Blood is the chief method of transport for vital and waste electrolytes.
The blood receives an excess of carbon dioxide (CO2) from metabolic activities which slight lowers blood pH, yet the pH of the blood remains relatively constant. Explain how CO2 is buffered in the blood causing stabilisation of blood pH?

There are 2 buffer systems in the blood where CO2 plays an important role.
1. CO_2 can bind to hemoglobin. As P_{CO2} rises, hemoglobin releases O_2 more readily. P_{CO2} and pH are related factors because low blood pH (acidity) results from high P_{CO2}. As CO_2 enters the blood, much of it is temporarily converted to carbonic acid (H_2CO_3), a reaction catalyzed by an enzyme in red blood cells called *carbonic anhydrase (CA):*
$CO_2 + H_2O$—CA→ $H_2CO_3 \leftrightarrow H^+ + HCO_3^-$
The carbonic acid thus formed in red blood cells dissociates into hydrogen ions and bicarbonate ions. As the H+ concentration increases, pH decreases. Thus, an increased P_{CO2} produces a more acidic environment, which helps release O_2 from hemoglobin.

2. The greatest percentage of CO_2—about 70%—is transported in blood plasma as **bicarbonate ions**
(HCO_3^-). As CO_2 diffuses into systemic capillaries and enters red blood cells, it reacts with water in the presence of the enzyme carbonic anhydrase (CA) to form carbonic acid, which dissociates into H_ and HCO_3
$CO_2 + H_2O$—CA→ $H_2CO_3 \leftrightarrow H^+ + HCO_3^-$
Thus, as blood picks up CO_2, HCO_3_ accumulates inside RBCs. Some HCO_3^- moves out into the blood plasma, down its concentration gradient. In exchange, chloride ions (Cl_) move from plasma into the RBCs. This exchange of negative ions, which maintains the electrical balance between blood plasma and RBC
cytosol, is known as the **chloride shift**. The net effect of these reactions is that CO_2 is removed from tissue cells and transported in blood plasma as HCO_3^-. As blood passes through pulmonary capillaries in the lungs, all these reactions reverse and CO_2 is exhaled.