

4. Water has a number of significant properties that are essential for life. Describe and discuss three of them. (6)

5. The Nobel prize for medicine was won in 1947 by Gerty Cori and her husband Carl. They isolated two enzymes that convert glucose phosphate into glycogen. Glycogen is a polysaccharide, composed of glucose molecules bonded together in two ways, called 1"4 and 1"6 bonds.

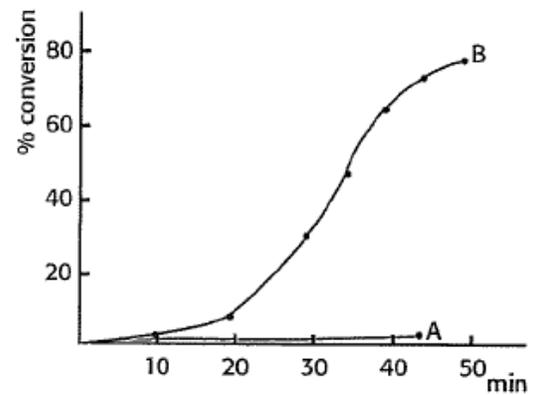
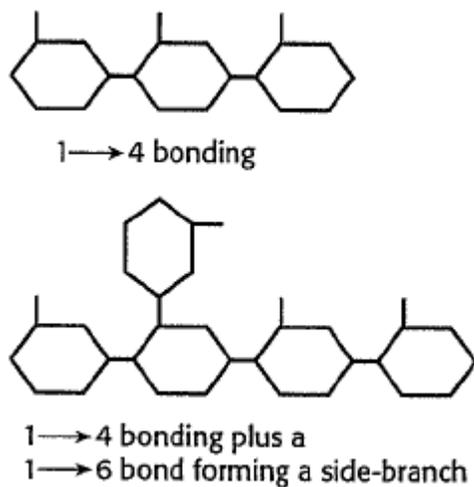


Figure 14 shows the percentage conversion of glucose phosphate to glycogen by the two enzymes, over a 50-minute period

a) Explain why the two different enzymes are needed for the synthesis of glycogen from glucose phosphate (2)

b) The formation of side-branches increases the rate at which glucose phosphate molecules can be linked on a growing glycogen molecule. Explain the reason for this (2)

c) Curve A was obtained using heat-treated enzymes. Explain the shape of curve A. (2)

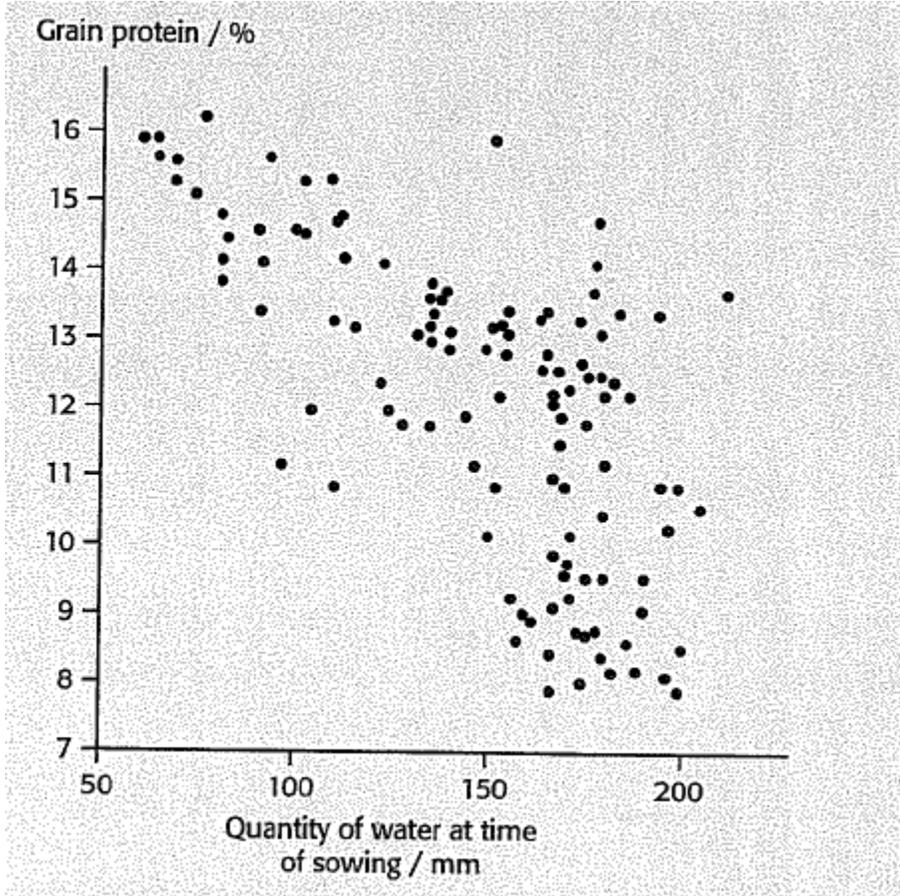
6. Lipase is a digestive enzyme that accelerates the breakdown of triglycerides in the small intestine. In the laboratory the rate of activity of lipase can be detected by a decline in pH.

a) Design an experiment to measure the activity of lipase over a range of pH values. (2)

b) Indicate which variable is dependent and which one is independent. (2)

c) Explain what causes the pH to decline as a result of lipase activity. (2)

7. The protein content of harvested wheat grain depends on the water content in the soil at the time of sowing. In an experiment carried out in semi-arid soil in Queensland, Australia, over several years, researchers measured the protein obtained from wheat sown in different conditions



- a) Outline the relationship between water content at planting time and protein content. (1)
b) Suggest why this relationship exists (2)