

Mechanisms of maintenance of acid-base balance

The mechanisms, by which the constant pH of the internal environment is maintained, can in principle be divided into two groups:

- *buffers*;
- regulation of *respiration* and *metabolic processes*.

Buffers

 For more information see *Buffers*.

They react practically immediately to a pH deviation, but their capacity is limited. The buffering reaction leads to a change in the composition of the buffer and thus, in accordance with the Henderson-Hasselbalch equation, to a change in the pH of the system. Although the deviation is much smaller than what would occur in an unbuffered system, nevertheless, from a longer-term perspective, buffers alone cannot be sufficient to maintain a constant pH of the internal environment.

Regulation of respiration and metabolic processes

Changes in ventilation and speed of some metabolic pathways change the composition of the buffers, especially the concentration of the components of the bicarbonate buffer (i.e. the concentration of carbonic acid and the concentration of the bicarbonate anion). Using these mechanisms, the composition of the buffers, and therefore the pH of the internal environment, can be completely normalized. However, these mechanisms are relatively slow (their upregulation takes minutes, hours and days).