Question 2: Enzyme Kinetics

1. According to the law of mass action, we have four equations for the rate of changes below:

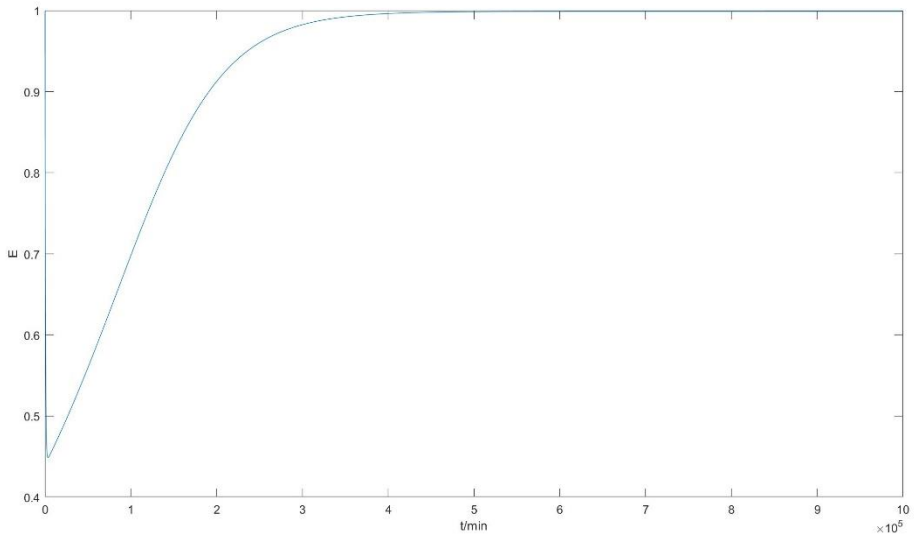
$$\frac{\mathrm{d[ES]}}{\mathrm{dt}} = k_1[E][S] - (k_2 + k_3)[ES]$$

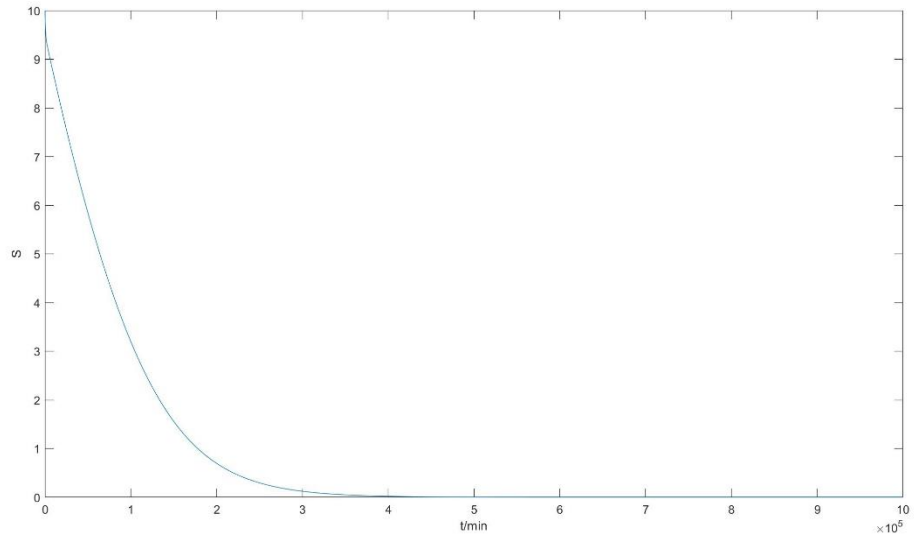
$$\frac{\mathrm{d[E]}}{\mathrm{dt}} = (k_2 + k_3)[ES] - k_1[E][S]$$

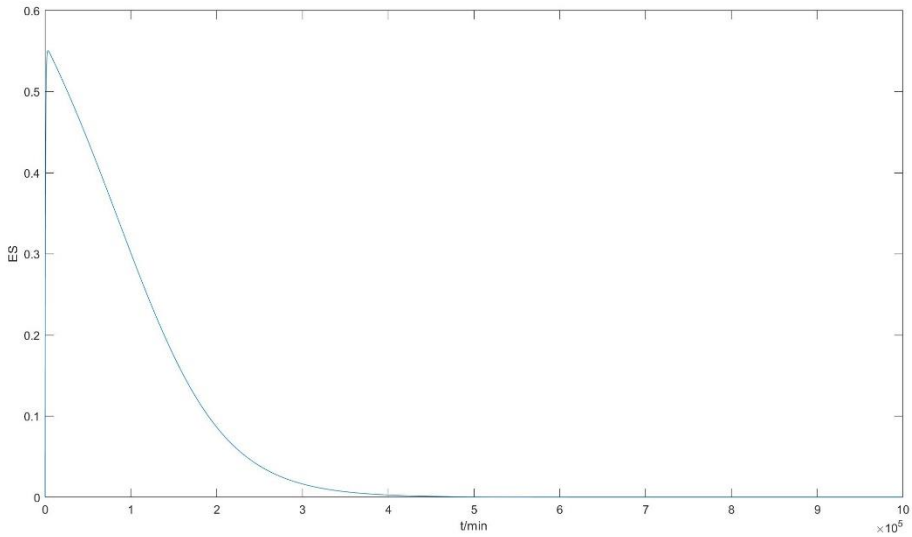
$$\frac{\mathrm{d[S]}}{\mathrm{dt}} = k_2[ES] - k_1[E][S]$$

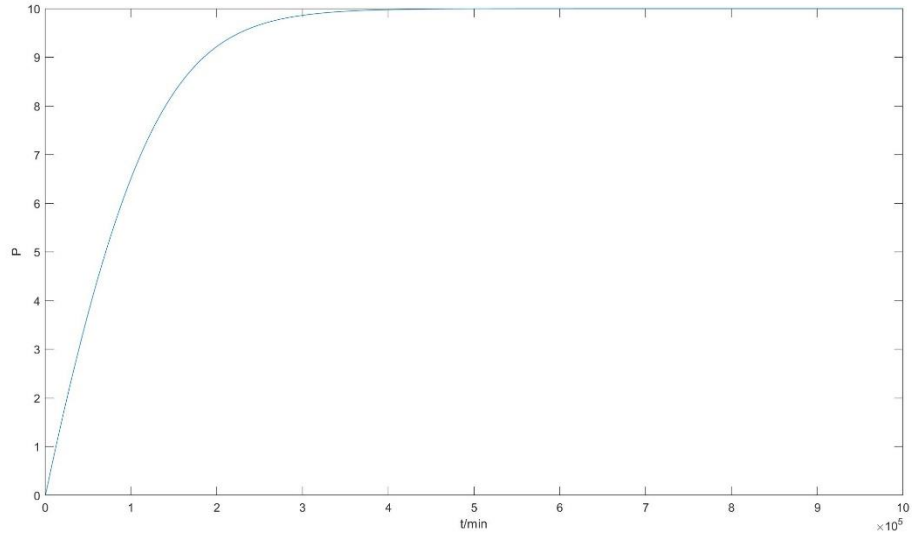
$$\frac{\mathrm{d[P]}}{\mathrm{dt}} = k_3[ES]$$

2. The solutions and figures of E, S, ES, and P are as follow:









3. The V_m is approximately 82.6 μm/min.