

pH meter – ph-value basics

Since water has the capacity to dissolve a considerable number of salts, it is the best naturally available and most frequently applied “solvent”.

From a chemical point of view, the water molecule (H_2O) consists of 2 hydrogen atoms and 1 oxygen atom. Chemically dissociated (separated), it can be found as $H_2O \rightarrow H^+ + OH^-$. When put this way, the pH neutral characteristic (pH7) of pure water becomes evident as the acidic component H^+ (strong acid) and the alkaline component OH^- (strong base) exist in the same proportion and neutralise each other chemically.

When water is used as a solvent (aqueous solution), it can dissolve salts or mix with other acidic or alkaline compounds. Therefore, the neutral equilibrium can change towards acid (pH <7) or base (pH >7).



Depending on whether the water is acidic or alkaline, its characteristic as a solvent regarding corrosivity as well as regarding the capacity to influence other chemical reactions in water will also change. Therefore, the pH value is one of the most important chemical parameters in aqueous solutions.

The standard pH scale ranges from pH 0 for strongly acidic to pH 14 for strongly alkaline. The pH value 7 marks the neutral point. This means that water with a pH value of exactly pH 7 is chemically neutral. In exceptional cases, however, negative pH values such as pH -2 or values above pH 14 can be measured.

What is the pH scale derived from?



In pure water, the concentration of H^+ as well as the concentration of OH^- is 10^{-7} mol/l. The definition that the pH value is the negative logarithm to base 10 of the concentration / activity of H^+ means that water with 10^{-7} mol H^+ has a pH value of pH 7. The pH scale is derived from the exponent of the concentration / activity. This means that the pH scale is not linear but logarithmic.

Thus, the stages of the scale are arranged in a way that the acid multiplies by 10 for each pH unit. This fact clarifies that possible changes in concentration relating to acids or bases around the neutral point have a much greater effect on the pH value than those related to highly acidic or alkaline ones.

This means that measurements in slightly acidic, neutral or slightly alkaline ranges require high-quality pH measuring equipment.

If you have any further questions regarding our pH measuring equipment, we will be happy to give advice.