SBML Model Report

Model name: "Zhou2015 - Circadian clock with immune regulator NPR1"

May 6, 2016

1 General Overview

This is a document in SBML Level 2 Version 4 format. This model was created by the following two authors: Vijayalakshmi Chelliah[1] and Sargis Karapetyan[2] at July tenth 2015 at 5:09 p. m. and last time modified at July tenth 2015 at 5:44 p. m. Table 1 shows an overview of the quantities of all components of this model.

Table 1: Number of components in this model, which are described in the following sections.

Element	Quantity	Element	Quantity
compartment types	0	compartments	3
species types	0	species	32
events	0	constraints	0
reactions	64	function definitions	64
global parameters	161	unit definitions	3
rules	18	initial assignments	0

Model Notes

Zhou2015 - Circadian clock with immuneregulator NPR1Arabidopsis clock model modified fromP2012 (Pokhilko et al., 2013 - BIOMD0000000445)model to include the master immune regulator NPR1 coupling to LHY,TOC1 and PRR7.

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Triggers: The Global Quantities contain triggers that allowone to change coupling settings, Salicyclic acid (SA) treatment andnpr1 mutants.
LHY_on: true->NPR1 couples to LHY
PRR7_on: true->NPR1 couples to PRR7
WT: true->WT plants, false->npr1 mutant plants
SA: true->SA treated plants, false->no treatment
This model has L=1, i.e. operates only under constant lightconditions and is not aiming to make preditions under diurnalconditions. Due to period overshoot only time points after 28h arerelevant.

This model is described in the article:Redox rhythm reinforces the circadian clock to gate immune response.Zhou M, Wang W, Karapetyan S, Mwimba M, Marqus J, Buchler NE, Dong X.Nature 2015 Jun;

Abstract:

Recent studies have shown that in addition to the transcriptional circadian clock, many organisms, including Arabidopsis, have a circadian redox rhythm driven by the organism's metabolic activities. It has been hypothesized that the redox rhythm is linked to the circadian clock, but the mechanism and the biological significance of this link have only begun to be investigated. Here we report that the master immune regulator NPR1 (non-expressor of pathogenesis-related gene 1) of Arabidopsis is a sensor of the plant's redox state and regulates transcription of core circadian clock genes even in the absence of pathogen challenge. Surprisingly, acute perturbation in the redox status triggered by the immune signal salicylic acid does not compromise the circadian clock but rather leads to its reinforcement. Mathematical modelling and subsequent experiments show that NPR1 reinforces the circadian clock without changing the period by regulating both the morning and the evening clock genes. This balanced network architecture helps plants gate their immune responses towards the morning and minimize costs on growth at night. Our study demonstrates how a sensitive redox rhythm interacts with a robust circadian clock to ensure proper responsiveness to environmental stimuli without compromising fitness of the organism.

This model is hosted on BioModels Database and identified by: BIOMD0000000577.

To cite BioModels Database, please use: BioModels Database: An enhanced, curated and annotated resource for published quantitative kinetic models.

2 Unit Definitions

This is an overview of five unit definitions of which two are predefined by SBML and not mentioned in the model.

2.1 Unit `volume`

Name volume

Definition µl

2.2 Unit `time`

Name time

Definition 3600 s

2.3 Unit `substance`

Name substance

Definition nmol

2.4 Unit `area`

Notes Square metre is the predefined SBML unit for `area` since SBML Level 2 Version 1.

Definition m^2

2.5 Unit `length`

Notes Metre is the predefined SBML unit for `length` since SBML Level 2 Version 1.

Definition m

3 Compartments

This model contains three compartments.

Table 2: Properties of all compartments.

Id	Name	SBO	Spatial Dimensions	Size	Unit	Constant	Outside
`default`	default		3	1	litre	☑	
`def`	def		3	1	litre	☑	
`compartment_1`	No Name		3	1	litre	☑	

3.1 Compartment `default`

This is a three dimensional compartment with a constant size of one µl.

Name default

3.2 Compartment `def`

This is a three dimensional compartment with a constant size of one µl.

Name def

3.3 Compartment `compartment_1`

This is a three dimensional compartment with a constant size of one µl.

Name No Name

4 Species

This model contains 32 species. Section 9 provides further details and the derived rates of change of each species.

Table 3: Properties of each species.

