



(1) rate of changes:

$$V_s = -k_1[E][S] + k_2[ES]$$

$$V_E = -k_1[E][S] + (k_2 + k_3)[ES]$$

$$V_{ES} = k_1[E][S] - (k_2 + k_3)[ES]$$

$$V_P = k_3[ES]$$