Buffer of blood

A buffer is a solution which tend to maintain its pH, when a small amount of acid or base added to it. It contains a H^+ donar & H^+ accepter from weak acid & weak base.

Carbonic acid - bicarbonate is common buffering system in blood plasma. The weak carbonic acid dissociate into H^+ & HCO_3^-

$$H_2CO_3 \rightleftharpoons H^+ + HCO_3^-$$

when a small amount of HCl added to this system, H^+ produced from HCl combine with HCO_3^- to form H_2CO_3. If a small amount of NaOH is added to it OH^- combine with H^+ to form H_2O. Thus this system 'soaks' the H^+ or OH^- produced from strong acid or base & tend to maintain the orginal pH.

Buffering in blood →

pH of blood range from 7.35 to 7.45

→ pH less then 7.35 cause acidosis & death occure at 7

→ pH > 7.45 cause alkalosis & death occure at 7.8

The death at pH-7 & 7.8 is because the enzyme of blood are extremely sensitive to change in pH. To maintain the pH of blood buffering system present in blood. The major buffers system of blood are

- bicarbonate
- Phosphates
- Haemoglobin

→ Hb is a good buffer because of its capacity to act as a oxygen acceptor as well as oxygen donar. Oxyhemoglobin ($HHbO_2$) is a stronger acid than carbonic acid but Haemoglobin (HHb) is a weaker acid.

when blood is circulated in pulmary vein (in lung) HHb is converted to $HHbO_2$ by absorbing O_2., Because of its acidic nature it react with bicarbonate ion in blood

$$HHbO_2 + BHCO_3 \longrightarrow BHbO_2 + H_2CO_3$$

(B = Na^+, K^+ --)

Lung

$$H_2CO_3 \longrightarrow H_2O + CO_2\uparrow$$

Tissue.

$$BHbO_2 \longrightarrow BHb + O_2$$

$$BHb + H_2CO_3 \longrightarrow BHCO_3 + HHb.$$

The salt of oxhemoglobin formed in Lung converted to salt ($BHCO_3$) & Hemoglobin at tissue.

The HHb thus liberated goes to lungs again where it oxygenate again & cycle repeated.

This cyclic oxygenation & deoxygenation of haemoglobin between lung & tissue is called Henderson cycle.