



Differential Equation System “MEMORY”

1 Rate Laws

1.1 Reaction: re1

$$v_1 = \frac{k_{transcrCIIIP_{22}} \cdot [s_8] \cdot km^2}{km^2 + ([s_6] + [s_{25}])^2} \quad (1)$$

1.2 Reaction: re2

$$v_2 = k_{translCIIIP_{22}} \cdot [s_{14}] \quad (2)$$

1.3 Reaction: re3

$$v_3 = \frac{k \cdot [s_1] \cdot km^2}{km^2 + [s_{13}]^2} \quad (3)$$

1.4 Reaction: re4

$$v_4 = k \cdot [s_4] \quad (4)$$

1.5 Reaction: re5

$$v_5 = d_{CIIIP_{22}} \cdot [s_{13}] \quad (5)$$

1.6 Reaction: re6

$$v_6 = d \cdot [s_{14}] \quad (6)$$

1.7 Reaction: re7

$$v_7 = d \cdot [s_4] \quad (7)$$

1.8 Reaction: re8

$$v_8 = d_{cI_{434}} \cdot [s_6] \quad (8)$$

1.9 Reaction: re9

$$v_9 = \frac{k \cdot km^n \cdot [s_{10}]}{[s_6]^n + km^n} \quad (9)$$

1.10 Reaction: re10

$$v_{10} = d \cdot [s_{16}] \quad (10)$$

1.11 Reaction: re11

$$v_{11} = [s_{17}] \cdot [s_5] \quad (11)$$

1.12 Reaction: re12

$$v_{12} = d \cdot [s_{23}] \quad (12)$$

1.13 Reaction: re13

$$v_{13} = [s_{23}] \cdot k \quad (13)$$

1.14 Reaction: re14

$$v_{14} = d_{cI434} \cdot [s_{25}] \quad (14)$$

2 Equations

2.1 Species: s1 (Gene_cI434)

$$\frac{d[s_1]}{dt} = 0 \quad (15)$$

2.2 Species: s4 (mRNA_cI434)

$$\frac{d[s_4]}{dt} = -v_7 + v_3 \quad (16)$$

2.3 Species: s5 (Gene_sensor)

$$\frac{d[s_5]}{dt} = 0 \quad (17)$$

2.4 Species: s7 (sa11_degraded)

$$\frac{d[s_7]}{dt} = v_7 \quad (18)$$

2.5 Species: s8 (Gene_CIIP22)

$$\frac{d[s_8]}{dt} = 0 \quad (19)$$

2.6 Species: s9 (sa14_degraded)

$$\frac{d[s_9]}{dt} = v_8 \quad (20)$$

2.7 Species: s10 (Gene_antiLuxI)

$$\frac{d[s_{10}]}{dt} = 0 \quad (21)$$

2.8 Species: s11 (sa10_degraded)

$$\frac{d[s_{11}]}{dt} = v_6 \quad (22)$$

2.9 Species: s12 (sa13_degraded)

$$\frac{d[s_{12}]}{dt} = v_5 \quad (23)$$

2.10 Species: s13 (CIIP22)

$$\frac{d[s_{13}]}{dt} = -v_5 + v_2 \quad (24)$$

2.11 Species: s14 (mRNA_CIIP22)

$$\frac{d[s_{14}]}{dt} = -v_6 + v_1 \quad (25)$$

2.12 Species: s15 (sa179_degraded)

$$\frac{d[s_{15}]}{dt} = v_{10} \quad (26)$$

2.13 Species: s16 (antimRNA_LuxI)

$$\frac{d[s_{16}]}{dt} = -v_{10} + v_9 \quad (27)$$

2.14 Species: s17 (OmpF_var_transcr_rate)

$$\frac{d[s_{17}]}{dt} = 0 \quad (28)$$

2.15 Species: s18 (transcription_cI434)

$$\frac{d[s_{18}]}{dt} = -v_{11} \quad (29)$$

2.16 Species: s19 (translation_CIIP22)

$$\frac{d[s_{19}]}{dt} = -v_2 \quad (30)$$

2.17 Species: s20 (transcription_CIIP22)

$$\frac{d[s_{20}]}{dt} = -v_1 \quad (31)$$

2.18 Species: s2 (transcription_antiLuxI)

$$\frac{d[s_2]}{dt} = -v_9 \quad (32)$$

2.19 Species: s22 (transcription_cI434_lva)

$$\frac{d[s_{22}]}{dt} = -v_3 \quad (33)$$

2.20 Species: s_{23} (asRNA_cI434)

$$\frac{d[s_{23}]}{dt} = -v_{12} + v_{11} \quad (34)$$

2.21 Species: s_{24} (sa22_degraded)

$$\frac{d[s_{24}]}{dt} = v_{12} \quad (35)$$

2.22 Species: s_6 (cI434_lva)

$$\frac{d[s_6]}{dt} = -v_8 + v_4 \quad (36)$$

2.23 Species: s_{25} (cI434)

$$\frac{d[s_{25}]}{dt} = -v_{14} + v_{13} \quad (37)$$

2.24 Species: s_3 (translation_cI434_lva)

$$\frac{d[s_3]}{dt} = -v_4 \quad (38)$$

2.25 Species: s_{26} (translation_cI434)

$$\frac{d[s_{26}]}{dt} = -v_{13} \quad (39)$$

2.26 Species: s_{27} (sa24_degraded)

$$\frac{d[s_{27}]}{dt} = v_{14} \quad (40)$$

3 Parameters

Parameter	Value
d	0.00462
d_{cI434}	9.627E-5
$k_{transcrCIIP_{22}}$	0.0125

4 Species

Species	Initial concentration	compartment
s_1	1.0	default
s_4	0.0	default
s_5	1.0	default
s_7	0.0	default
s_8	1.0	default
s_9	0.0	default
s_{10}	1.0	default
s_{11}	0.0	default
s_{12}	0.0	default

s_{13}	0.0	default
s_{14}	0.0	default
s_{15}	0.0	default
s_{16}	0.0	default
s_{17}	5.0E-5	default
s_{18}	0.0	default
s_{19}	0.0	default
s_{20}	0.0	default
s_2	0.0	default
s_{22}	0.0	default
s_{23}	0.0	default
s_{24}	0.0	default
s_6	0.0	default
s_{25}	0.0	default
s_3	0.0	default
s_{26}	0.0	default
s_{27}	0.0	default

5 Compartments

Compartment	Volume
<i>default</i>	1.0
