

What is the pH Scale?

Worksheet

pH < 7 is acidic, pH = 7 is neutral, pH > 7 is basic. Each unit change represents a 10-fold change in H concentration. pOH is calculated the same way using [OH].

$$\text{pH} = \log[\text{H}] \text{ and } \text{pOH} = \log[\text{OH}], \text{pH} + \text{pOH} = 14$$

Questions

1. What is the pH formula?

- A) $\text{pH} = \log[\text{H}]$
- B) $\text{pH} = \log[\text{H}]$
- C) $\text{pH} = [\text{H}]/10$
- D) $\text{pH} = 14 [\text{H}]$

2. If $[\text{H}] = 10$, what is pH?

- A) 4
- B) 4
- C) 10
- D) 0.0001

3. A solution has pH 11. Is it acidic or basic?

- A) Acidic
- B) Basic
- C) Neutral
- D) Cannot tell

4. If $\text{pH} = 6$, what is pOH?

- A) 6
- B) 8
- C) 20
- D) 6

5. Calculate pH if $[\text{H}] = 0.01 \text{ mol/L}$.

6. If $\text{pH} = 5$, what is $[\text{H}]$?

7. For a solution with $[\text{H}] = 10 \text{ mol/L}$, find pH and pOH.

8. Define: What does pH measure?

9. Define: Why is pH logarithmic?

10. Define: pH range for a neutral solution?

Answer Key

1. B) $\text{pH} = \log[\text{H}^+]$ - $\text{pH} = \log[\text{H}^+]$ is the definition.
2. A) $4 - \text{pH} = \log(10) = (4) = 4$.
3. B) Basic - $\text{pH} > 7$ is basic.
4. B) $8 - \text{pOH} = 14$ $\text{pH} = 14 - 6 = 8$.
5. $\text{pH} = \log[\text{H}^+] = \log(0.01) = (2) = 2$. The solution is acidic ($\text{pH} < 7$).
6. $\text{pH} = \log[\text{H}^+] = 5$ $[\text{H}^+] = 10^{-5} = 0.00001 \text{ mol/L}$.
7. $\text{pH} = \log(10) = 11$ $\text{pOH} = 14 - 11 = 3$ (or $\text{pOH} = \log(10) = 3$).
8. The concentration of hydrogen ions $[\text{H}^+]$; it quantifies acidity/basicity.
9. Because H^+ concentrations span many orders of magnitude (10^{-14} to 10^0).
10. $\text{pH} = 7$ (at 25°C, $[\text{H}^+] = [\text{OH}^-] = 10^{-7}$).

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