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 Hour: _____ Date: Nov. 23

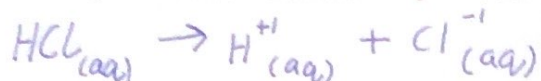
Chemistry: pH and pOH calculations

Part 1: Fill in the missing information in the table below.

pH	$[H_3O^{1+}]$	pOH	$[OH^{1-}]$	ACID or BASE?
3.78	$1.66 \times 10^{-4} M$	10.22	$6.03 \times 10^{-11} M$	Acid
3.41	$3.89 \times 10^{-4} M$	10.59	$2.57 \times 10^{-11} M$	Acid
8.81	$1.55 \times 10^{-9} M$	5.19	$6.46 \times 10^{-6} M$	Base
8.69	$2.04 \times 10^{-9} M$	5.31	$4.88 \times 10^{-6} M$	Base
8.46	$3.47 \times 10^{-9} M$	5.54	$2.88 \times 10^{-6} M$	Base
12.1	$8.45 \times 10^{-13} M$	1.90	$1.26 \times 10^{-2} M$	Base
11.86	$1.38 \times 10^{-12} M$	2.14	$7.24 \times 10^{-3} M$	Base
3.40	$3.98 \times 10^{-4} M$	10.6	$2.31 \times 10^{-11} M$	Acid
10.91	$1.23 \times 10^{-11} M$	3.09	$8.13 \times 10^{-4} M$	Base
5.13	$7.49 \times 10^{-6} M$	8.87	$1.35 \times 10^{-9} M$	Acid
4.06	$8.71 \times 10^{-5} M$	9.94	$1.15 \times 10^{-10} M$	Acid
6.41	$3.89 \times 10^{-7} M$	7.59	$2.57 \times 10^{-8} M$	Acid
4.16	$6.92 \times 10^{-5} M$	9.84	$1.45 \times 10^{-10} M$	Acid
0.98	$1.06 \times 10^{-1} M$	13.0	$1.00 \times 10^{-13} M$	Acid
10.18	$6.61 \times 10^{-11} M$	3.82	$1.51 \times 10^{-4} M$	Base
7.93	$1.17 \times 10^{-8} M$	6.07	$8.53 \times 10^{-7} M$	Base
7.05	$8.91 \times 10^{-8} M$	6.95	$1.12 \times 10^{-7} M$	Base
9.33	$4.73 \times 10^{-10} M$	4.67	$2.14 \times 10^{-5} M$	Base
12.67	$2.14 \times 10^{-13} M$	1.33	$4.68 \times 10^{-2} M$	Base
12.0	$1.0 \times 10^{-12} M$	2.01	$9.87 \times 10^{-3} M$	Base
11.68	$2.09 \times 10^{-12} M$	2.32	$4.79 \times 10^{-3} M$	Base
7.04	$9.22 \times 10^{-8} M$	6.96	$1.10 \times 10^{-7} M$	Base
1.76	$1.74 \times 10^{-2} M$	12.24	$5.79 \times 10^{-13} M$	Acid
2.70	$2.00 \times 10^{-3} M$	11.3	$5.39 \times 10^{-12} M$	Acid

Part 2: For each of the problems below, assume 100% dissociation.

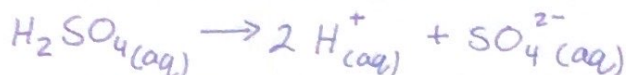
1. A. Write the equation for the dissociation of hydrochloric acid.



- B. Find the pH of a 0.00476 M hydrochloric acid solution.

$$\begin{aligned} \text{pH} &= -\log \text{H}^+ \\ &= -\log(0.00476\text{M}) \\ &= 2.32 \end{aligned}$$

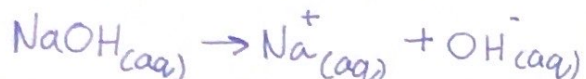
2. A. Write the equation for the dissociation of sulfuric acid.



- B. Find the pH of a solution that contains 3.25 g of H_2SO_4 dissolved in 2.75 liters of solution.

$$\begin{aligned} \textcircled{1} 3.25\text{g} \left(\frac{1\text{mol}}{98\text{g}} \right) &= 0.033\text{mol } \text{H}_2\text{SO}_4 & \textcircled{3} \text{pH} &= -\log(0.0242\text{M}) \\ & & &= 1.62 \\ \textcircled{2} \text{M} &= \frac{0.033\text{mol}}{2.75\text{L}} = 0.012\text{M } \text{H}_2\text{SO}_4 \end{aligned}$$

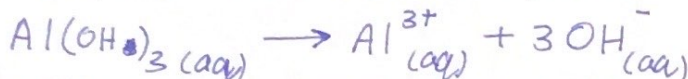
3. A. Write the equation for the dissociation of sodium hydroxide.



- B. Find the pH of a 0.000841 M solution of sodium hydroxide.

$$\begin{aligned} \text{pOH} &= -\log[\text{OH}^-] & \text{pH} &= 14 - 3.08 \\ &= -\log(0.000841\text{M}) & &= 10.92 \\ &= 3.08 \end{aligned}$$

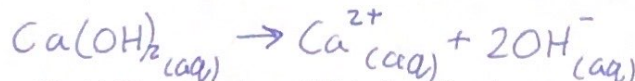
4. A. Write the equation for the dissociation of aluminum hydroxide.



- B. If the pH is 9.85, what is the concentration of the aluminum hydroxide solution?

$$\begin{aligned} \textcircled{1} \text{pOH} &= 14 - 9.85 & \textcircled{2} 4.15 &= -\log[\text{OH}^-] & \textcircled{3} \frac{7.08 \times 10^{-5}\text{M}}{3} &= 2.36 \times 10^{-5}\text{M} \\ &= 4.15 & 10^{-4.15} &= [\text{OH}^-] & & \\ & & 7.08 \times 10^{-5} &= [\text{OH}^-] \end{aligned}$$

5. A. Write the equation for the dissociation of calcium hydroxide.



- B. If the pH is 11.64 and you have 2.55 L of solution, how many grams of calcium hydroxide are in the solution?

$$\begin{aligned} \textcircled{1} \text{pOH} &= 14 - 11.64 & \textcircled{3} \frac{4.37 \times 10^{-3}\text{M}}{2} &= 2.18 \times 10^{-3}\text{M} \\ &= 2.36 & & \\ \textcircled{2} 2.36 &= -\log[\text{OH}^-] & \textcircled{4} & \\ 10^{-2.36} &= [\text{OH}^-] & & \\ 4.37 \times 10^{-3} &= [\text{OH}^-] \end{aligned}$$