and r'' can also be estimated within the integral. The coefficient $K(x)$ is related to the local concentration, $C(x)$, and the oxygen concentration in the aqueous phase equilibrated with air, $C_w(\text{air})$, by the equation $K(x) = C(x)/C_w(\text{air})$. Eq. **3** becomes

$$P_M = \frac{1}{A \times C_w(\text{air})} \left[\int_0^h \frac{dx}{W(x)} \right]^{-1}, \qquad [4]$$

where h is the entire thickness of the lipid bilayer. Eq. **4** allows us to evaluate permeability coefficients in terms of experimental observables $W(x)$ and values of $C_W(\text{air})$ taken from published tables. This method is based on the profile of the local oxygen transport parameter across the membrane and does not require formation of an oxygen gradient. Several attempts have previously been made to obtain the oxygen permeability of erythrocyte membranes by creating an oxygen gradient by rapid mixing, but they were not successful because the presence of a thick (≈ 2 μm) unmixed water layer on the cell surface prevented immediate contact of oxygenated solution with the erythrocyte membrane (9–11).