Question 8

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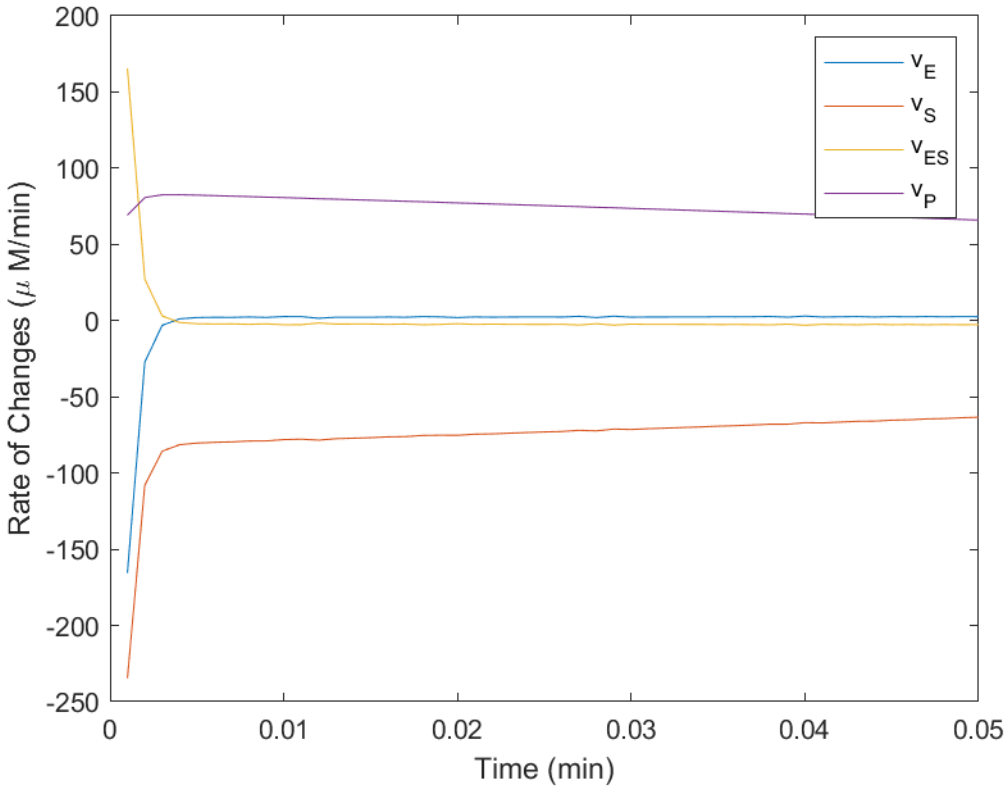
8.1

$$
\begin{aligned}
v_E &= -k_1[E][S] + k_2[ES] + k_3[ES] \\
v_S &= -k_1[E][S] + k_2[ES] \\
v_{ES} &= k_1[E][S] - k_2[ES] - k_3[ES] \\
v_P &= k_3[ES]
\end{aligned}
$$

where $[\cdot]$ denotes concentration.

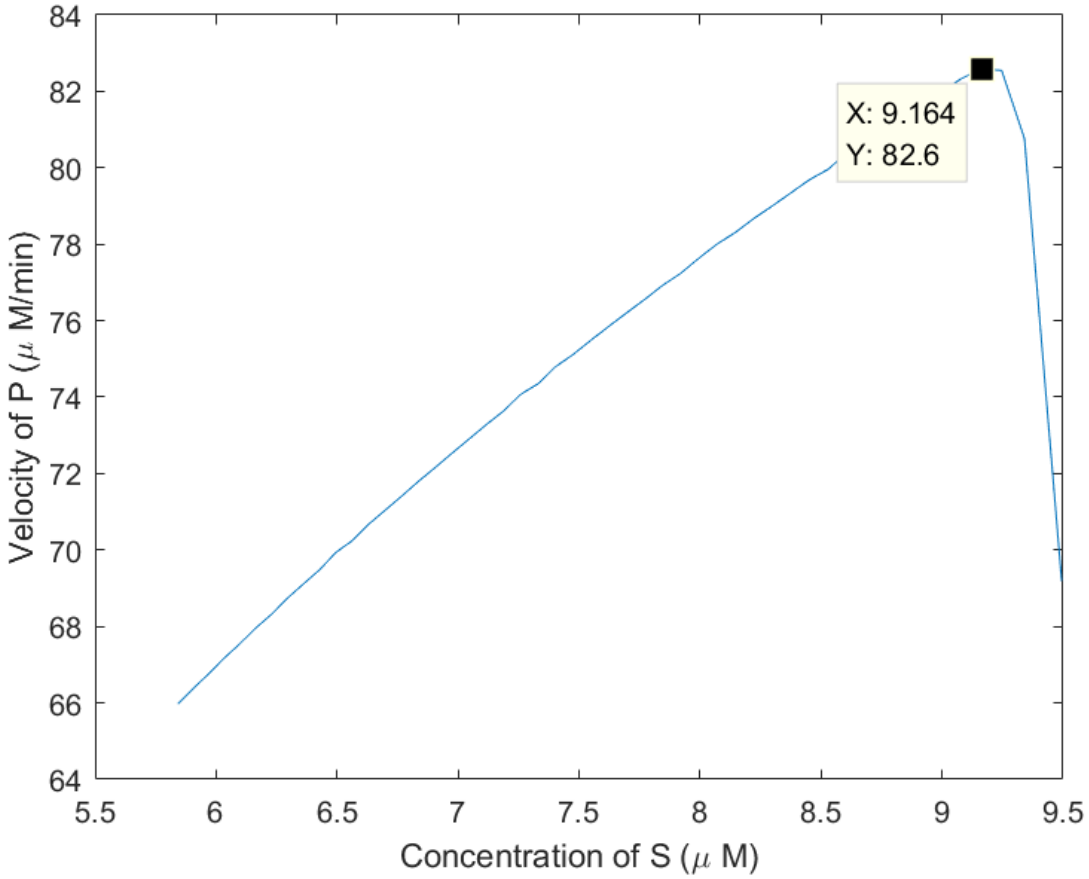
8.2

The calculated rates of changes for E, S, ES, and P versus time is shown below.



8.3

The velocity V versus the concentration of S is shown below.



We can see that when the concentrations of S are small, the velocity V increases approximately linearly. As is pointed out in the plot, the velocity V saturates to a maximum value $V_m = 82.6\ \mu M/min$.