



and



The final product P_3 is formed by the spontaneous reaction of P_1 and P_2 :



Reactions 1 and 2 occur only at the surface and reaction 3 is a homogeneous reaction occurring throughout the bulk liquid phase.

Figure 3.P2 gives the predicted reaction-rate dependence of reaction 1 (bottom curve) alone and reaction 2 (top curve) alone based on the measured amount of each enzyme immobilized and assuming the intrinsic reaction kinetics are not altered in the process of immobilization.

- a. If $k_L = 6 \times 10^{-5}$ cm/s and the bulk concentration of substrate is 500 mg/l, what is the *total* rate of substrate disappearance?
- b. What is the overall effectiveness factor under the conditions of part a?
- c. What will be the ratio of P_2 to P_1 under the conditions of part a?
- d. If you want to produce equimolar amounts of P_1 and P_2 and if $k_L = 6 \times 10^{-5}$ cm/s, what value of bulk substrate concentration must you pick?