pH problems

pH equations

- [ ]=concentration of, in molarity
- pH = -log $[H^+]$ or pH = -log $[H_3O^+]$
- $[H^+] = 10^{-pH} = [H_3O^+]$
- pOH = -log $[OH^-]$
- $[OH^-] = 10^{-pOH}$
- $[H^+][OH^-] = K_w = 1x10^{-14}$
- pH + pOH = 14
- pOH is the reverse of pH
- For pOH above 7 is acidic, below 7 is basic

Sig Figs and pH

- The number of **decimal places** in a logarithmic value, pH or pOH, is equal to the number of **significant figures** in the number that we took the logarithm of, concentration.
- So $[H_3O^+]$ = **2.45** x10^{-4} M 3 sig figs
- pH = -log 2.45 x10^{-4} M = 3.**611**
- 3 decimal places
- And pOH = 14-3.611 = 10.**389**

pH problems

- What is the pH of a 2.4 x 10^{-4} M H_3O^+?
- What is the OH^- concentration?
- What is the pOH?

pH problems

- What is the pH of a 2.4 x 10^{-4} M H_3O^+?
- pH = - log 2.4 x 10^{-4}
- pH = 3.62
- What is the OH^- concentration?
- $[H_3O^+]$ $[OH^-]$ = 1 x 10^{-14}
- 2.4 x10^{-4} $[OH^-]$ = 1 x 10^{-14}
- $[OH^-]$ = 4.2 x10^{-11} M
- What is the pOH?
- pOH = - log 4.16666x10^{-11}
- pOH = 10.38

Backwards problem

- What is the pOH, $[H_3O^+]$ and $[OH^-]$ of a solution with a pH of 8.72?

Backwards problem

- What is the pOH, $[H_3O^+]$ and $[OH^-]$ of a solution with a pH of 8.72?
- $[H_3O^+]$ = 10^(-pH)
- $[H_3O^+] = 10^{-8.72}$
- $[H_3O^+]$ = 1.9 x 10^{-9} M
- 1.905…x10^{-9} $[OH^-]$ = 1 x 10^{-14}
- $[OH^-]$ = 5.2 x 10^{-6} M
- pOH + pH = 14
- pOH = 5.28

Problem

- What is the pH, pOH and $[H_3O^+]$ of a soln. with a $[OH^-]$ conc. of 2.90 x10^{-4} M?

Problem

- What is the pH, pOH and $[H_3O^+]$ of a soln. with a $[OH^-]$ conc. of 2.90 x10^{-4} M?
- $[H_3O^+]$ 2.9 x 10^{-4} = 1 x 10^{-14}
- $[H_3O^+]$ = 3.45 x 10^{-11} M
- pH = -log 3.448275 x 10^{-11}
- pH = 10.462
- 10.462 + pOH = 14
- pOH = 3.538

Problem

- What is the pH, $[OH^-]$ and $[H_3O^+]$ of a solution with a pOH of 11.1?

Problem

- What is the pH, $[OH^-]$ and $[H_3O^+]$ of a solution with a pOH of 11.1?
- 11.1 + pH = 14
- pH = 2.9
- $[H_3O^+]$ = antilog (-2.9)
- $[H_3O^+] = 1 \times 10^{-3}$ M
- $[OH^-] = 8 \times 10^{-12}$ M

Another

- What is the pH, pOH, and $[OH^-]$ of a solution with a $[H_3O^+]$ of 4.90×10^{-8} M?

Another

- What is the pH, pOH, and $[OH^-]$ of a solution with a $[H_3O^+]$ of 4.90×10^{-8} M?
- pH = - log 4.90×10^{-8}
- pH = 7.310
- $[OH^-] = 2.04 \times 10^{-7}$ M
- pOH = 6.690

More

- What is the pH, pOH and $[H_3O^+]$ of a solution with a $[OH^-]$ of 1.78×10^{-12} M?

More

- What is the pH, pOH and $[H_3O^+]$ of a solution with a $[OH^-]$ of 1.78×10^{-12} M?
- pH = 2.250
- $[H_3O^+] = 5.62 \times 10^{-3}$ M
- pOH = 11.750

Continuing

- What is the pOH, $[OH^-]$ and $[H_3O^+]$ of a solution with a pH of 9.43?

Continuing

- What is the pOH, $[OH^-]$ and $[H_3O^+]$ of a solution with a pH of 9.43?
- $[H_3O^+]$ = antilog (-9.43)
- $[H_3O^+] = 3.7 \times 10^{-10}$ M
- $[OH^-] = 2.7 \times 10^{-5}$ M
- pOH = 4.57

Last one

- What is the pH, pOH, and $[OH^-]$ of a solution with a $[H_3O^+]$ of 2.7×10^{-6} M?

Last one

- What is the pH, pOH and $[OH^-]$ of a solution with a $[H_3O^+]$ of 2.7×10^{-6} M?
- pH = - log 2.7×10^{-6}
- pH = 5.57
- $[OH^-]$ = 3.7×10^{-9} M
- pOH = 8.43