Differential Equation System

Filter

KULeuven

1 Global Parameters

Parameter	Value	Value Units
$k_{translation}$	0.16667	
k_{open}	1.5	
$k_{gesloten}$	0.16667	
$k_{const\_translation}$	0.0011	
k_{B0032}	0.167	
$k_{const\_trnascription}$	0.00167	

2 Rate Laws

2.1 Reaction 1

Species

Reactants	Products
mRNA_RIBOKEY	sa3_degraded

Reaction Rate

$$v_1 = d_{mRNA\_RIBOKEY} \cdot mRNA_{RIBOKEY} \tag{1}$$

Parameters

Parameter	Value	Value Units
$d_{mRNA\_RIBOKEY}$	0.004621	

2.2 Reaction 2

Species

Reactants	Products
closed_mRNA_T7	sa10_degraded

Reaction Rate

$$v_2 = d_{gesloten\_mRNA\_T7} \cdot closed_{mRNA\_T7} \tag{2}$$

Parameters

Parameter	Value	Value Units
$d_{gesloten\_mRNA\_T7}$	0.004621	

2.3 Reaction 3

Species

Reactants	Products
pT7_tag	sa15_degraded

Reaction Rate

$$v_3 = d_{pT7\_tag} \cdot pT7_{tag} \tag{3}$$

Parameters

Parameter	Value	Value Units
d_{pT7_tag}	0.0015525	

2.4 Reaction 4

Species

Reactants	Products
Gene_RIBOKEY OmpF_var_transcr_rate	mRNA_RIBOKEY Gene_RIBOKEY OmpF_var_transcr_rate

Reaction Rate

$$v_4 = Gene_{RIBOKEY} \cdot OmpF_{var\_transcr\_rate} \tag{4}$$

Parameters

Parameter	Value	Value Units

2.5 Reaction 5

Species

Reactants	Products
Gene_T7	closed_mRNA_T7 Gene_T7

Reaction Rate

$$v_5 = k_{const\_translation} \cdot Gene_{T7} \tag{5}$$

Parameters

Parameter	Value	Value Units

2.6 Reaction 6

Species

Reactants	Products
open_mRNA_T7 open_mRNA_T7_complex	pT7_tag open_mRNA_T7 open_mRNA_T7_complex

Reaction Rate

$$v_6 = k_{B0032} \cdot (open_{mRNA\_T7} + open_{mRNA\_T7\_complex}) \tag{6}$$

Parameters

Parameter	Value	Value Units

2.7 Reaction 7

Species

Reactants	Products
closed_mRNA_T7	open_mRNA_T7

Reaction Rate

$$v_7 = k_{open} \cdot closed_{mRNA\_T7} - k_{gesloten} \cdot open_{mRNA\_T7} \tag{7}$$

Parameters

Parameter	Value	Value Units

2.8 Reaction 8

Species

Reactants	Products
open_mRNA_T7	sa18_degraded

Reaction Rate

$$v_8 = d_{open\_mRNA\_T7} \cdot open_{mRNA\_T7} \tag{8}$$

Parameters

Parameter	Value	Value Units
$d_{open\_mRNA\_T7}$	0.0023105	

2.9 Reaction 9

Species

Reactants	Products
open_mRNA_T7_complex	csa3_degraded

Reaction Rate

$$v_9 = d_{open\_mRNA\_T7\_complex} \cdot open_{mRNA\_T7\_complex} \tag{9}$$

Parameters

Parameter	Value	Value Units
$d_{open\_mRNA\_T7\_complex}$	0.0023105	

2.10 Reaction 10

Species

Reactants	Products
mRNA_RIBOKEY closed_mRNA_T7	open_mRNA_T7_complex

Reaction Rate

$$v_{10} = k_{complex} \cdot mRNA_{RIBOKEY} \cdot closed_{mRNA\_T7} - k_{dis} \cdot open_{mRNA\_T7\_complex} \tag{10}$$

Parameters

Parameter	Value	Value Units
$k_{complex}$	57	
k_{dis}	100	

3 Equations

3.1 Species: csa3_degraded

$$\frac{d[csa3_{degraded}]}{dt} = +v_9 \tag{11}$$

3.2 Species: sa18_degraded

$$\frac{d[sa18_{degraded}]}{dt} = +v_8 \tag{12}$$

3.3 Species: sa10_degraded

$$\frac{d[sa10_{degraded}]}{dt} = +v_2 \tag{13}$$

3.4 Species: mRNA_RIBOKEY

$$\frac{d[mRNA_{RIBOKEY}]}{dt} = -v_1 + v_4 - v_{10} \tag{14}$$

3.5 Species: sa3_degraded

$$\frac{d[sa3_{degraded}]}{dt} = +v_1 \tag{15}$$

3.6 Species: Gene_T7

$$\frac{d[Gene_{T7}]}{dt} = +v_5 - v_5 \tag{16}$$

3.7 Species: Gene_RIBOKEY

$$\frac{d[Gene_{RIBOKEY}]}{dt} = +v_4 - v_4 \tag{17}$$

3.8 Species: closed_mRNA_T7

$$\frac{d[closed_{mRNA\_T7}]}{dt} = -v_2 + v_5 - v_7 - v_{10} \tag{18}$$

3.9 Species: open_mRNA_T7

$$\frac{d[open_{mRNA\_T7}]}{dt} = +v_6 - v_6 + v_7 - v_8 \tag{19}$$

3.10 Species: sa15_degraded

$$\frac{d[sa15_{degraded}]}{dt} = +v_3 \tag{20}$$

3.11 Species: pT7_tag

$$\frac{d[pT7_{tag}]}{dt} = -v_3 + v_6 \tag{21}$$

3.12 Species: open_mRNA_T7_complex

$$\frac{d[open_{mRNA\_T7\_complex}]}{dt} = +v_6 - v_6 - v_9 + v_{10} \tag{22}$$

3.13 Species: OmpF_var_transcr_rate

$$\frac{d[OmpF_{var\_transcr\_rate}]}{dt} = +v_4 - v_4 \tag{23}$$

4 Compartments

4.1 default

Species	Initial Amount	Initial Amount Units
csa3_degraded	0	
sa18_degraded	0	
sa10_degraded	0	
mRNA_RIBOKEY	0	
sa3_degraded	0	
Gene_T7	1	
Gene_RIBOKEY	1	
closed_mRNA_T7	0	
open_mRNA_T7	0	
sa15_degraded	0	
pT7_tag	0	
open_mRNA_T7_complex	0	
OmpF_var_transcr_rate	0	