Question#46145 - Chemistry - Organic Chemistry

Question:

How does the pH effect the activity of enzymes in the biological systems ? Illustrate your answer.

Answer:

For example, pH can have an effect of the state of ionization of acidic or basic amino acids. Acidic amino acids have carboxyl functional groups in their side chains. Basic amino acids have amine functional groups in their side chains. If the state of ionization of amino acids in a protein is altered then the ionic bonds that help to determine the 3-D shape of the protein can be altered. This can lead to altered protein recognition or an enzyme might become inactive.

Changes in pH may not only affect the shape of an enzyme but it may also change the shape or charge properties of the substrate so that either the substrate connot bind to the active site or it cannot undergo catalysis.

In geneal enzyme have a pH optimum. However the optimum is not the same for each enzyme.

For example in the figure below is represented a situation inwhich two different enzymes might have very different pH optima. The one depicted by the green curve might represent the pH optimum for the enzyme pepsin which degraded proteins (protease) in the vert acidic lumen of the stomach. The second curve (in red) might represent the enzyme carbonic anhydrase that works in the neutral pH of your cytosol.