

Table S3: Q₁₀ values for enzyme-catalyzed reactions. When available, kinetics are presented for different substrates of the enzyme.

Thermophilic Enzyme	Organism	Q ₁₀ ^{mea}	k _{cat} /K _m Q ₁₀	Low temperature (T ₁)				High temperature (T ₂)				references
				[°C]	k _{cat} ^a [s ⁻¹]	K _m ^a [μM]	k _{cat} /K _m ^a [s ⁻¹ M ⁻¹]	[°C]	k _{cat} ^a [s ⁻¹]	K _m ^a [μM]	k _{cat} /K _m ^a [s ⁻¹ M ⁻¹]	
3-phosphoglycerate kinase (PGK)	<i>Thermoanaerobacter sp. R18.G4</i>	1.29	1.17	40	690 ^b	0.04	8.4 × 10 ⁵ b	68	1558 ^b	1200 ^b	1.3 × 10 ⁶ b	[32]
Indoleglycerol phosphate synthase (IGPS)	<i>Sulfolobus solfataricus</i>	2.71	2.54	25	0.03	0.04	7.5 × 10 ⁵	60	0.98	0.05	2.0 × 10 ⁷	[33]
Indoleglycerol phosphate synthase (IGPS)	<i>Thermotoga maritima</i>	2.63	1.41	25	0.11	0.006	1.8 × 10 ⁷	60	3.24	0.053	6.1 × 10 ⁷	[34]
Phosphoribosyl anthranilate isomerase (tPRAI)	<i>Thermotoga maritima</i>	1.95	1.49	25	3.7	0.28	1.3 × 10 ⁷	60	38.5	0.73	5.2 × 10 ⁷	[35]
β-glucosidase (CelB)	<i>Pyrococcus furiosus</i>	1.93	1.71	20	13	52 × 10 ³	250	90	1300	120 × 10 ³	1.1 × 10 ⁴	[16]
		1.70	1.83	20	16	23 × 10 ³	700	90	670	14 × 10 ³	4.8 × 10 ⁴	"
		2.22	1.67	20	9.1	0.7 × 10 ³	1.3 × 10 ⁴	90	2400	5.0 × 10 ³	4.8 × 10 ⁵	"
Adenylate kinase (Adk)	<i>Aquifex aeolicus</i>	1.58	N/A	24	47.6 ^b	N/A	N/A	91	1030.3 ^b	N/A	N/A	[36]
3-Isopropylmalate dehydrogenase (IPMDH)	<i>Sulfolobus tokodaii</i>	2.14	1.96	40	0.7	4.2	1.7 × 10 ⁵	70	6.9	5.5	1.3 × 10 ⁶	[37]
Hypoxanthine-guanine phosphoribosyltransferase (HPRT)	<i>Pyrococcus Horikoshii</i>	2.03	1.75	40	0.38	3.88	9.7 × 10 ⁴	70	3.16	6.10	5.2 × 10 ⁵	[38]
		1.66	1.75	40	0.66	42	1.6 × 10 ⁴	70	3.05	36.9	8.3 × 10 ⁴	"
		2.60	3.17	50	0.21	4.8	4.4 × 10 ⁴	70	1.43	3.26	4.4 × 10 ⁵	"
		1.80	1.86	50	0.68	101	6.7 × 10 ³	70	2.20	95	2.3 × 10 ⁴	"
Xylose isomerase (xyIA)	<i>Thermotoga neapolitana 5065</i>	1.81	0.82	60	3.02	15.1 × 10 ³	2.0 × 10 ²	90	24.15	260.7 × 10 ³	9	[39]
D-Xylose isomerase	<i>Arthrobacter strain N.R.R.L. B3728</i>	2.05	2.09	30	2.32	225 × 10 ³	10.3	60	19.87	210 × 10 ³	94.6	[40]
		2.31	2.03	30	1.67	170 × 10 ³	9.8	60	20.45	250 × 10 ³	81.8	"
Triosephosphate isomerase (TIM)	<i>Thermotoga maritima</i>	3.87	4.09	20	0.005	3.6 × 10 ³	1.39	80	16.83	2.6 × 10 ³	6.5 × 10 ³	[41]
