Table VI. Equations for growth-rate dependent biomass composition.

Component	Correlation	Reference
Optical density $(OD_{460}/10^9$ cells)	$-2.688 + 2.748 \cdot 2^{0.869\,\mu}$	Calculated from data in Figure 1(a)
Cell mass $(10^{-12}$ g DW)	$-0.636 + 0.635 \cdot 2^{0.718\,\mu}$	Calculated from data in Figure 1(b)
RNA[a,b] (μmol NTPs/g DW)	$1139.5 - \dfrac{966.5}{\mu} \cdot 2^{-0.665/\mu}$	Calculated from data in Figure 1(c)
DNA[b] (μmol dNTPs/g DW)	$\dfrac{100 \cdot \mu}{0.023}(2^{(0.017+0.663)/\mu} - 2^{0.663/\mu})$	Calculated from data in Figure 1(c)
Protein[b] (mmol AAs/g DW)	$4.228 \cdot 2^{0.288/\mu}$	Calculated from data in Figure 1(d)
Cell volume (μm^3)	$0.486 \cdot 2^{1.144\mu}$	Calculated from data in Figure 1(e)
Cell radius (R) (μm)	$0.293 \cdot 2^{0.41\mu}$	
Cell length (L) (μm)	$2 \cdot 2^{0.333\mu}$	Donachie and Robinson, 1987
Surface area[c] (μm^2)	$2\pi R\,(L - 2R) + 4\pi R^2$	
Glycogen (glycosyl units)	$10^3(1 - 2^{-3.24 \cdot 10^4/\mu})$	Calculated from data in Figure 1f

[a]It has been speculated that the increase in the RNA content with growth rate is due to the larger fraction of stable RNA (rRNA, tRNA) necessary for the increase in protein production rate.

[b]Although the amino acid and nucleotide compositions of protein and DNA and RNA, respectively, may vary under different growth conditions, the amino acid and nucleotide fractions were available for only a cell with a 40-min doubling time (Fig. 1); it was assumed that this composition was maintained at all growth rates.

[c]The radius and length are then used to calculate the surface area (A) of the cell, assuming that the cell is a cylinder with hemispherical caps. The lipid composition was calculated from the surface area. For a cell with a 40-min doubling time, phosphatidylethanolamine makes up 75% of these lipids, phosphatidylglycerol 18%, and cardiolipin 5% with only trace amounts of phosphatidylserine (Table II) (Ballesta and Schaechter, 1971; Neidhardt, 1987). The lipopolysaccharide content of the 40-min cell is 8.4 μmol/g DW and the peptidoglycan content is 8.4 μmol/g DW (Neidhardt, 1987). The fatty acid composition found in total lipids is presented in Bright–Gaertner and Proulx (1972), Kanemasa et al. (1967), Mavis and Vagelos (1972), and Neidhardt (1987). Because the lipid and fatty acid composition was available for only a cell with 40-min doubling time, it was assumed that the composition did not change with growth rate (data from Table III averaged).