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Numerical modeling of reaction diffusion transport into a core-shell geometry AMELIA A. BROWN, SCOTT P. BECKMAN, Washington State University — Cellular microencapsulation technology holds great promise for the treatment of several diseases including type one diabetes. The development of this technology requires an understanding of mass transport through semipermeable membranes and reactive materials. A non-dimensional Fickian diffusion model is developed that describes the transport of reagents into a core-shell structure similar to that of cells encapsulated in a protective polymer coating. The exterior is treated as an inert protective barrier and the interior is treated as a reactive, cellular, medium. The consumption of reagent is described using Michaelis-Menten kinetics. The model is solved numerically using the shooting method and the Runge-Kutta fourth order method. The resulting non-dimensional concentration curves show a competition between the diffusion and consumption of the diffusing species. The range within parameter phase space in which cellular life is maintained, is determined.

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None

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