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Coagulation Rate Studies of Spinnable Chitosan Solutions

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[Article in *J. Appl. Polym. Sci.,* **66,** 117 (1997)]

The authors regret that some errors were made in the theoretical text of this article. They apologize for the inconvenience and offer the following corrected paragraphs, which replace the corresponding, erroneous paragraphs appearing in the second column of page 121 of the original article.

In order to arrive at a solution to eqs. (2a) and (2b), the following assumptions are made:

i. That the solidification of chitosan in acetic acid involves an acid/base reaction and the resulting production of water. This mechanism has been outlined above in the Introduction section. The production of water was further evidenced by the swelling of the polymer samples during the coagulation step, and the subsequent reduction in volume if the samples were allowed to air dry.
ii. That there is no diffusion of the acid, or proton, from the liquid core through the solidified polymer. The OH^- ions migrate (i.e., from outside the sample) through the solidified layer to the boundary where solid polymer meets liquid polymer. There, the anions react with the proton to precipitate solid polymer. So then, while the OH^- ions diffuse through the solid polymer to the boundary, the H^+ ions likely do not diffuse out of the liquid center at all. Instead, they only make it as far as the boundary, where they instantaneously react with the anions. This supposition is based on the fact that the concentration of the coagulant (1*M* KOH) is greater than that of the solvent (0.33*M* CH_3COOH).

Based on these assumptions, the acid, component b, is not diffusing out of the polymer at all. If this is the case, then the rate of diffusion of component b, D_b in eq. (2b), is so small that it is considered to be negligible, and thus the boundary conditions for solving eq. (2a) are as follows:

$$C(0,\ t) = C_{a,0} \quad C(\varepsilon,\ t) = 0 \quad C(x,\ 0) = 0$$

Based on these boundary conditions, the solution to eq. (2a) is

$$C_{a,0} - C_a/C_{a,0} = \mathrm{erf}[\varepsilon/(2(tD)^{1/2})] \tag{3}$$

where $C_{a,0}$ is the initial and known concentration of component a, C_a is the concentration of a at some distance x from the surface of the sample, and ε has been substituted for x to consider diffusion at the boundary.[10]

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Journal of Applied Polymer Science, Vol. 73, 2299 (1999)
 CCC 0021-8995/99/112299-01