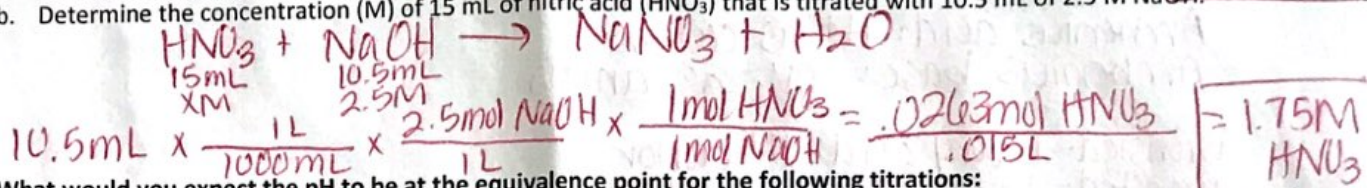
$$= 3.55 \times 10^{-7} M$$

9. Calculate the molarity for each of substance specified in the following problems.

- a. 25.5 mL of 0.75 M hydrochloric acid is used to titrate 10.0 mL of calcium hydroxide. What is the concentration (M) of the base? $2\text{HCl} + \text{Ca(OH)}_2 \rightarrow \text{CaCl}_2 + 2\text{H}_2\text{O}$

$$25.5 \text{ mL} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times \frac{0.75 \text{ mol HCl}}{1 \text{ L}} \times \frac{1 \text{ mol Ca(OH)}_2}{2 \text{ mol HCl}} = \frac{0.00956 \text{ mol}}{0.010 \text{ L}} = 0.956 \text{ M Ca(OH)}_2$$

- b. Determine the concentration (M) of 15 mL of nitric acid (HNO_3) that is titrated with 10.5 mL of 2.5 M NaOH.



10. What would you expect the pH to be at the equivalence point for the following titrations:

- a. strong acid-strong base 7 b. strong acid-weak base < 7 c. weak acid-strong base > 7

11. Complete the following statements.

- a. The process used to determine the concentration of an unknown solution is called titration.
- b. A reaction where an acid and a base react to form salt and water is called a neutralization reaction.
- c. A substance that can act as both an acid and a base is called a(n) amphoteric substance.
- d. A hydrogen ion and a water molecule form a hydronium ion. The formula is H_3O^+ .
- e. The equilibrium (ion product) constant of water has a symbol of K_w and a value of $1 \times 10^{-14} \text{ M}$.
- f. The pH scale has values of 0-14 and tells us whether a substance is an acid or a base.
- g. The equivalence point is reached when the moles of H^+ and moles of OH^- are equal.
- h. The end point is reached when the indicator changes color during a titration.