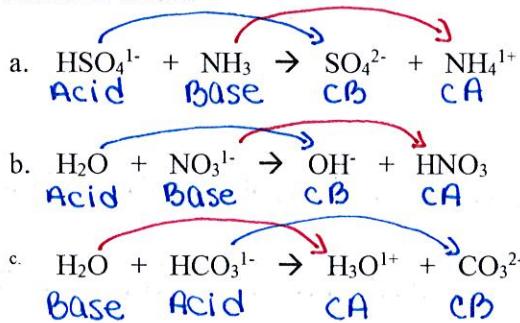


Acid/Base Quiz Review *Key*

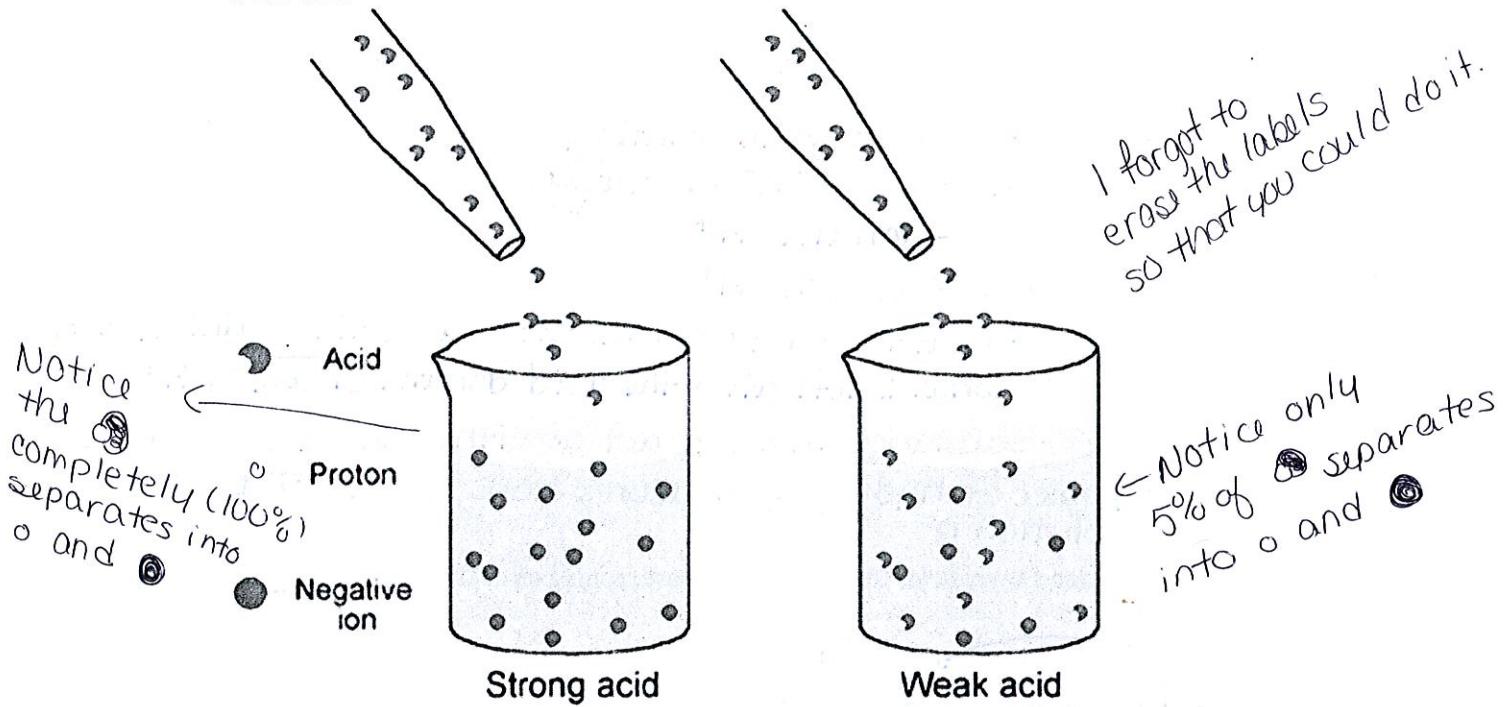
1. Define the following terms.

- Arrhenius acid - produces H^+ in solution
- Arrhenius base - produces OH^- in solution
- Brønsted-Lowry acid - donates H^+
- Brønsted-Lowry base - accepts H^+
- Conjugate acid - what the base becomes after accepting(gaining) a H^+
- Conjugate base - what is left after the acid donates (loses) a H^+
- Amphoteric - substance that can act as either an acid or a base
- pH - power of hydrogen, measures how acidic or basic a solution is

2. Identify the Brønsted-Lowry acid, Brønsted-Lowry base, conjugate acid, and conjugate base in the reactions below:



3. Label the beaker in the picture that represents a strong acid. Label the beaker that represents a weak acid.



- What makes an acid or base strong?
it completely dissociates (100%) into its ions in solution
 - What makes an acid or base weak?
it dissociates only 5% into its ions in solution
 - List 7 strong acids.
 HCl HBr H_2SO_4 HClO_4
 H_3NO_3 HClO_3
 - List 8 strong bases.
 LiOH KOH CsOH $\text{Sr}(\text{OH})_2$
 NaOH RbOH $\text{Ca}(\text{OH})_2$ $\text{Ba}(\text{OH})_2$
4. List 4 properties of an acid. List 4 properties of a base.

