

Question 3

(a) At a fixed enzyme concentration, the enzyme-catalysed reaction



was found experimentally to have the following dependence of initial rate, J_0 , on initial substrate concentration, $[S]_0$:

$$J_0 = \frac{V[S]_0}{K_m + [S]_0} \quad (8)$$

A plot of $1/J_0$ versus $1/[S]_0$ for the reaction is shown in Figure 1. Determine from this plot values of V and K_m . Show your reasoning.

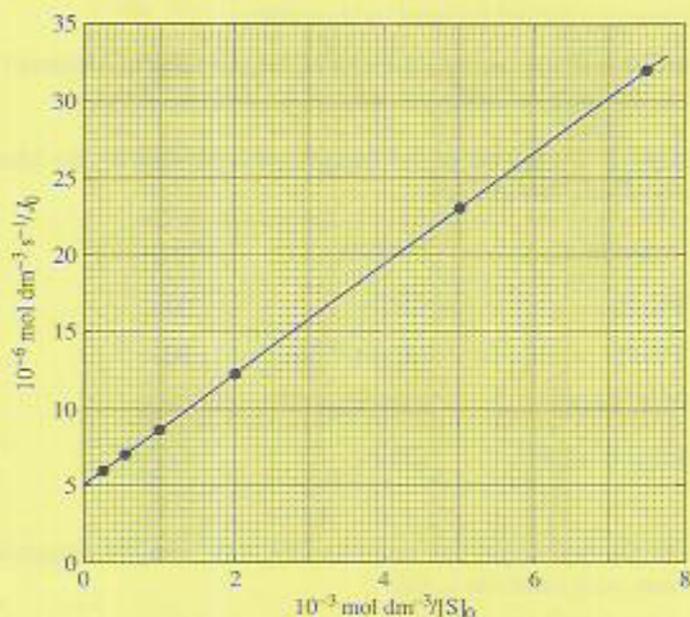
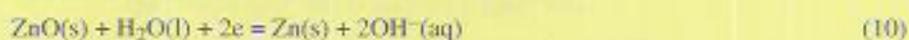
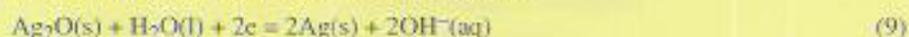


Figure 1 A plot of $1/J_0$ versus $1/[S]_0$ for the enzyme-catalysed reaction in equation 7.

(b) Explain why, out of a pair of isoenzymes that follow the chemical rate equation 8, the isoenzyme with the larger value of K_m occurs in tissue where the concentration of substrate is likely to be high.

Question 4

A zinc-silver oxide 'button' cell is formed by combining the following two half-reactions (with an electrolyte of aqueous potassium hydroxide):



Use information from the data sheet to determine (i) the standard emf of the cell at 50°C (323.15 K), and (ii) the maximum amount of electrical work obtainable under these conditions. State any assumptions involved in your answers.

Which electrode would be the anode and which the cathode? Which would be the positive electrode?

Would you expect the emf of the cell to depend on the pH of the electrolyte? Explain your answer.