

4 Comparison of the autocatalytic rates of different histidine kinases

Table S3 lists experimental values from the literature for the autocatalytic rates of different histidine kinases involved in bacterial two-component signaling systems. CheA is much faster than all of these, with an autocatalytic rate $k_{\text{cat}}^A = 2.6 \times 10^{-2}$ /s in *E. coli* (26) and $k_{\text{cat}}^A = 0.24$ /s in *S. typhimurium* (27) when isolated, and $k_{\text{cat}}^A = 23$ /s in *S. typhimurium* (27) when in complex with chemoreceptors and CheW.

Table S3: Autocatalytic rate k_{cat} for various histidine kinases (from different bacteria).

Organism	Function	Histidine kinase	k_{cat} (/s)	Ref.
<i>Enterococcus faecium</i>	Antibiotic resistance	VanS	2.83×10^{-3}	(28)
<i>Bacillus subtilis</i>	Sporulation	KinA	1.90×10^{-3}	(29)
<i>Bacillus subtilis</i>	Cold shock response	DesK	2.80×10^{-3}	(30)
<i>Thermotoga maritima</i>		HpkA	4.23×10^{-4}	(31)
<i>Streptococcus pneumoniae</i>	Virulence, etc.	WalKSpn (C)-His	1.40×10^{-3}	(32)
<i>Streptococcus pneumoniae</i>	Virulence, etc.	WalKSpn (N)-Sumo	3.60×10^{-3}	(32)
<i>Escherichia coli</i>	Response to nitrite	NarX	5.00×10^{-5}	(33)
<i>Escherichia coli</i>	Response to nitrate	NarQ	2.20×10^{-4}	(33)
<i>Synechocystis</i>	Light signaling system	Cph1 holo	2.00×10^{-4}	(34)
<i>Synechocystis</i>	Light signaling system	Cph1 apo	3.00×10^{-4}	(34)
<i>Myxococcus xanthus</i>	Aggregation; sporulation	RodK	1.67×10^{-4}	(35)

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