

Name \_\_\_\_\_

Date \_\_\_\_\_

## Acids & Bases Calculations Practice Worksheet

Directions: Solve the following pH calculations. Write the formula, plug numbers into formula, & give answer with correct units

1. If the pH of a solution is 10.3, what is the  $[H^+]$  concentration?

$$[H^+] = 10^{-10.3} = 5.0 \times 10^{-11} \text{ M}$$

2. If the  $[H^+]$  is  $2.1 \times 10^{-12}$  M  $HClO_4$ , what is the pH? Is the solution ACIDIC, BASIC, or NEUTRAL?

$$pH = -\log(2.1 \times 10^{-12}) = 11.7$$

Basic

3. Calculate the pOH if the  $[OH^-]$  concentration is  $5.9 \times 10^{-1}$  M? Is the solution ACIDIC, BASIC, or NEUTRAL?

$$pOH = -\log(5.9 \times 10^{-1}) = .23$$

Basic

$$pH + pOH = 14 \quad 14 - .23 = 13.77$$

4. What is the pH of a 0.033 M KOH solution?

$$pOH = -\log(.033) = 1.5$$

$$pH = 14 - 1.5 = 12.5$$

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

$$pOH = -\log(1.8 \times 10^{-3}) = 2.7$$

$$pH = 14 - 2.7 = 11.3$$

6. What is the pH of an aqueous solution with a hydroxide ion concentration of  $1.2 \times 10^{-6}$  M?

$$pOH = -\log(1.2 \times 10^{-6}) = 5.9$$

$$pH = 14 - 5.9 = 8.1$$

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

$$[H^+] = 10^{-8.25} = 5.6 \times 10^{-9} \text{ M}$$

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

$$pOH = -\log(2 \times .235) = .33$$

$$pH = 14 - .33 = 13.7$$

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9. Determine the concentration of  $[\text{OH}^-]$  ions in an aqueous solution where the  $\text{pH} = 5.22$ .

$$\text{pOH} = 14 - 5.22 = 8.78$$

$$[\text{OH}^-] = 10^{-8.78} = 1.7 \times 10^{-9} \text{ M}$$

10. What is the hydroxide ion concentration in an aqueous solution with a hydrogen ion concentration of  $2.70 \times 10^{-2} \text{ M}$ ?

$$\textcircled{1} \text{ pH} = -\log(2.7 \times 10^{-2}) = 1.6$$

$$\textcircled{2} \text{ pOH} = 14 - 1.6 = 12.4$$

$$\textcircled{3} [\text{OH}^-] = 10^{-12.4} = 3.98 \times 10^{-13} \text{ M}$$

11. Calculate the  $\text{pH}$  of a solution that is  $0.147 \text{ M HCl}$ ?

$$\begin{aligned} \text{pH} &= -\log(.147) \\ &= .83 \end{aligned}$$

12. Complete the table below.

pH	$[\text{H}^+]$	$[\text{OH}^-]$	pOH	Acid / Base
3	$1 \times 10^{-3} \text{ M}$	$1 \times 10^{-11} \text{ M}$	11	A
6	$1 \times 10^{-6} \text{ M}$	$1 \times 10^{-8} \text{ M}$	8	A
6	$1 \times 10^{-6} \text{ M}$	$1 \times 10^{-8} \text{ M}$	8	A
12	$1 \times 10^{-12} \text{ M}$	$1 \times 10^{-2} \text{ M}$	2	B
9.6	$2.3 \times 10^{-10} \text{ M}$	$3.98 \times 10^{-5} \text{ M}$	4.4	B
13.93	$1.2 \times 10^{-14} \text{ M}$	$8.5 \times 10^{-1} \text{ M}$	.07	B
3.2	$6.9 \times 10^{-4} \text{ M}$	$1.6 \times 10^{-11} \text{ M}$	10.8	A
3.7	$1.99 \times 10^{-4} \text{ M}$	$5.1 \times 10^{-11} \text{ M}$	10.3	A