

Can auxiliary sites accelerate enzymatic reactions?

Hila Katznelson and Saar Rahav

*Schulich Faculty of Chemistry, Technion - Israel Institute of Technology, Technion City, Haifa
3200008, Israel*

Recent work suggests that inactive binding sites may play a role in the kinetics of molecular machines and motors. We study if the rate at which fuel molecules reach a catalytic site and react there can be enhanced by the presence of nearby auxiliary sites. A simple model of the flow of molecules from a reservoir to the site is defined, and its steady state is analyzed. Two possible mechanisms of rate acceleration have been identified. In the first the auxiliary site stores a fuel molecule and releases it when the nearby active site is empty. In the second mechanism, the escape of molecules from the active site is blocked. Our results demonstrate an interesting and largely unexplored out-of-equilibrium phenomenon.