Honors Chemistry

Name Key

Calculating pH

1. Find $[H^+]$ and $[OH^-]$ and visa versa. Also, find the pH for each solution:

$[H^+]$	$[OH^-]$	pH
1×10^{-5} M	1×10^{-9} M	5
1×10^{-11} M	1×10^{-3} M	11
1×10^{-7} M	1×10^{-7} M	7
1×10^{-11} M	1×10^{-3} M	11
1×10^{14} M	1×10^{0} M	14
1×10^{-2} M	1×10^{-12}	2

2. Find the $[H^+]$ from the pH:

$[H^+]$	pH
1×10^{-2} M	2
7.94×10^{-5} M	4.1
2.00×10^{-10} M	9.7
3.98×10^{-13} M	12.4
6.03×10^{-4} M	3.22

3. If the pH of a solution is 6, what is the concentration of the H_3O^+ ion? and OH^-?

$[H_3O^+] = 1 \times 10^{-6}$ M

$[OH^-] = 1 \times 10^{-8}$ M

4. Find the hydronium ion concentration in a bottle of soda that has a pH of 2.09.

$10^{-2.09} = 8.13 \times 10^{-3}$ M $= [H_3O^+]$

1.23×10^{-12} M $= [OH^-]$

5. Calculate the pH of a sample of acid rain that has $[H_3O^+] = 1.29 \times 10^{-4}$ M.

$pH = -\log(1.29 \times 10^{-4})$

$pH = 3.89$

$[OH^-] = 7.75 \times 10^{-11}$ M

6. Calculate the pH of a ~~6.0~~ 1 M HCl solution.

$pH = -\log(1) = 0$

7. A sample of freshly pressed apple juice has a pH of 3.76. Calculate $[H^+]$, $[OH^-]$, and pOH.

$[H^+] = 10^{-3.76} = 1.74 \times 10^{-4}\ M = [H^+]$

$[OH^-] = \frac{1.0 \times 10^{-14}}{1.74 \times 10^{-4}} = 5.75 \times 10^{-11}\ M = [OH^-]$

$pOH = 10.24$

8. Find the pH, pOH and $[OH^-]$ of a grapefruit that has $[H_3O^+] = 0.0120$ M.

$pH = -\log(0.0120) = 1.92 = pH$

$pOH = 12.08$

$[OH^-] = 8.32 \times 10^{-13}\ M$

11. The pH of a sample of human blood was found to be 7.41 at 25°C. Calculate $[H^+]$ and $[OH^-]$.

$[H^+] = 10^{-7.41} = 3.89 \times 10^{-8}\ M$

$[OH^-] = \frac{1 \times 10^{-14}}{3.89 \times 10^{-8}} = 2.57 \times 10^{-7}\ M$