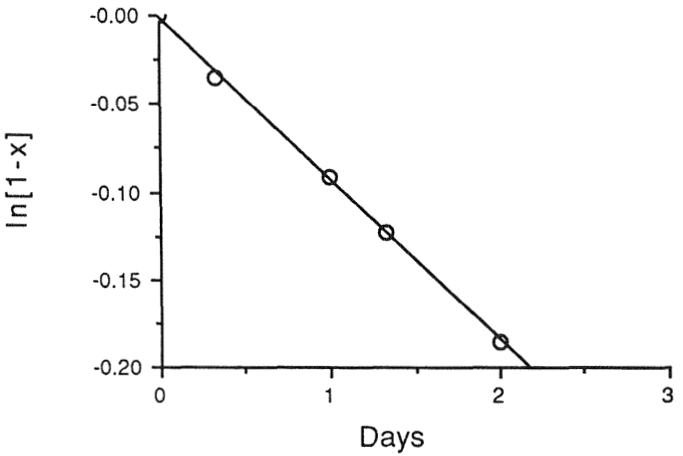

Fig. 13 Data in Fig. 12 treated as first order.

In general it is not possible to distinguish between a reaction of the type described by Eq. 38 and a first-order reaction. Only with excellent precision, with a fairly large number of assays, and with a sufficiently large decomposition will it be possible to distinguish between the two. The data in Fig. 12 are shown treated as first order in Fig. 13.

7. DIFFUSION CONTROLLED INTERACTIONS

Figure 14a shows a situation where a solid, A, is in contact with another solid, B. The contact area is assumed to be 1 cm^2. It is assumed that A can react with B in this situation, i.e.,

$$A + B \rightarrow C \tag{6.39}$$

As the reaction proceeds (Fig. 14b), decomposition product, C, will accumulate between A and B, and at a given time t, compound A must diffuse to the surface of compound B through a layer of compound C, h cm thick, in order for the reaction to take place. The density of B is denoted ρ. A layer of B h cm thick would contain $h\rho$ g of B, and hence

$$\frac{dB}{dt} = D\frac{dh}{dt} \tag{6.40}$$

By Fick's first law, dB/dt is inversely proportional to h, so that we may write

$$\rho\frac{dh}{dt} = \frac{q}{h} \tag{6.41}$$

or

$$h \cdot dh = \left[\frac{q}{\rho}\right]dt \tag{6.42}$$