Name :  Date :

# ACID AND BASE: CALCULATIONS

1. What is the pH of 0.033 M KOH solution?

2. What is the pH of an aqueous solution with a hydroxide ion concentration of $1.8 \times 10^{-3}$ M?

3. What is the hydrogen ion concentration of a solution with pH = 8.25?

4. What is the pH of a 0.235 M $Ba(OH)_2$ solution?

5. Find $[H^+]$ in 0.00256 M HBr

6. Find $[H^+]$ in 0.8 M LiOH

7. Find $[H^+]$ in a solution with pH = 3.216

8. Find $[OH^-]$ in 0.150 M $HClO_4$

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Answers

1. What is the pH of 0.033 M KOH solution?

   $pOH = - \log [OH^-] \Rightarrow pOH = - \log (0.033) = 1.48$

   Therefore. $pH = 14 - 1.48 = 13.52$

2. What is the pH of an aqueous solution with a hydroxide ion concentration of $1.8 \times 10^{-3}$ M?

   $pOH = - \log [OH^-] \Rightarrow pOH = - \log (1.8 \times 10^{-3}) = 2.74$

   Therefore, $pH = 14 - 2.74 = 11.26$

3. What is the hydrogen ion concentration of a solution with pH = 8.25?

   $pH = - \log [H^+] \Rightarrow 8.25 \Rightarrow - \log [H^+] \Rightarrow [H^+] = 10^{-8.25} = 5.6 \times 10^{-9}$

4. What is the pH of a 0.235 M $Ba(OH)_2$ solution?

   $2 \times [OH^-] = 2 \times 0.235 = 0.470$

   $pOH = - \log (2 \times [OH^-]) \Rightarrow pOH = - \log (0.47) = 0.33$

   Therefore, $pH = 14 - 0.33 = 13.67$

5. Find $[H^+]$ in 0.00256 M HBr

   $[H^+] = [HBr] = 2.56 \times 10^{-3}$ M

6. Find $[H^+]$ in 0.8 M LiOH

   $[OH^-] = 0.8$ M Therefore, $[H^+] = \dfrac{1.00 \times 10^{-14}}{8 \times 10^{-1}} = 1.3 \times 10^{-14}$ M

7. Find $[H^+]$ in a solution with pH = 3.216

   $[H^+] = \text{antilog}(-pH) = \text{antilog}(-3.216) = 6.08 \times 10^{-4}$ M

8. Find $[OH^-]$ in 0.150 M $HClO_4$

   $[H^+] = 0.150$ M

   $[OH^-] = \dfrac{1.00 \times 10^{-14}}{1.5 \times 10^{-1}} = 6.67 \times 10^{-14}$ M