Table 1. Catalytic activities and kinetic parameters of enzymes involved in C5 sugar metabolism.

Enzyme	Substrate	*Sulfolobus solfataricus*				*Sulfolobus acidocaldarius*
		Native enzyme (cell extract from xylose-grown cells)		Recombinant enzyme		Native enzyme (cell extract from xylose-grown cells)
		K_M (mM)	Enzyme activity (U/mg protein)	K_M (mM)	V_{MAX} (U/mg protein)	Enzyme activity (U/mg protein)
Xylose dehydrogenase	D-xylose L-arabinose	0.18 0.47	0.41 0.16	0.18 0.50	71 62	0.25
Xylonate dehydratase	D-xylonate L-arabinonate	0.28[b] 0.17[b]	0.08 0.05	nd nd	nd nd	0.024
KDG-aldolase	Pyruvate Glycolaldehyde	2.7[b] 2.0[b]	0.13	2.8[b] 2.9[b]	31[b]	0.07
Aldehyde oxidoreductase (DCPIP)	Glycolaldehyde	0.37	0.14	nd	nd	0.034
Glyoxylate reductase	Glyoxylate $NADH^-$	5.0 0.1	0.54	5.0 0.1	150	0.12
Malate synthase	Glyoxylate Acetyl-CoA	0.05 0.002	0.25	0.06 0.002	14	0.072
Isocitrate lyase	isocitrate	a	a	0.96	8	nd
2,5-dioxopentanoate dehydrogenase ($NADP^-$)	pentanedial	nd	0.1	3.3	35	0.15[c]

Enzyme activities in cell extracts are those measured under V_{max} conditions. Standard errors on all kinetic parameters are <10% of the mean values.

nd no data
a enzyme absent in cell extracts of xylose-grown cells
b these are apparent K_M and V_{max} values due to enzyme inhibition in the presence of high substrate concentration

c The recombinant enzyme of *S. acidocaldarius* was characterized as a homotetramer with subunit M_r values = 52,000. When assayed at 70°C and pH 7.0, V_{max} = 50 U/mg and K_M = 0.14 mM (pentanedial) and 0.04 mM ($NADP^-$). The specific activity with 2,5,dioxopentanoate (12 mM) was 1.5 U/mg. Enzyme activity was 15-fold higher in cells grown on xylose as compared to glucose.