- Acids
- electrolytes
 - tastes sour
 - produces H_2 gas when it reacts with metals
 - reacts with bases to produce a salt & water
 - pH is less than 7

- Bases
- electrolytes
 - tastes bitter
 - caustic
 - reacts with acids to produce a salt & water
 - pH is greater than 7

5. Use the pH equations below to answer these questions.

$$\text{pH} = -\log[\text{H}^+]$$

$$\text{pOH} = -\log[\text{OH}^-]$$

$$\text{pH} + \text{pOH} = 14.00$$

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

$$[\text{OH}^-] = 10^{-\text{pOH}}$$

$$[\text{H}^+] \times [\text{OH}^-] = 1.00 \times 10^{-14} \text{ M}^2$$

- a. Find the pOH of a solution of HNO_3 with a pH of 5.45.

$$\text{pH} + \text{pOH} = 14.00$$

$$\begin{array}{r} 5.45 + \text{pOH} = 14.00 \\ -5.45 \\ \hline \end{array}$$

$$\text{pH} = 8.55$$

- b. Calculate the pH of a solution of HCl with a concentration of $6.56 \times 10^{-7} \text{ M}$.

$$\text{pH} = -\log[\text{H}^+]$$

$$\text{pH} = -\log 6.56 \times 10^{-7}$$

$$\text{pH} = 6.18$$

$[\text{H}^+]$ only 1 H^+ in HCl

- c. Determine the pOH of a solution of HNO_3 with a $[\text{OH}^-]$ of $7.67 \times 10^{-11} \text{ M}$.

$$\text{pOH} = -\log[\text{OH}^-]$$

$$\text{pOH} = -\log 7.67 \times 10^{-11}$$

$$\text{pOH} = 10.1$$

- d. Find the pH of a solution of $\text{Ca}(\text{OH})_2$ with a concentration of $8.78 \times 10^{-6} \text{ M}$.

$$\text{pOH} = -\log[\text{OH}^-]$$

$$\text{pOH} = -\log 1.756 \times 10^{-5} = 4.76$$

1st $[\text{OH}^-]$ has 2 OH^- in it

$$[\text{OH}^-] = 2(8.78 \times 10^{-6} \text{ M}) = 1.756 \times 10^{-5} \text{ M}$$

$$\text{pH} + \text{pOH} = 14.00$$

$$\text{pH} + 4.76 = 14.00 \Rightarrow \text{pH} = 14.00 - 4.76 = 9.24$$

- e. Calculate the $[\text{H}^+]$ of an HClO_3 solution with a pH of 2.32.

only one H^+

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

$$[\text{H}^+] = 10^{-2.32} = 4.79 \times 10^{-3} \text{ M}$$

- f. Calculate the $[\text{OH}^-]$ of a solution of HI with a $[\text{H}^+]$ of $9.89 \times 10^{-4} \text{ M}$.

$$[\text{H}^+] \times [\text{OH}^-] = 1.00 \times 10^{-14} \text{ M}^2$$

$$\frac{(9.89 \times 10^{-4} \text{ M}) \times [\text{OH}^-]}{9.89 \times 10^{-4} \text{ M}} = \frac{1.00 \times 10^{-14} \text{ M}^2}{9.89 \times 10^{-4} \text{ M}}$$

$$[\text{OH}^-] = 1.01 \times 10^{-11} \text{ M}$$

- g. Calculate the $[\text{H}^+]$ of a solution of $\text{Sr}(\text{OH})_2$ with a pOH of 3.43.

has 2 OH^-

$$1^{\text{st}} [\text{OH}^-] = 10^{-\text{pOH}}$$

$$2[\text{OH}^-] = 10^{-3.43}$$

$$\frac{2[\text{OH}^-]}{2} = \frac{3.715352291 \times 10^{-4} \text{ M}}{2}$$

$$[\text{OH}^-] = 1.86 \times 10^{-4} \text{ M}$$

$$(2^{\text{nd}}) [\text{H}^+] \times [\text{OH}^-] = 1.00 \times 10^{-14} \text{ M}^2$$

$$\frac{[\text{H}^+] \times (1.86 \times 10^{-4} \text{ M})}{1.86 \times 10^{-4} \text{ M}} = \frac{1.00 \times 10^{-14} \text{ M}^2}{1.86 \times 10^{-4} \text{ M}}$$

$$[\text{H}^+] = 5.38 \times 10^{-11} \text{ M}$$

6. Use the neutralization equation to answer these questions.

a. What is the concentration of .900 L HCl needed to neutralize 1.21 L of .0750 M LiOH?

$$M_A = ?$$

$$V_A = .900 L$$

$$M_B = .0750 M$$

$$V_B = 1.21 L$$

$$M_A V_A = M_B V_B$$

$$\frac{M_A (.900 L)}{.900 L} = \frac{(.0750 M)(1.21 L)}{.900 L}$$

$$M_A = .101 M$$

b. What is the volume, in L, of $1.40 \times 10^{-4} M$ HClO₃ needed to neutralize 125 mL of 1.10 ×

$$\frac{10^{-4} M \text{ Ca(OH)}_2}{\text{BASE}} \rightarrow \text{HAS } 2\text{OH}^-$$

$$M_A = 1.40 \times 10^{-4} M$$

$$V_A = ?$$

$$M_B = 2(1.10 \times 10^{-4} M) = 2.20 \times 10^{-4} M$$

$$V_A = 125 \text{ mL} = .125 L$$

$$(1.40 \times 10^{-4} M)V_A = (2.20 \times 10^{-4} M)(.125 L)$$

$$\frac{(1.40 \times 10^{-4} M)V_A}{1.40 \times 10^{-4} M} = \frac{2.75 \times 10^{-5} M \cdot L}{1.40 \times 10^{-4} M}$$

$$V_A = .196 L$$