

(A) i) metabolic rate

$$\nu(c_{nt}) = \nu_{max} \frac{c_{nt}}{c_{nt} + K_M^{c_{nt}}}$$

maximal metabolic rate

Michaelis-Menten constant

(A) ii) precursor dynamics

$$\frac{dc_{pc}}{dt} = \underbrace{\frac{\nu(c_{nt}) M_{Mb}}{M}}_{\text{synthesis}} - \underbrace{\frac{\gamma(c_{pc}) M_{Rb}}{M}}_{\text{consumption}} - \underbrace{\frac{c_{pc} \gamma(c_{pc}) M_{Rb}}{M}}_{\text{dilution}}$$

precursor concentration

total metabolic protein mass

metabolic rate

(A) iii) nutrient dynamics

$$\frac{dc_{nt}}{dt} = - \frac{\nu(c_{nt}) M_{Mb}}{\underbrace{Y}_{\text{yield coefficient}}}$$

nutrient concentration

yield coefficient

(B) Model parameters, dimensions, and values

parameter	dimensions	E. coli value	reference
c_{nt}	concentration	≈ 10 mM (glucose)	-
$K_M^{c_{nt}}$	concentration	5×10^{-4} M	Scott et al., 2010
Y	AA / mmol	3×10^{19} AA / mmol glucose	This study & Shiloach & Fass, 2005

