



# Differential Equation System “MEMORY”

## 1 Rate Laws

### 1.1 Reaction: re1

$$v_1 = \frac{k_{transcrCIIP_{22}} \cdot [s_1] \cdot Km^2}{Km^2 + [s_{10}]^2} \quad (1)$$

### 1.2 Reaction: re2

$$v_2 = k \cdot [s_6] \quad (2)$$

### 1.3 Reaction: re5

$$v_3 = \frac{k \cdot [s_2] \cdot Km^2}{Km^2 + [s_9]^2} + [s_{11}] \cdot [s_3] \quad (3)$$

### 1.4 Reaction: re6

$$v_4 = k \cdot [s_7] \quad (4)$$

### 1.5 Reaction: re8

$$v_5 = d_{CIIP_{22}} \cdot [s_9] \quad (5)$$

### 1.6 Reaction: re9

$$v_6 = d \cdot [s_6] \quad (6)$$

### 1.7 Reaction: re10

$$v_7 = d \cdot [s_7] \quad (7)$$

### 1.8 Reaction: re11

$$v_8 = d_{cI_{434}} \cdot [s_{10}] \quad (8)$$

### 1.9 Reaction: re12

$$v_9 = d \cdot [s_{18}] \quad (9)$$

## 1.10 Reaction: **re13**

$$v_{10} = \frac{k \cdot Km^n \cdot [s_{17}]}{[s_{10}]^n + Km^n} \quad (10)$$

## 2 Equations

### 2.1 Species: **s3** (Gen\_sensor)

$$\frac{d[s_3]}{dt} = 0 \quad (11)$$

### 2.2 Species: **s4** (transcription)

$$\frac{d[s_4]}{dt} = 0 \quad (12)$$

### 2.3 Species: **s5** (translation)

$$\frac{d[s_5]}{dt} = 0 \quad (13)$$

### 2.4 Species: **s11** (OmpF var input)

$$\frac{d[s_{11}]}{dt} = 0 \quad (14)$$

### 2.5 Species: **s13** (sa13\_degraded)

$$\frac{d[s_{13}]}{dt} = 0 \quad (15)$$

### 2.6 Species: **s14** (sa10\_degraded)

$$\frac{d[s_{14}]}{dt} = 0 \quad (16)$$

### 2.7 Species: **s15** (sa11\_degraded)

$$\frac{d[s_{15}]}{dt} = 0 \quad (17)$$

### 2.8 Species: **s16** (sa14\_degraded)

$$\frac{d[s_{16}]}{dt} = 0 \quad (18)$$

### 2.9 Species: **s1** (Gen\_CIIP22)

$$\frac{d[s_1]}{dt} = 0 \quad (19)$$

### 2.10 Species: **s9** (CIIP22)

$$\frac{d[s_9]}{dt} = -v_5 + v_2 \quad (20)$$

## 2.11 Species: s2 (Gen\_cI434)

$$\frac{d[s_2]}{dt} = 0 \quad (21)$$

## 2.12 Species: s10 (cI434)

$$\frac{d[s_{10}]}{dt} = -v_8 + v_4 \quad (22)$$

## 2.13 Species: s6 (mRNA\_CIIP22)

$$\frac{d[s_6]}{dt} = -v_6 + v_1 \quad (23)$$

## 2.14 Species: s7 (mRNA\_cI434)

$$\frac{d[s_7]}{dt} = -v_7 + v_3 \quad (24)$$

## 2.15 Species: s17 (antiLuxIgen)

$$\frac{d[s_{17}]}{dt} = 0 \quad (25)$$

## 2.16 Species: s18 (antimRNA\_LuxI)

$$\frac{d[s_{18}]}{dt} = -v_9 + v_{10} \quad (26)$$

## 2.17 Species: s19 (sa15\_degraded)

$$\frac{d[s_{19}]}{dt} = 0 \quad (27)$$

## 3 Parameters

Parameter	Value
d	0.00462
k <sub>transcrCIIP22</sub>	0.0125
d <sub>cI434</sub>	0.002311

## 4 Species

Species	Initial concentration	compartment
s <sub>3</sub>	1.0	default
s <sub>4</sub>	0.0	default
s <sub>5</sub>	0.0	default
s <sub>11</sub>	1.0E-4	default
s <sub>13</sub>	0.0	default
s <sub>14</sub>	0.0	default
s <sub>15</sub>	0.0	default
s <sub>16</sub>	0.0	default
s <sub>1</sub>	1.0	default

$s_9$	0.0	default
$s_2$	1.0	default
$s_{10}$	0.0	default
$s_6$	0.0	default
$s_7$	0.0	default
$s_{17}$	0.0	default
$s_{18}$	0.0	default
$s_{19}$	0.0	default

## 5 Compartments

Compartment	Volume
<i>default</i>	1.0