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
species_1	cABAR_m	default	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
species_2	cPP2C	default	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
species_3	cSnRK2	default	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
species_4	cs	default	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cCOP1c	cCOP1c	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cCOP1d	cCOP1d	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cCOP1n	cCOP1n	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cE3	cE3	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cE3_m	cE3_m	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cE3n	cE3n	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cE4	cE4	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cE4_m	cE4_m	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cEC	cEC	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cEG	cEG	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cG	cG	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cG_m	cG_m	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cL	cL	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cLUX	cLUX	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cLUX_m	cLUX_m	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cL_m	cL_m	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cLm	cLm	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cNI	cNI	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
cNI_m	cNI_m	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cP	cP	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cP7	cP7	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cP7_m	cP7_m	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cP9	cP9	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cP9_m	cP9_m	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cT	cT	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cT_m	cT_m	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cZG	cZG	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟
cZTL	cZTL	def	$\mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$	⊟	⊟

5 Parameters

This model contains 161 global parameters.

Table 4: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
n1	n1		2.600		☑
n2	n2		0.350		☑
n3	n3		0.290		☑
n4	n4		0.040		☑
n5	n5		0.400		☑
n6	n6		20.000		☑
n7	n7		0.100		☑
n8	n8		0.500		☑
n9	n9		0.600		☑
n10	n10		0.300		☑
n11	n11		0.600		☑
n12	n12		9.000		☑
n13	n13		2.000		☑
n14	n14		0.100		☑
g1	g1		0.100		☑
g2	g2		0.010		☑
g3	g3		0.600		☑
g4	g4		0.006		☑
g5	g5		0.200		☑
g6	g6		0.300		☑
g7	g7		1.000		☑
g8	g8		0.040		☑
g9	g9		0.300		☑
g10	g10		0.500		☑
g11	g11		0.700		☑
g12	g12		0.100		☑
g13	g13		1.000		☑
g14	g14		0.020		☑
g15	g15		0.400		☑
g16	g16		0.300		☑
m1	m1		0.540		☑
m2	m2		0.240		☑
m3	m3		0.200		☑
m4	m4		0.200		☑
m5	m5		0.300		☑
m6	m6		0.200		☑
m7	m7		0.100		☑

Id	Name	SBO	Value	Unit	Constant
m8	m8		0.500		☑
m9	m9		0.200		☑
m10	m10		0.100		☑
m11	m11		1.000		☑
m12	m12		1.000		☑
m13	m13		0.320		☑
m14	m14		0.400		☑
m15	m15		0.700		☑
m16	m16		0.500		☑
m17	m17		0.500		☑
m18	m18		3.400		☑
m19	m19		0.900		☑
m20	m20		0.600		☑
m21	m21		0.080		☑
m22	m22		0.100		☑
m23	m23		0.500		☑
m24	m24		0.500		☑
m25	m25		0.900		☑
m26	m26		0.500		☑
m27	m27		0.100		☑
m28	m28		28.000		☑
m29	m29		0.300		☑
m30	m30		1.000		☑
m31	m31		0.100		☑
m32	m32		0.200		☑
m33	m33		13.000		☑
m34	m34		0.600		☑
m35	m35		0.300		☑
m36	m36		0.300		☑
m37	m37		0.400		☑
a	a		2.000		☑
b	b		2.000		☑
c	c		2.000		☑
d	d		2.000		☑
e	e		2.000		☑
f	f		2.000		☑
p1	p1		0.130		☑
p2	p2		0.270		☑
p3	p3		0.100		☑
p4	p4		0.500		☑
p5	p5		1.000		☑
p6	p6		0.200		☑

Id	Name	SBO	Value	Unit	Constant
p7	p7		0.300		☑
p8	p8		0.600		☑
p9	p9		0.800		☑
p10	p10		0.540		☑
p11	p11		0.500		☑
p12	p12		10.000		☑
p13	p13		0.100		☑
p14	p14		0.140		☑
p15	p15		2.000		☑
p16	p16		0.620		☑
p17	p17		17.000		☑
p18	p18		4.000		☑
p19	p19		1.000		☑
p20	p20		0.100		☑
p21	p21		1.000		☑
p22	p22		0.500		☑
p23	p23		0.370		☑
p24	p24		11.000		☑
p25	p25		2.000		☑
p26	p26		0.300		☑
p27	p27		0.800		☑
p28	p28		2.000		☑
p29	p29		0.100		☑
p30	p30		0.900		☑
q1	q1		1.000		☑
q2	q2		1.560		☑
q3	q3		3.000		☑
L	L		1.000		☑
D	D		0.000		☐
lightOffset	lightOffset		0.000		☑
cyclePeriod	cyclePeriod		24.000		☑
lightAmplitude	lightAmplitude		1.000		☑
phase	phase		0.000		☑
twilightPeriod	twilightPeriod		0.050		☑
photoPeriod	photoPeriod		12.000		☑
parameter_1	g17		0.600		☑
parameter_2	g18		0.400		☑
parameter_3	g19		0.400		☑
parameter_4	g20		0.030		☑
parameter_5	g21		0.400		☑
parameter_6	g22		0.100		☑
parameter_7	g		2.000		☑