Mannosylglycerate synthase (MGS)	<i>Rhodothermus marinus</i>	1.56	1.53	25	1.02	81.2	12.6 × 10 ³	65	6.10	89.4	68.2 × 10 ³	[42]
		1.15	1.12	25	0.63	124.9	5.0 × 10 ³	65	1.10	138.6	7.9 × 10 ³	"
		1.59	1.68	25	1.02	121.9	8.4 × 10 ³	65	6.50	96.5	67.3 × 10 ³	"
Esterase 2 (EST2)	<i>Alicyclobacillus acidocaldarius</i>	1.72	1.58	25	30.00	3.0	1.0 × 10 ⁷	70	340.00	4.3	7.8 × 10 ⁷	[43]
Carboxylesterase	<i>Bacillus acidocaldarius</i>	1.18	1.72	37	830.00	196.0	4.2 × 10 ⁶	60	1226.00	82.8	14.8 × 10 ⁶	[44]
		1.31	1.51	37	904.00	98.3	9.2 × 10 ⁶	60	1669.00	70.5	23.7 × 10 ⁶	"
		1.33	1.35	37	1074.00	80.0	13.4 × 10 ⁶	60	2054.00	16.6	26.8 × 10 ⁶	"
		1.32	0.82	37	908.00	12.6	72.1 × 10 ⁶	60	1707.00	37.5	45.5 × 10 ⁶	"
		1.11	0.82	37	692.00	16.5	41.9 × 10 ⁶	60	881	33.5	26.3 × 10 ⁶	"
Orotidine 5'-Monophosphate decarboxylase	<i>Methanothermobacter thermoautotrophicus</i>	2.33	1.59	5	0.64	1.1	6 × 10 ⁵	55	44	7.21	6.1 × 10 ⁶	[23]
DNA ligase	<i>Thermus scotoductus</i>	1.81	N/A	29	0.006 ^b	N/A	N/A	53	0.025 ^b	N/A	N/A	[45]
Lactate Dehydrogenase	<i>Thermus thermophilus</i>	1.77	N/A	65	190.5 ^b	N/A	N/A	90	829 ^b	N/A	N/A	[11]
Average (SD)		1.88 (0.69)	1.64 (0.76)									
Mesophilic Enzyme	Organism	Q ₁₀ ^{mea}	k _{cat} /K _m Q ₁₀	Low temperature (T ₁)				High temperature (T ₂)				references
				[°C]	k _{cat} ^a [s ⁻¹]	K _m ^a [μM]	k _{cat} /K _m ^a [s ⁻¹ M ⁻¹]	[°C]	k _{cat} ^a [s ⁻¹]	K _m ^a [μM]	k _{cat} /K _m ^a [s ⁻¹ M ⁻¹]	
endonuclease I	<i>Vibrio cholerae</i>	2.67	2.60	5	1.03	0.118	8.73 × 10 ⁶	37	32.1	0.174	1.85 × 10 ⁹	[46]
Bovine serum amine oxidase (BSAO)	<i>Ox</i>	1.98	1.96	5	0.1 ^b	660 ^b	151.51 ^b	60	4.35 ^b	700 ^b	6214.3 ^b	[47]
cytidine deaminase	<i>Escherichia coli</i>	1.53	1.07	7	4.95 ^b	N/A	601.9 (at 20°C) ^b	35	15.9 ^b	N/A	735.1 (at 50°C) ^b	[27]
Orotidine 5'-Monophosphate decarboxylase	<i>Saccharomyces cerevisiae</i>	1.92	1.25	5	3.1	1.15	2.7 × 10 ⁶	50	59	7.9	7.5 × 10 ⁶	[23]
DNA ligase	<i>Escherichia coli</i>	2.45	N/A	11	0.002	N/A	N/A	49	0.015	N/A	N/A	[10]
glutamate dehydrogenase	<i>Ox</i>	2.39	N/A	5	0.93	N/A	N/A	35	12.68	N/A	N/A	[48]
alpha-amylase	<i>Bacillus amyloliquefaciens</i>	2.15	N/A	6	6 ^b	N/A	N/A	60	375 ^b	N/A	N/A	[49]
Aspartate aminotransferase	<i>Escherichia coli</i>	1.69	N/A	6	10 ^b	N/A	N/A	75	380 ^b	N/A	N/A	[50]
beta-galactosidase	<i>Escherichia coli</i>	1.80	N/A	5	100 ^b	N/A	N/A	50	1400 ^b	N/A	N/A	[51]
