3.2.) **ACID / BASE PHYSIOLOGY**

Our metabolism constantly produces acids ($H^+$). If these were not buffered the plasma would become so acidic that life were impossible.

![Acid plus Base = Salt plus Water](image)

> Strong acids dissociate completely:

![Strong Acid](image)

> Weak acids dissociate partially.

> **Buffer** = Weak acid + its **Salt** (for example $H_2CO_3 + NaHCO_3$)

When dissolved in water forms an equilibrium:

![Buffer](image)

Add acid ($H^+$): equilibrium shifts to the left: $H_2CO_3 \leftrightarrow HCO_3^-$

Remove acid ($H^+$): equilibrium shifts to the right: $H_2CO_3 \rightarrow HCO_3^-$

The body has two additional defense mechanisms against too much acid:

1. If too much $H_2CO_3$ is produced by the above reactions, the lungs can remove it in the form of $CO_2$.

   - Inability to remove $CO_2$ due to hypoventilation causes acidosis.

   - Removal of too much $CO_2$ by hyperventilation causes alkalosis.

2. The kidneys can supply (recover) additional buffer base $HCO_3^-$ to compensate for acidosis.

   - Inability of the kidneys to recover $HCO_3^-$ causes acidosis.