2.1 IN VITRO SKIN DIFFUSION MODELS IN PERCUTANEOUS ABSORPTION

We consider first the mathematical models associated with solute penetration through excised skin. The simplest of these models is when a well-stirred vehicle of infinite volume is applied to the stratum corneum (SC) and the solute passes into a receptor sink (Figure 2.2A). The complexity of the model increases when the vehicle volume is finite (Figure 2.2B), when the receptor is no longer a sink (Figure 2.2C), and when the vehicle cannot be considered well-stirred (Figure 2.2D). We examine each of these models in terms of expressions for amount penetrating, flux, and, where possible, summary parameters such as mean absorption time, normalized variance, peak time for flux, and maximum flux.

2.1.1 In Vitro Skin Permeability Studies with a Constant Donor Concentration and Sink Receptor Conditions

Most in vitro skin permeability studies are carried out assuming that both (1) the concentration of solute in a vehicle applied to the skin and (2) the sink conditions provided by the receptor remain constant

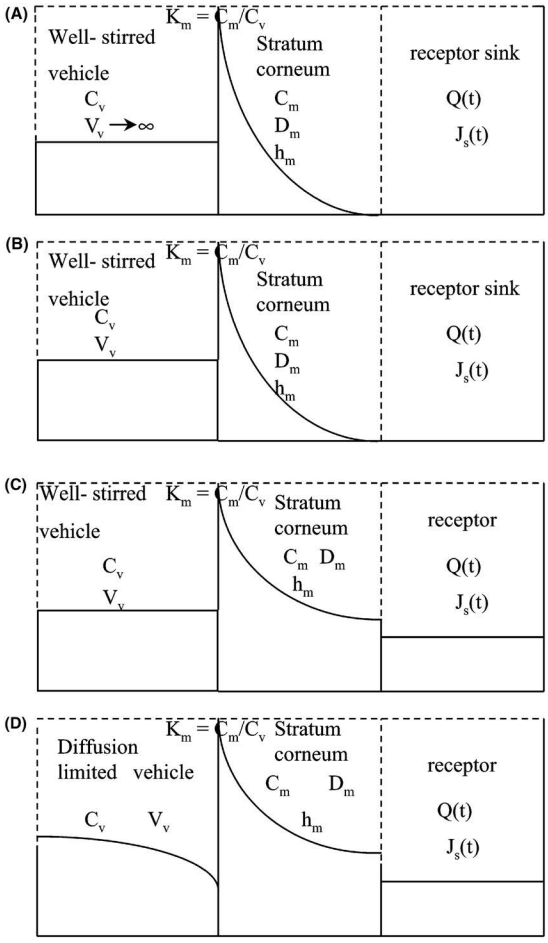

FIGURE 2.2 In vitro skin models of transport. (A) Well-stirred vehicle containing solute concentration C_v in volume V_v (where $V_v = \infty$) adjacent to assumed homogenous SC with solute concentration C_m at distance x from applied vehicle. Solute moves with a diffusion coefficient D_m over an effective path length h_m and penetrates into a receptor sink to give an amount penetrated $Q(t)$ in time t or flux $J(t)$. (B) as for (A), but with V_v finite. (C) as for (B), but the receptor is not a sink. (D) as for (B) but the vehicle is not well-stirred.