

Parameter Table

Variable	Description	Value	Source
kr	RNA Polymerase transcription rate	50 bp/s	Bionumbers
krHIV RT	rate of HIV-RT mRNA transcription (RNA polymerase parameter)	0.000664 mRNA/s	^ and Anderson Promoter Value
HIV gene	ORI HIV RT plasmid copy number	15	Addgene
krHIV RT HIV RT	rate of r oligo transcription (HIV RT Parameter)	0.7216 roligo/s	Hu et. al.
kdHIV RT mRNA	degradation rate of HIV RT mRNA	0.00333 mRNA/s	Bionumbers
kdHIV RT	degradation rate of HIV RT	$1 \cdot 10^{-7}$ /s	^
kdroligo	degradation rate of r oligo	$1 \cdot 10^{-5}$ /s	^
kdDNA	degradation rate of DNA Scaffold	$1 \cdot 10^{-5}$ /s	^
kl	translation rate of HIV RT	9.74 au	Denovo Results
ka	annealing rate of complementary r oligos	$2.3 \cdot 10^4$ mM ⁻¹ s ⁻¹	Ramanagoudr-Bhojappa et. al.
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Acetate Ci	Shell-free initial acetate concentration	15.54 mM	Long et. al.
HSCoA Ci	Shell-free initial HSCoA concentration	1.370 mM	Bennett et. al.
Acetyl-CoA Ci	Shell-free initial acetyl-CoA concentration	0.606 mM	^
Malonyl-CoA Ci	Shell-free initial Malonyl-CoA concentration	0.035 mM	^
p-coumaric acid Ci	Shell-free initial p-coumaric acid concentration	0.25 mM	Lim et. al.
ACS kc	Catalytic rate of ACS enzyme	0.05 /s	You et. al.
ACS enzyme	Shell-free molecules of ACS	18410 molecules/cell	-
kmacetate	Km of acetate for ACS	0.2 mM	Bionumbers
kmHSCoA	Km of HSCoA for ACS	0.2 mM	Brown et. al.
kiacetyl-coaACS	Ki of Acetyl-CoA for ACS	2.7 mM	Behal et. al.
ACC kc	Catalytic rate of ACC enzyme	0.143 /s	Livieri et. al.
ACC enzyme	Shell-free molecules of ACC	18410 molecules/cell	-
kmacetyl-CoA	Km of Acetyl-CoA for ACC	0.168 mM	Livieri et. al.
4CL kc	Catalytic rate of 4CL enzyme	0.44 /s	Gaid et. al.
4CL enzyme	Shell-free molecules of 4CL	18410 molecules/cell	-
kmp-coumaricacid	Km of p-coumaric acid for 4CL	0.09016 mM	Gaid et. al.
kmHSCoA	Km of HSCoA for 4CL	0.0956 mM	Gaid et. al.
STS kc	Catalytic rate of STS enzyme	0.0017 /s	Lim et. al.
STS enzyme	Shell-free molecules of STS	18410 molecules/cell	-

kmmalonyl-CoA	Km of Malonyl-CoA for STS	0.002 mM	Suh et. al.
kmcoumaroyl-CoA	Km of Coumaroyl-CoA for STS	0.00443 mM	Lim et. al.
kiacetyl-coaSTS	Ki of Acetyl-CoA for STS	0.52 mM	Lim et. al.
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VBMC	Volume of BMC	677924.44 nm ³	Calculated from Rao et. al.
Vcell	Volume of E. coli cell	6.7 x 10 ⁸ nm ³	ECMDB
CdSF	Cell Density of E. coli in shell free model	4.8x10 ¹¹ cell/L	Warren et. al & OD600 conversion factor
CdBMC	Cell Density of E. coli with BMC production	1.0x10 ¹¹ cell/L	^
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d	BMC shell thickness	4.5 nm	Liu et. al.
w	BMC pore width	10 angstroms	PYMOL visualization
Ep_1,2-propanediol	Computed energy barrier height for 1,2-propanediol	1.0 kcal/mol	Yeates et. al.
Ep_propionaldehyde	Computed energy barrier height for propionaldehyde	1.7 kcal/mol	^
Dmax_1,2-propanediol	Maximum diffusion of 1,2-propanediol in water	1.0x10 ⁹ nm/s ²	^
Dmax_propionaldehyde	Maximum diffusion of propionaldehyde in water	1.15x10 ⁹ nm/s ²	^