

The reaction can be separated into three reactions:



SD

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

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

$$\frac{d[S]}{dt} = r_b - r_a = k_2 C(ES) - k_1 C(E) C(S)$$

$$\frac{d[P]}{dt} = k_3 C(ES)$$