

## pH Calculation Worksheet

1. What is the concentration of  $[H^+]$  in a solution whose  $pH = 4.3$  ?
2. What is the  $pH$  of a solution with a hydronium concentration of  $3.4 \times 10^{-3}$  ?
3. What is the  $pOH$  of a solution with a  $pH$  of  $6.8$  ?
4. What is the concentration of hydroxide ions in a solution with a  $pOH$  of  $2.9$  ?
5. A solution has a hydrogen ion concentration of  $2.8 \times 10^{-6}$  M. What is the  $pOH$  of its solution ?
6. A solution has a  $[OH^-]$  of  $5.8 \times 10^{-7}$ . What is the  $pH$  of this solution ?
7. A 450 mL beaker is 0.00045 M HCl. What is the  $pH$  of this solution ?
8. A 320 mL solution contains 2.30 mg of NaOH. What is the  $pH$  of this solution ?

## pH Calculation Worksheet

1. What is the concentration of  $[H^+]$  in a solution whose pH = 4.3 ?

$$[H^+] = 10^{-\text{pH}} = 10^{-4.3} = 5 \times 10^{-5} \text{ M}$$

2. What is the pH of a solution with a hydronium concentration of  $3.4 \times 10^{-3}$  ?

$$[H_3O^+] = [H^+]$$

$$\text{pH} = -\log [H^+] = -\log (3.4 \times 10^{-3}) = 2.5$$

3. What is the pOH of a solution with a pH of 6.8 ?

$$\text{pOH} = 14 - \text{pH} = 14 - 6.8 = 7.2$$

4. What is the concentration of hydroxide ions in a solution with a pOH of 2.9 ?

$$[OH^-] = 10^{-\text{pOH}} = 10^{-2.9} = 1.3 \times 10^{-2} \text{ M}$$

5. A solution has a hydrogen ion concentration of  $2.8 \times 10^{-6}$  M. What is the pOH of its solution ?

$$\text{pH} = -\log [H^+] = -\log (2.8 \times 10^{-6}) = 5.6$$

$$\text{pOH} = 14 - \text{pH} = 14 - 5.6 = 8.4$$

6. A solution has a  $[OH^-]$  of  $5.8 \times 10^{-7}$ . What is the pH of this solution ?

$$\text{pOH} = -\log [OH^-] = -\log (5.8 \times 10^{-7}) = 6.2$$

$$\text{pH} = 14 - \text{pOH} = 14 - 6.2 = 7.8$$

7. A 450 mL beaker is 0.00045 M HCl. What is the pH of this solution ?

Because this is a strong acid, the molarity of the solution is equal to  $[H^+]$ . Also, volume is not important here.

$$\text{pH} = -\log [H^+] = -\log [0.00045] = 3.3$$

8. A 320 mL solution contains 2.30 mg of NaOH. What is the pH of this solution ?

$$2.30 \text{ mg NaOH} = 0.0023 \text{ g NaOH} = 1/40 \text{ g mol}^{-1} \text{ NaOH} = 0.000058 \text{ mol NaOH}$$

$$\text{Concentration} = 0.000058 \text{ mol NaOH} / 0.320 \text{ L} = 0.00018 \text{ M} = [OH^-]$$

$$\text{pOH} = -\log [OH^-] = -\log (0.00018) = 3.7$$

$$\text{pH} = 14 - \text{pOH} = 14 - 3.7 = 10.3$$