**S3 Table. Analytic formulas used to calculate flux ratios in central carbon metabolism for *E. coli* and *B. subtilis* (adapted from Fischer & Sauer 2003).**

|  |  |  |
| --- | --- | --- |
| Flux ratio | Analytic formula for *E. coli* | Analytic formula for *B. subtilis* |
| Glycolysis / Pentose-phosphate pathway | $$F=\frac{BPG\_{13}-N\_{13}}{0.5L\_{13}×0.5N\_{13}-N\_{13}}$$ | $$F=\frac{BPG\_{13}-N\_{13}}{0.5L\_{13}×0.5M\_{13}-M\_{13}}$$ |
| Pyruvate from Entner-Doudoroff pathway | $$F=\frac{PYR\_{13}-BPG\_{13}}{L\_{13}-BPG\_{13}}$$ | n/a |
| Oxaloacetate from anaplerosis | $$\left[\begin{array}{c}F\\F\*CO\_{2}\end{array}\right]=\frac{OAA\_{14}-αKG\_{25}}{\left[\begin{matrix}PEP\_{13}0&αKG\_{25}\\0 PEP\_{13}&PEP\_{13}0\end{matrix}\right]}$$ | $$\left[\begin{array}{c}F\\F\*CO\_{2}\end{array}\right]=\frac{OAA\_{14}-αKG\_{25}}{\left[\begin{matrix}PYR\_{13}0&αKG\_{25}\\0 PYR\_{13}&PYR\_{13}0\end{matrix}\right]}$$ |
| PEP from gluconeogenesis | $$F=\frac{PEP\_{12}-BPG\_{12}}{OAA\_{12}-BPG\_{12}}$$ | $$F=\frac{PEP\_{12}-BPG\_{12}}{OAA\_{12}-BPG\_{12}}$$ |
| Pyruvate from malate | $$F=\frac{PYR\_{23}-PEP\_{23}}{M\_{1}×M\_{1}-PEP\_{23}}$$ | $$F=\frac{PYR\_{23}-PEP\_{23}}{M\_{1}×M\_{1}-PEP\_{23}}$$ |

M1-one carbon molecule labeled according to the substrate labeling

M13-last three carbon molecule labeled according to the substrate labeling

N13-three carbon molecule naturally labeled (C13 natural abundance 1%)

L13- first three carbon molecule fragment of the substrate propagated through glycolysis

αKG – α-ketoglutarate

BPG – biphosphoglycerate

OAA – oxaloacetate

PEP – phosphoenolpyruvate

PYR – pyruvate

Numbers in subscript indicate metabolic fragment