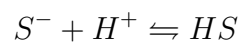


**Problem 1:**    pH-dependence of enzyme activity

We consider an enzymatic reaction where the substrate can be in two protonation states



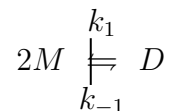
and the enzyme reacts only with the deprotonated form



Calculate the reaction rate as a function of the proton concentration  $c_{H^+}$

**Problem 2:**    Transition from double helix to single strand

Consider the reaction scheme



where M denotes the single-stranded form and D the double helical form. Calculate the half period  $\tau$  as a function of the total concentration  $c_T = 2c_D + c_M$