A patient was born with a congenital mutation in an enzyme that severely affected its ability to bind an activation-transfer coenzyme. As a consequence, which one of the following is most likely to occur?

A. The enzyme will be unable to bind the substrate of the reaction.

B. The enzyme will be unable to form the transition-state complex.

C. The enzyme will normally use a different activation-transfer coenzyme.

 D. The enzyme will normally substitute the functional group of an active site amino acid residue for the coenzyme.

 E. The reaction may be carried out by the free coenzyme, provided the diet carries an adequate amount of its vitamin precursor.

Step 1: Answer

B. The enzyme will be unable to form the transition-state complex.

Step 2:

Congenital describes a problem or characteristic that exists from birth. Congenitaldisorders or features may be inherited, the result of an event or exposure during pregnancy or delivery, or a combination of these causes.

A variant or defective protein could be synthesised as a result of mutations. The specific substrate might not fit into the substrate binding site, for instance, if the protein is a significant enzyme. It may become weaker if it is a structural protein like collagen.

Enzymes stabilise the structure of the transition state by interacting with substrates at their active sites. This reduces the transition state's free energy, which in turn slows down the rate of the chemical reaction. Enzymes do not however change the Gibbs free energy of the chemical reaction.