3.8. Assume that for an enzyme immobilized on the surface of a nonporous support material the external mass transfer resistance for substrate is not negligible as compared to the reaction rate. The enzyme is subject to substrate inhibition (eq. 3.34).

a. Are multiple states possible? Why or why not?

b. Could the effectiveness factor be greater than one?

3.9. The following data were obtained for an enzyme-catalyzed reaction. Determine V_{max} and K_m by inspection. Plot the data using the Eadie–Hofstee method and determine these constants graphically. Explain the discrepancy in your two determinations. The initial rate data for the enzyme-catalyzed reaction are as follows:

[S] mol/l	v μmol/min
5.0×10^{-4}	125
2.0×10^{-4}	125
6.0×10^{-5}	121
4.0×10^{-5}	111
3.0×10^{-5}	96.5
2.0×10^{-5}	62.5
1.6×10^{-5}	42.7
1.0×10^{-5}	13.9
8.0×10^{-6}	7.50

Do these data fit into Michaelis–Menten kinetics? If not, what kind of rate expression would you suggest? Use graphical methods.

3.10. a. H. H. Weetall and N. B. Havewala report the following data for the production of dextrose from corn starch using both soluble and immobilized (azo-glass beads) glucoamylase in a fully agitated CSTR system.

1. Soluble data: $T = 60°C$, $[S_0] = 168$ mg starch/ml, $[E_0] = 11{,}600$ units, volume = 1000 ml.
2. Immobilized data: $T = 60°C$, $[S_0] = 336$ mg starch/ml, $[E_0] = 46{,}400$ units initially, immobilized, volume = 1000 ml.

	Product concentration (mg dextrose/ml)	
Time (min)	Soluble	Immobilized
0	12.0	18.4
15	40.0	135
30	76.5	200
45	94.3	236
60	120.0	260
75	135.5	258
90	151.2	262
105	150.4	266
120	155.7	278
135	160.1	300
150	164.9	310
165	170.0	306
225	—	316
415	—	320