

## pH Calculations

Useful Information:	
$\text{pH} = -\log [\text{H}^+]$	$[\text{H}^+] = 10^{-\text{pH}}$
$\text{pOH} = -\log [\text{OH}^-]$	$[\text{OH}^-] = 10^{-\text{pOH}}$
$\text{pH} + \text{pOH} = 14$	

1. Calculate the pH of the following solutions given the concentration of  $\text{H}^+$ :

- a.  $[\text{H}^+] = 0.10 \text{ M}$
- b.  $[\text{H}^+] = 1.00 \text{ M}$
- c.  $[\text{H}^+] = 1.79 \times 10^{-5}$
- d.  $[\text{H}^+] = 5.52 \times 10^{-10}$
- e.  $[\text{H}^+] = 1.78 \times 10^{-2}$

**Answers: a) 1.00 b) 0.00 c) 4.74 d) 9.26 e) 1.75**

2. Calculate the pOH of the following solutions given the concentration of  $\text{OH}^-$ :

- a.  $[\text{OH}^-] = 0.20 \text{ M}$
- b.  $[\text{OH}^-] = 1.00 \times 10^{-4} \text{ M}$
- c.  $[\text{OH}^-] = 8.55 \times 10^{-6} \text{ M}$
- d.  $[\text{OH}^-] = 4.13 \times 10^{-2} \text{ M}$
- e.  $[\text{OH}^-] = 7.98 \times 10^{-5} \text{ M}$

**Answers: a) 0.70 b) 4.00 c) 5.06 d) 1.38 e) 4.10**

3. Given the pH, calculate the  $[\text{H}^+]$  of the following solutions:

- a.  $\text{pH} = 4.34$
- b.  $\text{pH} = 8.33$
- c.  $\text{pH} = 1.19$
- d.  $\text{pH} = 11.32$
- e.  $\text{pH} = 5.54$

**Answers: a)  $4.57 \times 10^{-5} \text{ M}$  b)  $4.68 \times 10^{-9} \text{ M}$  c)  $6.46 \times 10^{-2} \text{ M}$  d)  $4.79 \times 10^{-12} \text{ M}$  e)  $2.88 \times 10^{-6} \text{ M}$**

4. Given the pOH, calculate the  $[\text{H}^+]$  of the following solutions:

- a.  $\text{pOH} = 9.87$
- b.  $\text{pOH} = 2.32$
- c.  $\text{pOH} = 8.65$
- d.  $\text{pOH} = 12.26$
- e.  $\text{pOH} = 4.43$

**Answers: a)  $7.41 \times 10^{-5} \text{ M}$  b)  $2.09 \times 10^{-12} \text{ M}$  c)  $4.47 \times 10^{-6} \text{ M}$  d)  $1.82 \times 10^{-2} \text{ M}$  e)  $2.69 \times 10^{-10} \text{ M}$**

5. Fill in the table below:

	pH	pOH	$[\text{H}_3\text{O}^+]$	$[\text{OH}^-]$	Acidic or Basic
a.	1.00				
b.		10.50			
c.			$1.76 \times 10^{-12}$		
d.				$1.49 \times 10^{-3}$	

**Answers:**

a) $\text{pOH} = 13.00$	[ $\text{H}_3\text{O}^+$ ] = $1.00 \times 10^{-1} \text{ M}$	[ $\text{OH}^-$ ] = $1.00 \times 10^{-13} \text{ M}$	ACIDIC
b) $\text{pH} = 3.50$	[ $\text{H}_3\text{O}^+$ ] = $3.16 \times 10^{-4} \text{ M}$	[ $\text{OH}^-$ ] = $3.16 \times 10^{-11} \text{ M}$	ACIDIC
c) $\text{pH} = 11.75$	$\text{pOH} = 3.25$	[ $\text{OH}^-$ ] = $5.62 \times 10^{-4} \text{ M}$	BASIC
d) $\text{pH} = 11.17$	$\text{pOH} = 2.83$	[ $\text{H}_3\text{O}^+$ ] = $6.71 \times 10^{-12} \text{ M}$	BASIC