Guided Notes: pH and pOH

Name: _____ Period: _____

K_w: _____

- H_2O breaks down to give _____ and _____
  - _____
- K_w = _____
- K_w = _____ = _____
- So, $[H^+]$ and $[OH^-]$ have an _____ relationship

Practice: What is the $[OH^-]$ when $[H^+] = 1.0 \times 10^{-6}$?

pH:

- pH = _____
- acids have a _____
- bases have a _____
- neutral has a _____
- Increases by a factor of _____ between numbers on the pH scale
  - pH of 3 has ten times the [H+] of pH 4

pOH:

- **pOH = -log[OH^-]**
- acids have a _____
- bases have a _____
- neutral has a _____
- increases by a factor of _____ between numbers on the pOH scale
  - pOH of 3 has ten times the $[OH^-]$ of pOH 4

pH and pOH:

_____

pH Practice:

Calculate the pH of solutions having the following ion concentrations at 298K.

$[H+] = 1.0 \times 10^{-2}$ M

$[OH-] = 8.6 \times 10^{-6}$ M

Which of the solutions is more acidic?

pOH Practice:

What is the pH of a solution with a pOH of 12.5?

What is the pOH of a solution with a pH of 8.5?

Which of the solutions is more acidic?

Finding Ion Concentration:

[H+] = _____

$[OH^-]$ = _____

Practice:

Calculate the $[H^+]$ and the $[OH^-]$ in a solution with a pH of 2.37.

Calculate the $[H^+]$ of a solution with a pOH of 8.5.

Strength of Acids and Bases:

- _____: refer to the # of moles of acid or base dissolved in a volume of solution
- _____: refers to degree of ion formation
- _____ acids and bases _____ ionize (also called strong electrolytes)
  - ex: HCl --> H+ + Cl-
- _____ acids and bases have _____ ionization (establish equilibrium)
  - ex: $HC_2H_3O_2$ <--> $H^+ + C_2H_3O_2^-$

> **Strong Acids: HCl, HI, HBr, HNO_3, H_2SO_4, $HClO_4$**
> **Strong Bases: LiOH, NaOH, KOH, RbOH, $Ca(OH)_2$, Sr(OH)2, $Ba(OH)_2$**
> Any acids or bases not on this list are weak!

K_a: _____

- = the value of the equilibrium constant expression for the _____ of a _____ acid
- _____ acids have the _____ K_a value

K_b: _____

- = the value of the equilibrium constant expression for the _____ of a _____ base
- _____ bases have the _____ K_b value

Calculating the pH and pOH of Strong Acids and Bases

- For all strong _____, the concentration of the acid is the concentration of the _____.
- For all strong _____, the concentration of the base is the concentration of the _____.

Practice Calculating pH and pOH: Calculate the pH and pOH of the following solutions.

0.10 M HI

2.4×10^{-5} M KOH

Measuring pH:

- _____: will change the color depending on the hydrogen ion concentration in solution, the color is then compared to a standard scale
- _____: more accurate than pH paper, contains electrode that are immersed in solution, will give a digital readout

Check for Understanding:

1. Calculate the pH and pOH of a solution that contains:
   a. $[H^+] = 3.0 \times 10^{-8}$ M
   b. 0.050 M HNO_3
   c. $[H^+] = 9.8 \times 10^{-2}$ M
2. What is the $[H^+]$ in a solution that has a pH of 4.75? $[OH^-]$?