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Kramers' Problem: Investigating Reaction Rate Theory Using DNA in Nanofluidic Devices[1] ELIJAH SHELTON, JACKSON DEL-BONIS O'DONNELL, DEREK STEIN[2], Brown University — Kramers' kinetics is the standard theoretical framework for understanding the rates of thermally activated processes. Despite its long history and established place in fields such as chemistry, the theory's prediction of viscosity-dependent rates has been left largely unexplored. We have studied the transport of a biological polymer (Lambda DNA) across a nanofluidic device with a linear array of nanopits, which present a series of free-energy barriers analogous to those that govern chemical reaction rates. By demonstrating the important role of viscosity in this model system, we call attention to viscosity's role in other thermally activated processes.

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