Id	Name	SBO	Value	Unit	Constant
parameter_8	n15		2.000		☑
parameter_9	h		2.000		☑
parameter_10	i		2.000		☑
parameter_11	j		2.000		☑
parameter_12	g23		0.600		☑
parameter_13	g24		0.300		☑
parameter_14	g25		0.500		☑
parameter_15	g26		0.300		☑
parameter_16	g27		0.200		☑
parameter_17	g28		0.100		☑
parameter_18	g29		1.000		☑
parameter_19	m38		0.300		☑
parameter_20	m39		0.200		☑
parameter_21	n18		0.500		☑
parameter_22	n16		0.000		☑
parameter_23	quantity		0.000		☑
parameter_24	n17		0.500		☑
parameter_25	n19		0.200		☑
parameter_26	p31		0.100		☑
parameter_27	p32		0.100		☑
parameter_28	p33		0.200		☑
parameter_29	A0		1.000		☑
nb_TOC1	nb_TOC1		0.561		⊟
nb_LHY	nb_LHY		0.481		⊟
nb_PRR7	nb_PRR7		0.392		⊟
na_TOC1	na_TOC1		1.027		⊟
na_LHY	na_LHY		1.820		⊟
na_PRR7	na_PRR7		0.608		⊟
Kd_TOC1	Kd_TOC1		1.337		⊟
Kd_LHY	Kd_LHY		2.506		⊟
Kd_PRR7	Kd_PRR7		0.000		☑
NPR1_WT	NPR1_WT		1.000		⊟
NPR1_SA	NPR1_SA		1.000		⊟
PRR7_on	PRR7_on		1.000		⊟
LHY_on	LHY_on		1.000		⊟
WT	WT		1.000		⊟
SA	SA		1.000		⊟
F_TOC1	F_TOC1		1.000		⊟
F_LHY	F_LHY		1.000		⊟
F_PRR7	F_PRR7		1.000		⊟

6 Function definitions

This is an overview of 64 function definitions.

6.1 Function definition function_4_cCOP1d_degr

Name function_4_cCOP1d_degr

Arguments L, [cCOP1d], m31, m33

Mathematical Expression

$$\mathrm{m31} \cdot (1 + \mathrm{m33} \cdot (1 - \mathrm{L})) \cdot [\mathrm{cCOP1d}] \tag{1}$$

6.2 Function definition function_4_cP7_m_degr

Name function_4_cP7_m_degr

Arguments [cP7_m], vol (def), m14

Mathematical Expression

$$\frac{\mathrm{m14} \cdot [\mathrm{cP7\_m}]}{\mathrm{vol}\,(\mathrm{def})} \tag{2}$$

6.3 Function definition function_4_cP7_m_trscr_1

Name function_4_cP7_m_trscr_1

Arguments [cL], [cLm], [cP9], [cT], vol (def), e, f, g10, g11, n8, n9, parameter_6, parameter_7, F_PRR7

Mathematical Expression

$$\frac{\frac{\mathrm{F\_PRR7} \cdot \mathrm{parameter\_6}^{\mathrm{parameter\_7}}}{\mathrm{parameter\_6}^{\mathrm{parameter\_7}} + [\mathrm{cT}]^{\mathrm{parameter\_7}}} \cdot \left(\frac{\mathrm{n8} \cdot ([\mathrm{cLm}] + [\mathrm{cL}])^{\mathrm{e}}}{([\mathrm{cLm}] + [\mathrm{cL}])^{\mathrm{e}} + \mathrm{g10}^{\mathrm{e}}} + \frac{\mathrm{n9} \cdot [\mathrm{cP9}]^{\mathrm{f}}}{[\mathrm{cP9}]^{\mathrm{f}} + \mathrm{g11}^{\mathrm{f}}} \right)}{\mathrm{vol}\,(\mathrm{def})} \tag{3}$$

6.4 Function definition function_4_cL_trsl

Name function_4_cL_trsl

Arguments L, [cL_m], p1, p2

Mathematical Expression

$$[\mathrm{cL\_m}] \cdot (\mathrm{p1} \cdot \mathrm{L} + \mathrm{p2}) \tag{4}$$

6.5 Function definition function_4_cABAR_m_trscr_1

Name function_4_cABAR_m_trscr_1

Arguments [cL], [cT], vol (def), e, parameter_13, parameter_17, parameter_24, parameter_7

Mathematical Expression

$$\frac{\frac{\text{parameter\_13}^{\text{parameter\_7}}}{\text{parameter\_13}^{\text{parameter\_7}}+[\text{cT}]^{\text{parameter\_7}}}\cdot\text{parameter\_24}\cdot[\text{cL}]^{\text{e}}}{[\text{cL}]^{\text{e}}+\text{parameter\_17}^{\text{e}}}}{\text{vol}\,(\text{def})} \tag{5}$$

