

(10)

FROM PLOT (FOLLOWING PAGE)

$$K_m = 7.27 \text{ mM}$$

$$V_{\text{MAX}} = 4.5 \text{ mmol/L MIN}$$

$$i) k_{\text{CAT}} = \frac{(4.5 \text{ mmol/L MIN})(82800 \text{ mg ENZ} / \text{mmol ENZ})}{(0.35 \text{ mg ENZ} / 100 \mu\text{L})(2 \text{ mmol ACT SITE} / \text{mmol ENZ})} \times \frac{L}{1000 \mu\text{L}}$$

$$= 53200 \text{ min}^{-1}$$

$$= \underline{\underline{887 \text{ s}^{-1}}}$$

$$\frac{k_{\text{cat}}}{K_m} = \frac{887 \text{ s}^{-1}}{7.27 \text{ mM}} = \underline{\underline{123 \text{ s}^{-1} \text{ mM}^{-1}}} \quad (7,380 \text{ min}^{-1} \text{ mM}^{-1})$$

ii) IF $[E] = 3.5 \text{ mg/L}$ THEN $V_{\text{MAX}} = 4.5 \text{ mmol/L MIN}$
 (THE ENZYME CONCENTRATION IS IDENTICAL TO ORIGINAL EXPERIMENT ABOVE)

$$S_0 - S + K_m \ln(S_0/S) = V_{\text{MAX}} t$$

$$15 - S + 7.27 \ln(15/S) = (4.5)(5)$$

$$12.19 - 7.27 \ln(S) = S$$

$$\text{FROM PLOT } \underline{\underline{S = 3.3 \text{ mM}}}$$

iii) IF $[E] = 1.0 \text{ mg/L}$ THEN V_{MAX} HAS CHANGED!

METHOD #1 $V_{\text{MAX}} \propto [E]$ SO $\frac{V_{\text{MAX}}''}{V_{\text{MAX}}'} = \frac{[E]''}{[E]'}$ $\Rightarrow V_{\text{MAX}}'' = \frac{(4.5)(1.0)}{(3.5)} = 1.29 \frac{\text{mmol}}{\text{L MIN}}$

METHOD #2 $V_{\text{MAX}} = k_{\text{CAT}} [E]$

$$= \left(\frac{53200}{\text{MIN}} \right) \left(\frac{1.0 \text{ mg ENZ}}{\text{L}} \right) \left(\frac{\text{mmol ENZ}}{82,800 \text{ mg ENZ}} \right) \left(\frac{2 \text{ mmol ACT SITE}}{\text{mmol ENZ}} \right) = 1.29 \frac{\text{mmol}}{\text{L MIN}}$$

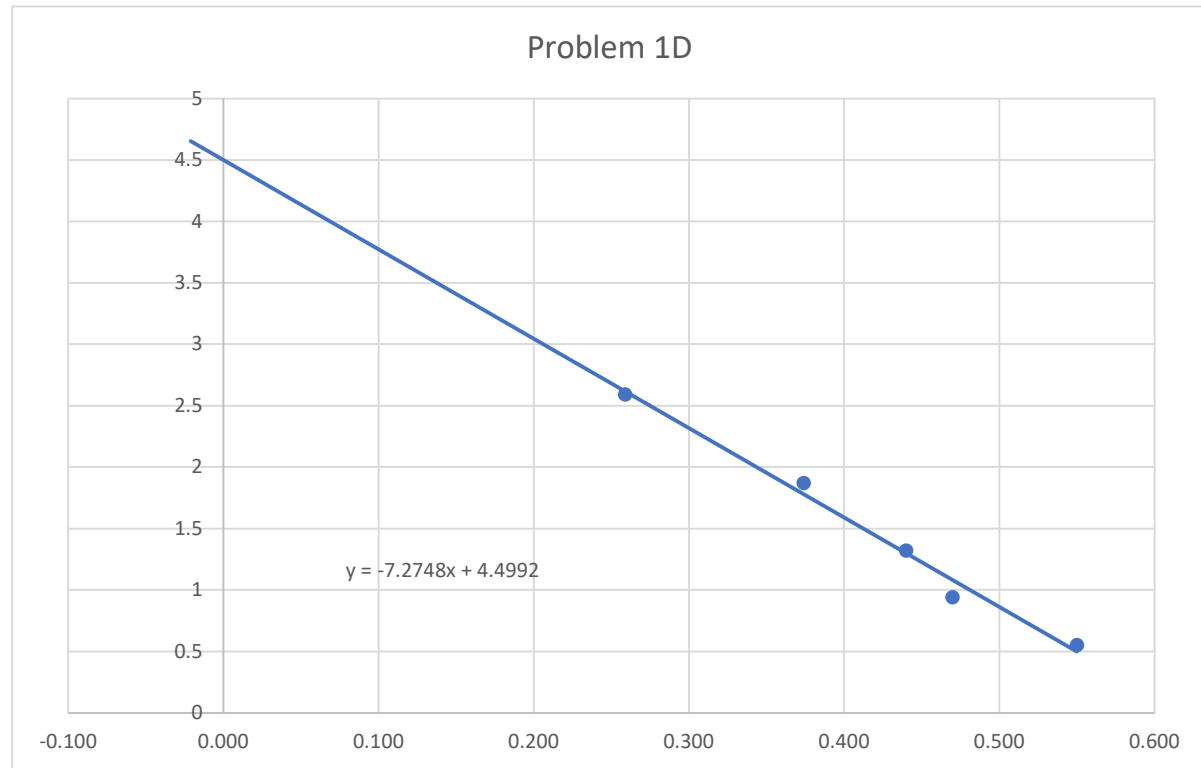
SO, $S_0 - S + K_m \ln(S_0/S) = V_{\text{MAX}} t$

