

Pre-AP Chemistry
Unit #12—Acids and Bases

An ordinary household ammonia cleaner is an aqueous solution of ammonia gas that is mixed with a hydroxide-ion concentration of 4.0×10^{-3} M. Calculate the pH, pOH, and H^+ . Is the solution acidic, basic, or neutral based on the pH?

$$pOH = -\log [4.0 \times 10^{-3}] = 2.40$$

$$pH = 14 - 2.40 = 11.60$$

$$[H^+] = 10^{(-11.60)} = 2.512 \times 10^{-12} \text{ M}$$

Solution is basic because pH is greater than 7

Calculate the pH, pOH, and OH^- for a solution that has a H^+ concentration of 0.025 M. Is the solution acidic, basic, or neutral based on the pH?

$$pH = -\log [0.025] = 1.602$$

$$pOH = 14 - 1.602 = 12.398$$

$$[OH^-] = 10^{(-12.398)} = 4.00 \times 10^{-13} \text{ M}$$

Solution is acidic because the pH is less than 7

Using the ion product constant for water, K_w , find the concentrations of $[H^+]$, and $[OH^-]$

If the $[H^+]$ is 2.33×10^{-3} , what is the $[OH^-]$, pH, and pOH? Is the solution acidic, basic, or neutral based on the pH?

$$\frac{1.0 \times 10^{-14}}{2.33 \times 10^{-3} \text{ M}} = 4.292 \times 10^{-12} \text{ M}$$

$$pOH = -\log [4.292 \times 10^{-12}] = 11.367$$

$$pH = 14 - 11.367 = 2.633$$

Solution is acidic because pH is less than 7

If the $[OH^-]$ is 7.25×10^{-10} , what is the $[H^+]$, pH, and pOH? Is the solution acidic, basic, or neutral based on the pH?

$$\frac{1.0 \times 10^{-14}}{7.25 \times 10^{-10} \text{ M}} = 1.379 \times 10^{-5} \text{ M}$$

$$pH = -\log [1.379 \times 10^{-5}] = 4.860$$

$$pOH = 14 - 4.860 = 9.140$$

Solution is acidic because the pH is less than 7