

Abstract Submitted
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Effective molecular diffusion coefficient in a two-phase gel medium CHRISTINE KINGSBURRY, GARY W. SLATER, University of Ottawa — Our group has previously derived a mean-field expression for the effective diffusion coefficient of a probe molecule in a two-phase medium consisting of a hydrogel with large gel-free solvent inclusions. The diffusion coefficient is expressed in terms of the homogeneous diffusion coefficient in the gel and in the solvent, the gel concentration, the relative volume of the inclusions and the viscosities of the two phases. The expression was compared with exact numerical lattice calculations and was found to provide remarkably accurate predictions. The work presented here is an extension of the previously described study. The goal is to investigate more characteristics of a two-phase medium using further exact numerical calculations and then bring everything into one final expression. Some of the parameters we now include are the possible presence of gel fibers inside the inclusions, the local affinity effects (attractive obstacles) and the interfacial effects between the two phases. This work provides robust grounds for the modeling and design of multiphase systems for specific applications, e.g., phase-separated hydrogels as novel food agents or efficient drug-delivery platforms.

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