$$15 - S + 7.27 \ln(15/S) = (1.29)(5)$$

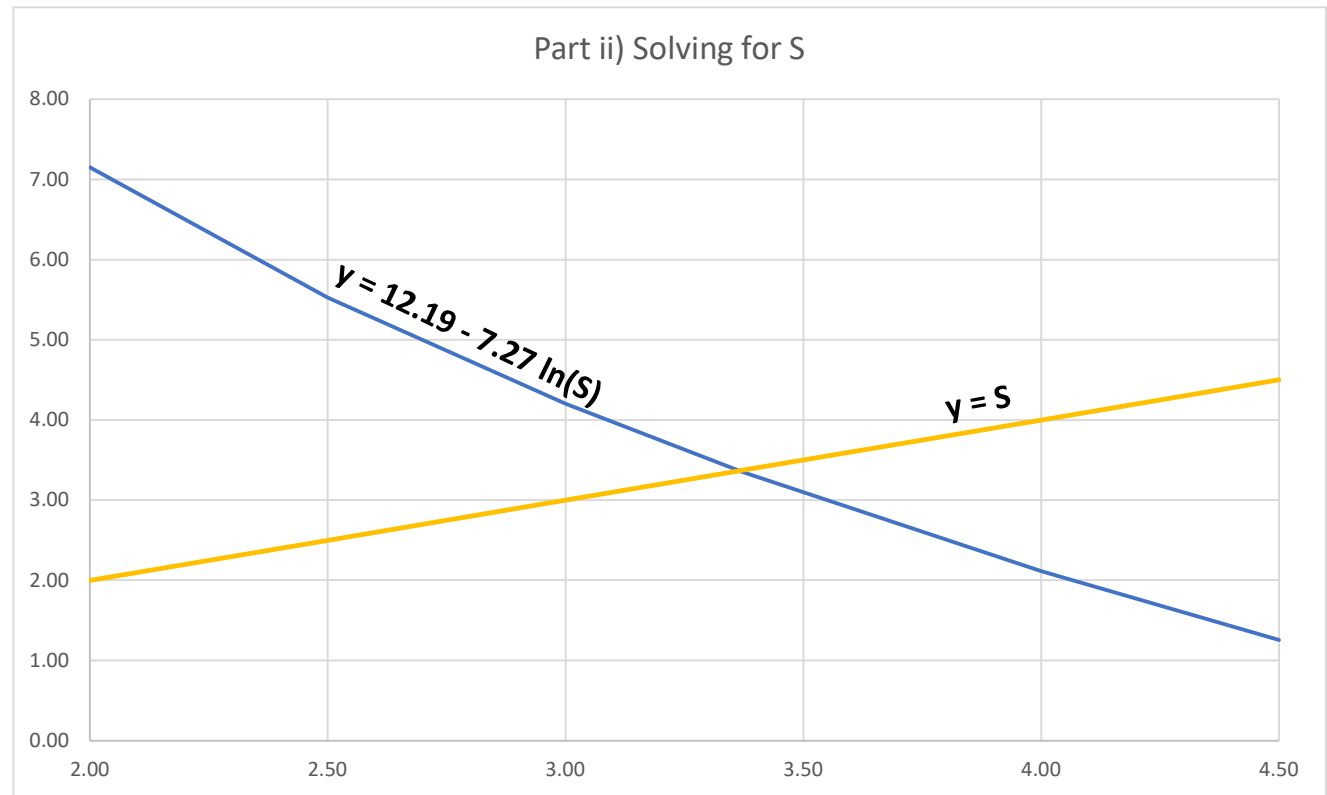
$$28.24 - 7.27 \ln(S) = S$$

$$\text{FROM PLOT } \underline{\underline{S = 10.9 \text{ mM}}}$$

Substrate (mM)	v (mM/min)	v/S (1/min)	v (mM/min)
1.0	0.55	0.550	0.55
2.0	0.94	0.470	0.94
3.0	1.32	0.440	1.32
5.0	1.87	0.374	1.87
10.0	2.59	0.259	2.59



S	$12.19 - 7.27 \ln(S)$
2.00	7.15
2.50	5.53
3.00	4.20
3.36	3.38
3.37	3.36
4.00	2.11
4.50	1.26



S	28.24 - 7.27 ln(S)
9.00	12.27
9.50	11.87
10.00	11.50
10.50	11.15
10.88	10.89
11.00	10.81
11.50	10.48

