

# Fresh buffers for every calibration

## What is the meaning of "pH buffer"?

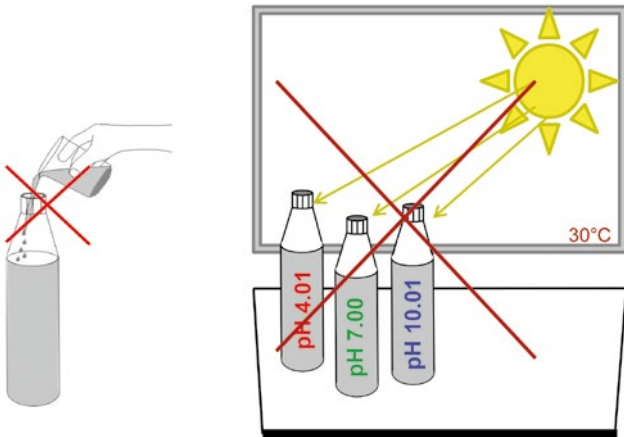
pH buffers can compensate the addition of small amounts of acid or base, keeping the nominal pH value stable (buffer equilibrium).

## Check your pH probe's performance on a regular basis:

- visual inspection of the probe parts
- correct storage (short/long term)
- cleaning/maintenance (depends on contamination of the probe)
- apply sufficient stirring (gently, without forming a vortex)

A continuously decreasing slope (mV/pH or %) may indicate a drop in pH probe performance. This could indicate a requirement to clean the glass indicator bulb or even complete probe replacement. However, in reality it is not always the probe causing the loss of sensitivity, it may also be the pH buffer which has changed over time!

Experience shows: a pH reading is influenced 50/50 by pH buffer and pH probe performance. Often it is not the pH probe, causing the problem but the buffer.



**Tip:** Never put used pH buffer back into the buffer bottle. Never store pH buffers (or sensors) in direct sunlight. UV light may damage the sensors and high temperatures of the buffers may influence the pH calibration.



*Certified pH buffers deliver the highest precision and accuracy*

## What are the main reasons for incorrect pH readings caused by buffer solutions?

- old pH buffer solutions (end of shelf life)
- incorrect storage of pH buffer solutions (e.g. exposed to heat)
- collection of remaining volumes of same pH buffer solutions in one bottle
- putting used pH buffer solutions after calibration back into the buffer bottle
- using cheap pH buffer solutions of low quality.

In any case, if the measured pH value in a buffer solution is not correct, first check:

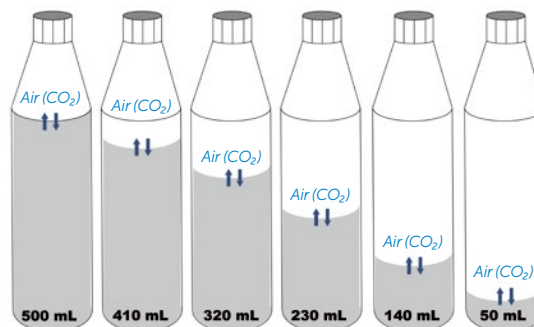
- the shelf life of the buffer
- how many times the bottle has been opened and exposed to air
- the pH probe's performance and start refill or maintenance procedures.

### The effect of opening the bottle

Change of the buffer pH is caused by opening the bottle and allowing CO<sub>2</sub> from ambient air to dissolve in buffer solution. Every opening adds CO<sub>2</sub>.

The graphic shows the individual and cumulated amount of moles CO<sub>2</sub> added per opening of the bottle (see reaction equation and table). At the end the pH value is lowered by e.g. 0.014 pH.

**Tip:** Opening the bottle with buffer solution should be as short as possible. The bottle should never be open for a long period of time. pH buffer quality directly influences the accuracy of the pH probe calibration and therefore directly impacts the reliability of the sample measurement.



### How long do pH buffer solutions last when opened?

Following the manufacturer's recommendation a bottle with pH buffer should only be opened for taking out a small volume for calibration and must be closed quickly afterwards.

pH buffer solutions in open beakers for calibration should not be used longer than 10-15 minutes (pH 4 and 7). Alkaline buffers (pH 10 or 12) are very sensitive to CO<sub>2</sub> from ambient air and will quickly change their pH. Those should be used no longer than 5-10 minutes, depending on the pH probe stabilisation time and temperature.

At lower temperatures (0-20 °C) pH buffers are more stable than at higher temperatures (20-40 °C). Above 40 °C pH buffers (and samples) should be measured in a closed vessel with cover. Otherwise, too much water can vaporize, changing the concentration of the buffer or sample and therefore the pH value. In addition, the equilibrium between the solution and steam/air phase can change the buffer pH as well.

pH buffer	Volume (mL)		CO <sub>2</sub> addition (air)			pH (25 °C)
	Air	CO <sub>2</sub>	mmol CO <sub>2</sub>	cum. mmol		
500	25	0.10	0.0045	0.0045	10.012	
410	115	0.46	0.0205	0.0250	10.011	
320	205	0.82	0.0366	0.0616	10.009	
230	295	1.18	0.0527	0.1143	10.006	
140	385	1.54	0.0688	0.1830	10.002	
50	475	1.90	0.0848	0.2679	9.998	



pH buffers can be stored in sealed cans for up to two years.



Sachets supply a fresh buffer for each new calibration.

For application and technical support just give us a call or visit our website.

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