

# What is pH Calculation?

## Worksheet

pH is calculated as  $\text{pH} = -\log[\text{H}^+]$ , where  $[\text{H}^+]$  is the hydrogen ion concentration in mol/L; lower pH means a higher H concentration and a stronger acid.

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

## Questions

1. What is the pH of a solution with  $[\text{H}^+] = 1.10 \text{ mol/L}$ ?  
A) 5  
B) 9  
C) 110  
D) 14
2. A solution has pH 2. Which best describes it?  
A) Strongly basic  
B) Strongly acidic  
C) Neutral  
D) Weakly basic
3. If  $[\text{H}^+]$  increases, what happens to pH?  
A) pH increases  
B) pH decreases  
C) pH stays the same  
D) pH becomes negative
4. What is  $[\text{H}^+]$  for a solution with pH 6?  
A) 6 mol/L  
B) 110 mol/L  
C) 0.6 mol/L  
D) 110 mol/L
5. A solution has  $[\text{H}^+] = 1.10 \text{ mol/L}$ . Find its pH.
6. Pure water has  $[\text{H}^+] = 1.10 \text{ mol/L}$ . Find its pH and state whether it is acidic, basic or neutral.
7. A solution has a pH of 4. Find its hydrogen ion concentration  $[\text{H}^+]$ .
8. Define: What is the pH formula?
9. Define: What pH range is acidic?
10. Define: What is the pH of pure water?

## Answer Key

1. A)  $5 - \text{pH} = -\log(10) = 5$ .
2. B) Strongly acidic - A low pH close to 0 indicates a strongly acidic solution.
3. B) pH decreases - pH and  $[\text{H}^+]$  are inversely related through the logarithm, so more H means lower pH.
4. B)  $110 \text{ mol/L} - [\text{H}^+] = 10^{(-\text{pH})} = 10 \text{ mol/L}$ .
5.  $\text{pH} = -\log[\text{H}^+]$   $\text{pH} = -\log(0.001) = -\log(10^{-3})$   $\text{pH} = 3$
6.  $\text{pH} = -\log(10^{-7}) = 7$   $\text{pH} = 7$  neutral
7.  $\text{pH} = -\log[\text{H}^+]$   $[\text{H}^+] = 10^{(-\text{pH})}$   $[\text{H}^+] = 10^{-4}$   $[\text{H}^+] = 0.0001 \text{ mol/L}$
8.  $\text{pH} = -\log[\text{H}^+]$ , where  $[\text{H}^+]$  is the hydrogen ion concentration in mol/L.
9. pH below 7 is acidic; the lower the number, the more acidic.
10. 7 - neutral, with  $[\text{H}^+] = 10^{-7} \text{ mol/L}$ .

### Bounlu

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