Lactate Dehydrogenases	<i>Deinococcus radiodurans</i>	1.83	N/A	16	101.5 ^b	N/A	N/A	50	773 ^b	N/A	N/A	[11]
Average (SD)		2.04 (0.37)	1.72 (0.70)									
Psychrophilic Enzyme	Organism	Q ₁₀ ^{mea}	k _{cat} /K _m Q ₁₀	Low temperature (T ₁)				High temperature (T ₂)				references
				[°C]	k _{cat} ^a [s ⁻¹]	K _m ^a [μM]	k _{cat} /K _m ^a [s ⁻¹ M ⁻¹]	[°C]	k _{cat} ^a [s ⁻¹]	K _m ^a [μM]	k _{cat} /K _m ^a [s ⁻¹ M ⁻¹]	
cellulase	<i>Pseudoalteromonas haloplanktis</i>	1.93	1.76	4	0.2 ^b	N/A	35 ^b	40	2.15 ^b	N/A	270 ^b	[52]
subtilisin	<i>Bacillus TA39</i>	1.58	1.41	5	32	26	1.23 × 10 ⁶	45	203	42	4.83 × 10 ⁶	[53]
endonuclease I	<i>Vibrio salmonicida</i>	1.65	1.84	5	9.41	0.246	3.83 × 10 ⁶	37	48.4	0.181	2.68 × 10 ⁷	[46]
subtilisin	<i>Bacillus TA41</i>	1.66	N/A	0	10 ^b	N/A	N/A	42	85 ^b	N/A	N/A	[54]
lactate dehydrogenase	<i>chromis punctipinnis</i>	1.79	N/A	5	450 ^b	N/A	N/A	35	2600 ^b	N/A	N/A	[55]
chitinase	<i>Arthrobacter sp. TAD20</i>	1.86	N/A	5	48 ^b	N/A	N/A	30	225 ^b	N/A	N/A	[56]
malate synthase	<i>Cobwellia maris</i>	1.5	N/A	10	39 ^b	N/A	N/A	45	162 ^b	N/A	N/A	[57]
GTP hydrolysis (EF-G)	<i>Pseudoalteromonas haloplanktis</i>	1.82	N/A	5	0.033 ^b	N/A	N/A	45	0.367 ^b	N/A	N/A	[58]
GTP hydrolysis (EF-Tu)	<i>Moraxella sp. Tac II 25</i>	2.69	N/A	10	0.0016 ^b	N/A	N/A	45	0.0053 ^b	N/A	N/A	[59]
DNA ligase	<i>Pseudoalteromonas haloplanktis</i>	2.35	N/A	4	0.01 ^b	N/A	N/A	22	0.021 ^b	N/A	N/A	[10]
glutamate dehydrogenase	<i>Chaenocephalus aceratus</i>	1.64	N/A	5	3.8	N/A	N/A	40	21.5	N/A	N/A	[48]
alpha-amylase	<i>Alteromonas haloplanktis A23</i>	2.26	N/A	4	49 ^b	N/A	N/A	26	296 ^b	N/A	N/A	[49]
Aspartate aminotransferase	<i>Pseudoalteromonas haloplanktis TAC 125</i>	2.07	N/A	10	12 ^b	N/A	N/A	60	364 ^b	N/A	N/A	[50]
beta-galactosidase	<i>Arthrobacter sp. C2-2</i>	1.74	N/A	5	204 ^b	N/A	N/A	40	1410 ^b	N/A	N/A	[51]
ATPase	<i>Pseudoalteromonas haloplanktis</i>	2.98	N/A	10	0.15 ^b	N/A	N/A	30	1.33 ^b	N/A	N/A	[60]
Lactate Dehydrogenase	<i>Champscephalus gunnari</i>	1.34	N/A	5	469 ^b	N/A	N/A	45	1480 ^b	N/A	N/A	[11]
Average (SD)		1.93 (0.44)	1.67 (0.25)									

^a - Data published as numerical values

^b - Data extracted from graphs

^c - Unspecified units

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