



pH measurement and temperature compensation

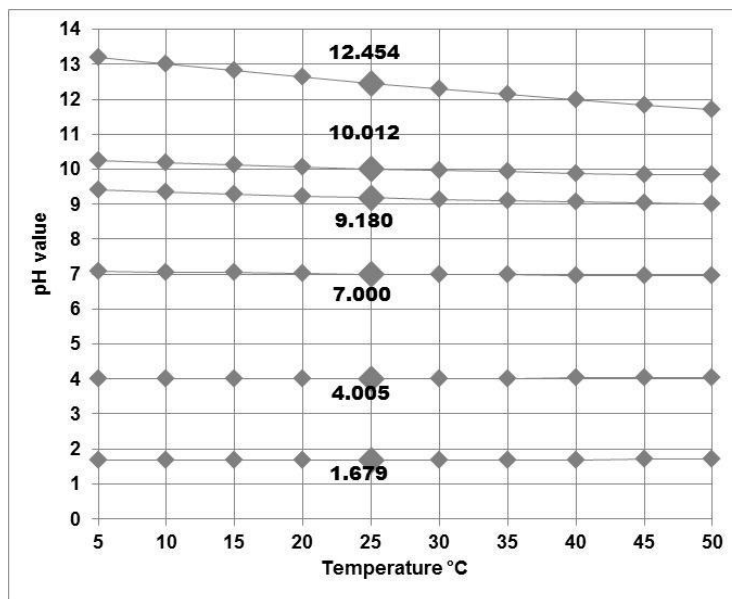
All pH buffers are defined by international norms, including their individual change in pH as a function of the temperature (°C). pH meters have data tables stored of most common pH buffers to calculate the right pH based on temperature measurement. However, e.g. water samples from the nature, samples from production control etc. have not been analyzed to get their specific pH versus T function $pH = F(°C)$.

Compared with pH buffer solutions, **samples can NOT be temperature compensated.**

It is common practice that pH meters adjust the slope value from the calibration procedure to the temperature of the currently measured sample. This compromise, to do a temperature adjustment of the slope value, is at least more precise than using a slope value from a different / wrong temperature. It is essential for pH measurements to measure the temperature during calibration and sample measurement. Ideal is to have during the measurements the same temperature.

International norms (e.g. EN ISO 10523, DIN 19266) describe the temperature dependence of pH buffer solutions.

T (°C)	pH buffer 1.679	pH buffer 4.008	pH buffer 7.000	pH buffer 9.180	pH buffer 10.012	pH buffer 12.454
5	1,668	3,998	7,087	9,395	10,245	13,207
10	1,670	3,997	7,059	9,332	10,179	13,003
15	1,672	3,998	7,036	9,276	10,118	12,810
20	1,675	4,001	7,016	9,226	10,062	12,627
25	1,679	4,005	7,000	9,180	10,012	12,454
30	1,683	4,011	6,987	9,139	9,966	12,289
35	1,688	4,018	6,977	9,102	9,925	12,133
40	1,694	4,027	6,970	9,068	9,889	11,984
45	1,700	4,038	6,966	9,038	9,856	11,841
50	1,707	4,050	6,964	9,010	9,828	11,705



While pH buffer solutions are well known and the pH meters can automatically do temperature compensation (ATC), the temperature behavior of real samples is not known. ATC with samples is normally not possible.

As long as the temperature during calibration and sample measurement is the same or similar ($\pm 1^\circ\text{C}$), the sample pH measurement is reliable. Differences in temperature between calibration and sample can be “adjusted” by the pH meter. The calibration slope factor is recalculated to the sample temperature, to minimize the error.

Note: For quick and reliable pH measurements it is recommended to store pH buffers **not** on the window bench. Exposure to sunlight or placing them next to a heating can increase their temperature.