

## Receptor



### Formulae for two certain parts

CqsS and CqsSp:

$$\frac{d[\text{CqsS}]}{dt} = a_{cs} - k_{cc}[\text{CqsS}] + k_{cd}[\text{CAI-1-CqsS}] - d[\text{CqsS}]$$

CqsS and CAI:

$$\frac{d[\text{CAI-1-CqsS}]}{dt} = k_{cc}[\text{CAI}] - k_{cd}[\text{CAI-1-CqsS}] - d[\text{CAI-1-CqsS}] \quad (\text{CAI=t})$$

CqsSp and CqsS:

$$\frac{d[\text{CAI-1-CqsS}]}{dt} = k_{cc}[\text{CqsS}] - k_{cd}[\text{CAI-1-CqsS}] - d[\text{CAI-1-CqsS}]$$

LuxU and CqsSp:

$$\frac{d[\text{LuxU}]}{dt} = \alpha_U - \beta_{cu} \frac{[\text{CAI-1-CqsS}][\text{LuxU}]}{k_{cu} + [\text{LuxU}]} - d[\text{LuxU}]$$

LuxUp and LuxU:

$$\frac{d[\text{LuxUp}]}{dt} = \beta_{cu} \frac{[\text{LuxU}]}{k_{cu} + [\text{LuxU}]} - d[\text{LuxUp}]$$

LuxUp and CqsSp:

$$\frac{d[\text{LuxUp}]}{dt} = \beta_{cu}[\text{CAI-1-CqsS}] - d[\text{LuxUp}]$$

LuxOp and LuxO:

$$\frac{d[\text{LuxOp}]}{dt} = \beta_{uo} \frac{[\text{LuxO}]}{k_{uo} + [\text{LuxO}]} - d[\text{LuxOp}]$$

LuxOp and LuxUp:

$$\frac{d[\text{LuxOp}]}{dt} = \beta_{uo}[\text{LuxUp}] - d[\text{LuxOp}]$$

**Parameter Table**

Symbols	Parameters	Values and Units
$a_{cs}$	CqsS protein production rate	5 h <sup>-1</sup>
$k_{cc}$	CAI and CqsS coupling rate	1 h <sup>-1</sup>
$k_{cd}$	CAI and CqsS decoupling rate	1 h <sup>-1</sup>
$d_{CqsS}$	CqsS protein decay rate	0.5 h <sup>-1</sup>
$d_{CqsSp}$	CqsSp protein decay rate	1 h <sup>-1</sup>
$\alpha_U$	LuxU protein production rate	5 h <sup>-1</sup>
$\beta_{cu}$	Phosphorylation rate of CqsS to LuxU	1 h <sup>-1</sup>
$k_{cu}$	Michaelis Menten Constant for the phosphorylation CqsS-LuxU	2 nM
$d_{LuxU}$	LuxU protein decay rate	0.65 h <sup>-1</sup>
$d_{LuxUp}$	LuxUp protein decay rate	0.12 h <sup>-1</sup>
$\beta_{uo}$	Phosphorylation rate of LuxU to LuxO	3.2 h <sup>-1</sup>
$k_{uo}$	Michaelis Menten Constant for the phosphorylation LuxU-LuxO	2 nM
$d_{LuxOp}$	LuxOp protein decay rate	0.12 h <sup>-1</sup>
atr	TetR protein production rate	1 h <sup>-1</sup>
acp	AmilCP protein production rate	1 h <sup>-1</sup>
$d_{TetR}$	TetR protein decay rate	0.12 h <sup>-1</sup>
$h_0$	LuxOp-DNA coupling rate	1.5 h <sup>-1</sup>
n	Hill constant	3
$d_{TetA}$	TetA protein decay rate	0.12 h <sup>-1</sup>
$\beta_{TetR}$	Maximum rate of TetR expression	5 h <sup>-1</sup>

Reference: <http://2014.igem.org/Team:Colombia>