

**Table 1** Intracellular metabolite concentrations and turnover time in glucose limited aerobic cultures of several organisms (*Saccharomyces cerevisiae* from [2], *Penicillium chrysogenum* from [3, 4] *E. coli* from [5])

Metabolites	Intracellular level ( $\mu\text{mol/gDW}$ )			Turnover time (s)		
	<i>P. chrysogenum</i>	<i>S. cerevisiae</i>	<i>E. coli</i>	<i>P. chrysogenum</i>	<i>S. cerevisiae</i>	<i>E. coli</i>
<i>Central metabolites</i>						
G6P	4.64	5.2	1.42	23.3	17	3.6
F6P	0.71	1.4	0.38	5.7	7.3	1.2
T6P	0.55		0.13	47.8		NA
M6P	1.95		0.48			NA
6PG	0.25	0.48	0.10	3.7	4.5	1.1
Mannitol-1P			0.99			NA
G3P		0.13	0.17		57	13.1
FBP	0.9	0.64	0.82	7.2	3.2	2.5
F2,6bP	0.01		0.35			NA
2PG+3PG	0.59	2.8	1.65	2.3	6.6	2.5
PEP	0.24	2.3	1.61	0.9	5.7	2.7
Pyruvate	0.22	1.1	0.75	0.9	1.7	1.5
$\alpha$ -Ketoglutarate	2.05		0.31	22.1		0.6
Succinate	0.23	4.0	2.65	3.3	20	8.9
Fumarate	0.65	0.85	0.22	13.0	4.1	0.7
Malate	3.33	7.3	0.94	19.0	30	2.8
<i>Amino acids</i>						
Alanine	21.7	32	1.34	269	3,268	76.7
Asparagine	1.5	4.7	0.58	459	1,142	81.7
Aspartate	16.3	21	2.57	717	577	35.0
Glutamate	53.0	170	74.69	658	1,112	229.0
Glutamine	28.7	64	6.14	1,243	2,401	80.0
Glycine	2.1	2.9	1.51	244	247	31.0
Histidine	0.72	6.0	0.15	432	3,141	53.8
Isoleucine	0.33	1.6	0.11	111	140	12.9
Leucine	0.73	1.0	0.36	131	125	27.1
Lysine	1.2	4.1	1.21	356	619	119.7
Methionine	0.14	0.20	0.05	58.8	66	10.5
Phenylalanine	0.19	1.6	0.13	61.2	430	23.8
Proline	0.95	3.9	0.66	206	925	101.4
Serine	5.7		0.53	453		8.0
Threonine	5.9	4.0	0.47	758	220	29.3
Tryptophan	0.11	0.51	0.02	130	788	11.9
Tyrosine	0.26	1.6	0.18	145	832	44.3
Valine	2.1	10	0.51	243	490	40.9
Ornithine		4.1	0.49		502	49.1
<i>Adenine nucleotides</i>						
ATP	7.39	7.0	5.95	NA	1.4	2.0
ADP	1.03	1.3	2.31	NA	0.25	0.8
AMP	0.27	0.6	0.91	NA	3.1	9.4