Table 4 Rate constants used by Thorneley and Lowe in the simulation of the kinetics of Kp nitrogenase at 23°, pH 7.4*

Rate constant	Value	Comment
k_1	[a] $5 \times 10^7\ M^{-1}\ s^{-1}$	Responsible for dilution effect
k_{-1}	[a] $15\ s^{-1}$	
k_2	$200\ s^{-1}$	Electron transfer coupled to MgATP hydrolysis
k_3	[a] $4.4 \times 10^6\ M^{-1}\ s^{-1}$	Responsible for inhibition at high protein concentrations
k_{-3} [b]	[a] $6.4\ s^{-1}$	Rate limiting when Kp2 and substrates are saturating
k_4	$3.0 \times 10^6\ M^{-1}\ s^{-1}$	Rate of reduction of $Kp2_{ox}$(MgADP)2 by $SO_2^{\cdot -}$
k_5	[a] $4.4 \times 10^6\ M^{-1}\ s^{-1}$	Responsible for inhibition of H_2 evolution when MgATP but not reductant is limiting
k_{-5}	[a] $6.4\ s^{-1}$	
k_6	$1.2 \times 10^9\ M^{-1}\ s^{-1}$	$S_2O_4^{2-} \underset{k_6}{\overset{k_{-6}}{\rightleftharpoons}} 2SO_2^{\cdot -}$
k_{-6}	$1.75\ s^{-1}$	
k_7	[b] $250\ s^{-1}$	Responsible for enhanced H_2 evolution at low e^- flux
k_8	[b] $8.0\ s^{-1}$	Slow in order to maximize N_2 binding to E_3
k_9	[b,c] $400\ s^{-1}$	Rapid H_2 evolution from the most reduced hydridic species
k_{10}	$4 \times 10^5\ M^{-1}\ s^{-1}$	Determined from $K_m^{N_2}$ at low e^- flux
k_{-10}	$8 \times 10^4\ M^{-1}\ s^{-1}$	Determined from $K_i^{H_2}$ at low e^- flux
k_{11}	[c] $2.2 \times 10^6\ M^{-1}\ s^{-1}$	Determined from $K_m^{N_2}$ at high e^- flux
k_{-11}	[c] $3 \times 10^6\ M^{-1}\ s^{-1}$	Determined from $K_i^{H_2}$ at high e^- flux

* Reproduced from Reference 144.

[a] Kp1–Kp2 association-dissociation rates assumed to be independent of Kp1 oxidation level.

[b] H_2 evolution rates. These depend on small differences between large numbers and are subject to errors of factors of about two.

[c] Since these rate constants determine K_m's and K_i's, only their ratios are absolute values.

Note: The difference between the values of some of the rate constants shown and those reported previously are due to the more accurate determination of k_1.