CONCEPT: THE pH SCALE

To deal with incredibly small concentration values of $[H^+]$ and $[OH^-]$ we can use the pH scale.

- Under normal conditions, the pH scale operates within the range of _____ to _____ .

By taking the – log of $[H^+]$ and $[OH^-]$ we can find pH and pOH.

$$pH = -\log[H^+] \qquad pOH = -\log[OH^-] \qquad p = -\log$$

By recognizing the relationship between $[H^+]$ and $[OH^-]$ with pH and pOH we can create new formula relationships.

$$pH = -\log[H^+] \qquad pOH = -\log[OH^-]$$

A species with a pH greater than 7 is classified as _____ and the $[H^+]$ is _____ than the $[OH^-]$.

- The _____ the base then the _____ the pH.

A species with a pH less than 7 is classified as _____ and the $[H^+]$ is _____ than the $[OH^-]$.

- The _____ the acid then the _____ the pH.

A species with a pH equal to 7 is classified as _____ and the $[H^+]$ is _____ than the $[OH^-]$.

By using – log with the equilibrium expression for water a relationship between pH and pOH can be created.

$$pH + pOH = 14$$

EXAMPLE: What is the hydroxide ion and hydronium ion concentration of an aqueous solution that has a pH equal to 6.12?

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PRACTICE: Which of the following statements about aqueous solutions is/are true?

a) For an basic solution the concentration of H_3O^+ is greater than the concentration of OH^-.

b) The pH of a neutral aqueous solution is 7.00 at all temperatures.

c) An acidic solution under normal conditions has a pH value less than 7.00.

d) If the concentration of H_3O^+ decreases then the concentration of OH^- will also decrease.

e) The pH of aqueous solutions is less than 7.

EXAMPLE: A solution is prepared by dissolving 0.235 mol $Sr(OH)_2$ in water to produce a solution with a volume of 750 mL.

a) What is the $[OH^-]$?

b) What is the $[H^+]$?

PRACTICE: What is the K_W of pure water at 20.0°C, if the pH is 7.083?

a) 8.26×10^{-8} b) 6.82×10^{-15} c) 7.23×10^{-14} d) 1.00×10^{-14}