2023 Bi H1 Q9

Section: Metabolism and Survival

Topic: Metabolic Pathways

Question Summary

This question investigates how copper nitrate concentration affects the activity of the enzyme catalase. Catalase breaks down hydrogen peroxide into water and oxygen.

Worked Solution

As the concentration of copper nitrate increases, the time taken to collect 10 cm^3 of oxygen increases. A longer time means the reaction is happening more slowly, so the enzyme activity is decreasing. Copper ions act as an inhibitor of catalase activity, possibly by changing the shape of the enzyme’s active site.

■ Answer: D — Catalase activity decreased

Revision Tips

• Catalase speeds up the breakdown of hydrogen peroxide into water and oxygen.
• Inhibitors reduce enzyme activity by interfering with the active site or altering its shape.
• Competitive inhibitors resemble the substrate; non-competitive inhibitors bind elsewhere and change the enzyme’s shape.

• Increasing inhibitor concentration slows the reaction — shown here by a longer time to produce oxygen.
• Enzyme activity is inversely proportional to time taken (activity $\propto$ 1/time).