



÷ 5565 The pH Scale



 The pH scale is a convenient way to describe the concentration of hydronium ions (H₃O⁺) in acidic solutions as well as the hydroxide ions (OH⁻)in basic solutions

-Hydronium ions are produced when acids break apart (dissociate) in water.

For example: When HCl dissociates in water the equation ,looks like this: HCl + H₂O \rightarrow H₃O⁺ + Cl⁻

Hydoxide ions are produced when bases break apart (dissociate) in water.

For example: When NaOH dissociates in water the equation ,looks like this: NaOH + $H_2O \rightarrow Na^+ + OH^-$

 pH is a mathematical scale in which the concentration of hydronium and hydroxide ions in a solution are expressed as a number from 0-14.

Hydronium (H₃O⁺) and hydroxide (OH⁻) ions can be thought of being on a sliding scale. As the concentration of one increases, the concentration of the other decreases

- Acidic solutions contain more Hydronium (H₃O⁺) ions than hydroxide ions
- Basic solutions contain more hydroxide (OH⁻) ions than hydronium ions.
- Neutral solutions contain equal numbers of Hydronium (H₃O⁺) and hydroxide (OH⁻) ions.



- The pH decreases as the [H⁺] increases.
 A lower pH means a more acidic solution.
- -Acids have a pH of less than 7
- The pH increases as the [OH-] increases.
- A higher pH means a more basic solution.
- -Bases have a pH of greater than 7
- -Neutral solutions have a pH equal to 7
- The pH scale and the pH values for several common substances are shown in the figure



- The pH scale is a log scale based on powers of 10.
- the pH changes by 1 for every power-of-10 change in the [H⁺].
 - For example, a solution of pH 3 has an H⁺ concentration which is 10 times that of a solution of pH 4 and 100 times that of a solution of pH 5.
 - This is true for bases too
 (a pH of 14 is 10x stronger than a pH of 13 and 100 x stronger than a pH of 12)

| Table 16.2 The Relationship of the H ⁺ Concentration of a Solution to Its pH | | | |
|-----------------------------------------------------------------------------------------------|------|---------------------|------|
| | | [H ⁺] | рН |
| | | $1.0 	imes 10^{-1}$ | 1.00 |
| $1.0 	imes 10^{-2}$ | 2.00 | | |
| $1.0 	imes 10^{-3}$ | 3.00 | | |
| $1.0	imes10^{-4}$ | 4.00 | | |
| $1.0 	imes 10^{-5}$ | 5.00 | | |
| $1.0 	imes 10^{-6}$ | 6.00 | | |
| $1.0 	imes 10^{-7}$ | 7.00 | | |
| | | | |

• The end

