APPLICATION NOTE

TEMPERATURE COMPENSATION WITH pH MEASUREMENT

Is there a temperature compensation table for pH measurement in samples?

The temperature coefficient of a sample is normally not known. Therefore no table exists correlating sample pH with temperature, as known from pH buffer solutions. That is why no exact temperature compensation can be made with sample measurements.

In order to correct the pH value of a sample to the calibration temperature, the following formula is commonly used in pH meter software.

$$S(T\ sample) = S(T\ cal) \ * \ \frac{T(sample) + 273.15}{T(cal) = 273.15}$$

S = slope
T = temperature °C
cal = calibration

With the new calculated slope S(T sample) from the mV signal, the pH of the sample can be calculated at sample temperature T(sample). A linear relationship is assumed between sample pH and temperature.

Example:

Calibration was done with pH buffers 4.01 and 7.00 at 24°C. The samples have been stored cool and now the measurement is done at 10°C.

The corrected pH value is calculated with slope (24°C) = -58,0 mV/pH and offset = 0.0mV:

Slope (10°C) = slope(24°C) * (10 + 273.15) / (24 + 273.15)
Slope (10°C) = -58.0 * (283.15) / (297.15)
Slope (10°C) = -55.28 mV/pH

pH value of the sample (measured potential +100 mV)
= 7 – 100 mV / -58.0 mV/pH = pH 5.28 (not corrected),
= 7 – 100 mV / -55.28 mV/pH = pH 5.19 (corrected)

The difference of 0.09 pH shows how important it is to precisely measure and correct for temperature.

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