

Buffers and how they work

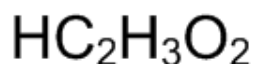
Definition

A buffer solution is one which resists changes in pH when small quantities of an acid or a base are added to it.

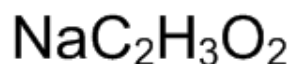
A buffer is composed of a Weak Acid and its conjugate base (also thought of as a salt of the Weak Acid)

OR a Weak Base and its conjugate acid (also thought as the salt of the Weak Base).

You can change the pH of the buffer solution by changing the **ratio** of acid to salt, or by choosing a different acid and one of its salts.

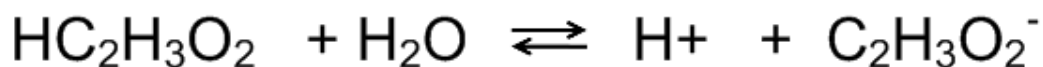


weak acid



conjugate base

- pH is unchanged by dilution (as long as the restrictions hold.)
- pH change due to added strong acid or base is resisted (since strong acids or bases are exchanged for weak acids and bases.)



- When you add H^+ it combines with the acetate ion and produces more $\text{HC}_2\text{H}_3\text{O}_2$, thus shifting to the left and restoring the equilibrium so the pH goes back to the original value.
- When you add OH^- it combines with H^+ and makes more water, thus shifting back to the left restoring the equilibrium so the pH goes back to the original value.
- Note: At some point it can no longer shift because the overall concentration will have changed due to the increased volume and production of more water.

Review the linked animations for a visual interpretation:

[Preparation of a Buffer](#)

[Strong Base with a Buffer](#)

[Strong Acid with a Buffer](#)