

**Table S5. Net and exchange fluxes during growth on [1,4-<sup>13</sup>C]fumarate.**

Reaction	Wild type				NifA*			
	net flux	90% CI	xch flux	90% CI	net flux	90% CI	xch flux	90% CI
<i>Uptake</i>	50.0	0.0			50.0	0.0		
<i>CS</i>	8.9	0.8			12.1	0.7		
<i>IDH</i>	8.9	0.9			12.1	0.7		
<i>αKDH</i>	2.4	0.2			4.4	0.3		
<i>αKDH2</i>	2.4	0.2			4.4	0.3		
<i>SDH</i>	4.0	0.4			8.2	0.3		
<i>MDH</i>	54.0	1.3			58.2	2.7		
<i>ILy</i>	0.0	0.1	0.5	0, 1.0	0.0	0.2	0	0, 0.5
<i>ILy2</i>	0.0	0.1	0.5	0, 1.0	0.0	0.2	0	0, 0.5
<i>MSyn</i>	0.0	0.1	0.1	0, 0.3	0.0	0.5	0.1	0, 0.1
<i>PK</i>	30.4	2.0			29.9	3.2		
<i>PEPCK</i>	40.0	1.5	10	9, 11	41.4	2.8	20	17, 22
<i>PDH_POR</i>	18.7	1.5	7	0, 41	19.9	1.5	0	0, 3
<i>ME<sub>enz</sub></i>	0.0	1.2			0.0	2.7		
<i>Eno</i>	7.1	1.9	75	70, 81	9.4	1.5	62	55, 70
<i>GAPDH</i>	36.8	10.6			16.5	2.3		
<i>Ald</i>	0.5	5963			-3.5	756		
<i>PGI</i>	1.4	2.4			1.2	4.2		
<i>Rubisco</i>	17.1	6.1			5.6	1.1		
<i>S7Ald</i>	13.7	5967			9.7	756		
<i>OPPP</i>	0.0	2.4			0.0	4.2		
<i>net_CO2</i>	63.1	4.7			83.6	3.4		
<i>TK1</i>	7.0	2.0			2.9	1.5		
<i>TK2</i>	5.8	2.0			1.9	1.5		
<i>TA</i>	7.9	5965			7.8	755		
<i>vAsp</i>	3.4	0.4			3.1	0.4		
<i>vAsp<sub>out</sub></i>	1.4	0.2			1.3	0.2		
<i>vThr</i>	1.2	0.2			1.1	0.2		
<i>vThrou<sub>t</sub></i>	2.1	0.3			1.8	0.3		
<i>vIle<sub>T</sub></i>	0.8	0.1			0.6	0.1		
<i>vIle<sub>C</sub></i>	0.8	0.1			0.7	0.1		
<i>vIle<sub>3</sub></i>	0.8	0.1			0.7	0.1		
<i>vIle<sub>out</sub></i>	0.1	0.0			0.1	0.0		
<i>vVal</i>	1.4	0.2			1.2	0.1		
<i>vVal<sub>2</sub></i>	1.4	0.2			1.2	0.1		
<i>vVal<sub>out</sub></i>	1.2	0.2			1.0	0.2		
<i>vLeu</i>	1.6	0.3			1.3	0.2		
<i>vLeu<sub>out</sub></i>	1.6	0.3			1.3	0.2		
<i>vSer</i>	4.5	0.5			4.0	0.5		
<i>vSer<sub>out</sub></i>	2.0	0.3			1.7	0.3		
<i>vGly</i>	2.6	0.4			2.3	0.3		

<i>vGly_out</i>	2.2	0.4	2.0	0.3
<i>vMet</i>	0.1	0.0	0.1	0.0
<i>vMet_out</i>	0.1	0.0	0.1	0.0
<i>vPhe1</i>	1.1	0.2	0.9	0.2
<i>vPhe2</i>	1.1	0.2	0.9	0.2
<i>vPhe_out</i>	1.1	0.2	0.9	0.2
<i>vG6P_out</i>	1.4	0.2	1.2	0.2
<i>vF6P_out</i>	0.1	0.0	0.1	0.0
<i>vpp_out</i>	1.4	0.2	1.1	0.2
<i>vG3P_out</i>	1.0	0.2	0.9	0.2
<i>vPEP_out</i>	0.4	0.1	0.4	0.1
<i>vE4P_out</i>	0.1	0.0	0.1	0.0
<i>vPyr_out</i>	4.2	0.7	3.6	0.7
<i>vAc_out</i>	7.4	1.3	5.9	1.1
<i>vOAA_out</i>	1.8	0.3	1.6	0.3
<i>vaKG_out</i>	4.2	0.7	3.2	0.6
<i>vS7P_out</i>	0.1	0.0	0.1	0.0
<i>v_AL</i>	0.3	0.0	0.3	0.0
<i>v_BCchl</i>	0.3	0.0	0.3	0.0
<i>v_Pent</i>	0.3	0.1	0.3	0.1
<i>vAL_out</i>	0.1	0.0	0.1	0.0
<i>vBC_out</i>	0.3	0.0	0.3	0.0
<i>vPent_out</i>	0.3	0.1	0.3	0.1
<i>vCl_out</i>	2.5	0.4	2.2	0.3

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Exchange fluxes (xch fluxes; ranging from zero to infinity) that could be determined are shown with non-symmetrical 90% confidence intervals.