1. $\dot{gRNA} = \delta_{gRNA} - K_{\rightarrow dCas9^*}[gRNA][dCas9] + K_{\leftarrow dCas9^*}[dCas9^*] - T_{gRNA}[gRNA] - \frac{\ln(2)}{\tau_{gRNA}}[gRNA]$

2. $\dot{m_{dCas9}} = \alpha_{mdCas9}\delta_{mdCas9}\frac{DNA_{free-dCas9^*}}{DNA_{tot-dCas9^*}} + \delta_{mdCas9}\frac{DNA_{bound-dCas9^*}}{DNA_{tot-dCas9^*}} - T_{mdCas9}[mdCas9] - \frac{\ln(2)}{\tau_{symb}}[mdCas9]$

3. $\dot{p_{dCas9}} = \sigma_{dCas9}[mdCas9] - T_{dCas9}[dCas9] - \frac{\ln(2)}{\tau_{dCas9}}[dCas9]$

4. $\dot{p_{dCas9^*}} = K_{\rightarrow dCas9^*}[gRNA][dCas9] - K_{\leftarrow dCas9^*}[dCas9^*] - T_{pdCas9^*}[pdCas9^*] - \frac{\ln(2)}{\tau_{symb}}[pdCas9^*]$

5. $\dot{mR} = \alpha_R\delta_{mI}\frac{DNA_{free-Q}}{DNA_{tot-Q}} + \delta_{mR}\frac{DNA_{bound-Q}}{DNA_{tot-Q}} - T_{mR}[mR] - \frac{\ln(2)}{\tau_{mR}}[mR]$

6. $\dot{pR} = \sigma_R[mR] - T_{pR}[pR] - \frac{\ln(2)}{\tau_{pR}}[pR] + K_{\rightarrow RQ}[R][Q] - K_{\leftarrow RQ}[RQ]$

7. $\dot{mI} = \alpha_{mI}\delta_{mI}\frac{DNA_{free-Q}}{DNA_{tot-Q}} + \delta_{mI}\frac{DNA_{bound-Q}}{DNA_{tot-Q}} - T_{mI}[mI] - \frac{\ln(2)}{\tau_{symb}}[mI]$

8. $\dot{pI} = \sigma_I[mI] - T_{pI}[pI] - \frac{\ln(2)}{\tau_{symb}}[pI]$

9. $\dot{pQ} = K_{\rightarrow RQ}[R][Q] - K_{\leftarrow RQ}[RQ] - 2\left(K_{\rightarrow (RQ)_2}[RQ]^2\right) + 2\left(K_{\leftarrow (RQ)_2}[(RQ)_2]\right) - T_{pQ}[pQ] - \frac{\ln(2)}{\tau_{symb}}[pQ]$

10. $(\dot{pQ})_2 = K_{\rightarrow (RQ)_2}[RQ]^2 - K_{\leftarrow (RQ)_2}[(RQ)_2] - K_{\rightarrow lux}[DNA_{free-Q}][(RQ)_2] + K_{\leftarrow lux}[DNA_{bound-Q}] - K_{\rightarrow lux}[DNA_{free-dCas9}][(RQ)_2] + K_{\leftarrow lux}[DNA_{bound-dCas9}] - T_{(pQ)_2}[(pQ)_2] - \frac{\ln(2)}{\tau_{symb}}[(pQ)_2]$

11. $\dot{DNA_{free-Q}} = -K_{\rightarrow lux}[DNA_{free-Q}][(RQ)_2] + K_{\leftarrow lux}[DNA_{bound-Q}]$

12. $\dot{DNA_{bound-Q}} = K_{\rightarrow lux}[DNA_{free-Q}][(RQ)_2] - K_{\leftarrow lux}[DNA_{bound-Q}]$

13. $\dot{DNA_{free-dCas^*}} = -K_{\rightarrow lux}[DNA_{free-dCas9}][(RQ)_2] + K_{\leftarrow lux}[DNA_{bound-dCas9}]$

14. $\dot{DNA_{free-Q}} = K_{\rightarrow lux}[DNA_{free-dCas9}][(RQ)_2] - K_{\leftarrow lux}[DNA_{bound-dCas9}]$

15. $\dot{Q} = K_{\leftarrow RQ}[RQ] - K_{\rightarrow RQ}[R][Q] + K_{synth}[pI] - DifAS[Q] + DifAS[Q_{Host}] - T_Q[Q] - \frac{\ln(2)}{\tau_{symb}}[Q]$

16. $\dot{Q_{Host}} = \frac{mean(V_{symb})}{V_{Host} - \sum V_{symb}}\left(\sum DifAS[Q] - \sum DifAS[Q_{Host}]\right) - DifAH[Q_{Host}] - T_{Q_{Host}}[Q_{Host}] - \frac{\ln(2)}{\tau_{Host}}[Q_{Host}]$