

Chapter 9

Question 9.16

k_{cat} = the catalytic rate constant, measured as the enzymatic reactions catalysed per second (= product formation per second) when the enzyme is saturated with substrate.

(i) k_{cat} at 20 °C is given as 150 s⁻¹

Q_{10} for rate of reaction is given as 2, i.e. reaction rate doubles for an acute 10°C rise in temperature or halved (1/2) for an acute 10°C decrease in temperature.

Therefore, at 0 °C after 2 hours:

$$\begin{aligned}\text{Predicted } k_{\text{cat}} &= 150 \times (1/2) \times (1/2) \\ &= 37.5 \text{ s}^{-1}\end{aligned}$$

(ii) If the frogs are held at 0°C for a prolonged time (3 months) and complete compensation for temperature occurs, the rate of reaction at 0 °C would be 150 s⁻¹.