6.6 Function definition function_4_cABAR_m_degr

Name function_4_cABAR_m_degr

Arguments vol (def), m37, [species_1]

Mathematical Expression

$$\frac{\text{m37}\cdot[\text{species\_1}]}{\text{vol}\,(\text{def})} \tag{6}$$

6.7 Function definition function_4_cP7_degr

Name function_4_cP7_degr

Arguments L, [cP7], m15, m23

Mathematical Expression

$$(\text{m15}+\text{m23}\cdot(1-\text{L}))\cdot[\text{cP7}] \tag{7}$$

6.8 Function definition function_4_cP7_trsl

Name function_4_cP7_trsl

Arguments [cP7_m], vol (def), p9

Mathematical Expression

$$\frac{\text{p9}\cdot[\text{cP7\_m}]}{\text{vol}\,(\text{def})} \tag{8}$$

6.9 Function definition function_4_cNI_m_degr

Name function_4_cNI_m_degr

Arguments [cNI_m], vol (def), m16

Mathematical Expression

$$\frac{\text{m16}\cdot[\text{cNI\_m}]}{\text{vol}\,(\text{def})} \tag{9}$$

6.10 Function definition function_4_cNI_m_trscr_1

Name function_4_cNI_m_trscr_1

Arguments b, [cLm], [cP7], [cT], vol(def), e, g12, g13, n10, n11, parameter_12, parameter_7

Mathematical Expression

$$\frac{\frac{\text{parameter\_12}^{\text{parameter\_7}}}{\text{parameter\_12}^{\text{parameter\_7}}+[\text{cT}]^{\text{parameter\_7}}}\cdot\left(\frac{\text{n10}\cdot[\text{cLm}]^{\text{e}}}{[\text{cLm}]^{\text{e}}+\text{g12}^{\text{e}}}+\frac{\text{n11}\cdot[\text{cP7}]^{\text{b}}}{[\text{cP7}]^{\text{b}}+\text{g13}^{\text{b}}}\right)}{\text{vol}(\text{def})} \tag{10}$$

6.11 Function definition function_4_cPP2C_act_1

Name function_4_cPP2C_act_1

Arguments vol(def), parameter_16, parameter_18, parameter_28, parameter_29, parameter_9, [species_1]

Mathematical Expression

$$\frac{\frac{\text{parameter\_28}\cdot\text{parameter\_16}^{\text{parameter\_9}}}{\left(0.5\cdot\left(\text{parameter\_29}+[\text{species\_1}]+\text{parameter\_18}-\left((\text{parameter\_29}+[\text{species\_1}]+\text{parameter\_18})^2-4\cdot\text{parameter\_29}\cdot[\text{species\_1}]\right)^{\frac{1}{2}}\right)\right)^{\text{parameter\_9}}+\text{parameter\_16}^{\text{p}}}}{\text{vol}(\text{def})} \tag{11}$$

6.12 Function definition function_4_cNI_degr

Name function_4_cNI_degr

Arguments L, [cNI], m17, m24

Mathematical Expression

$$(\text{m17}+\text{m24}\cdot(1-\text{L}))\cdot[\text{cNI}] \tag{12}$$

6.13 Function definition function_4_cNI_trsl

Name function_4_cNI_trsl

Arguments [cNI_m], vol(def), p10

Mathematical Expression

$$\frac{\text{p10}\cdot[\text{cNI\_m}]}{\text{vol}(\text{def})} \tag{13}$$

6.14 Function definition function_4_cL_m_degr

Name function_4_cL_m_degr

Arguments L, [cL_m], m1, m2

Mathematical Expression

$$(\mathrm{m2} + (\mathrm{m1} - \mathrm{m2}) \cdot \mathrm{L}) \cdot [\mathrm{cL\_m}] \tag{14}$$

6.15 Function definition function_4_cZG_degr

Name function_4_cZG_degr

Arguments [cZG], vol(def), m21

Mathematical Expression

$$\frac{\mathrm{m21} \cdot [\mathrm{cZG}]}{\mathrm{vol}(\mathrm{def})} \tag{15}$$

6.16 Function definition function_4_cT_m_trscr

Name function_4_cT_m_trscr

Arguments [cEC], [cL], vol(def), e, g4, g5, n2, parameter_11, parameter_14, [species_3], F_TOC1

Mathematical Expression

$$\frac{\frac{1}{1+\left(\frac{[\mathrm{cL}]}{\mathrm{g5}\cdot\left(1+\left(\frac{[\mathrm{species\_3}]}{\mathrm{parameter\_14}}\right)^{\mathrm{parameter\_11}}\right)}\right)^{\frac{\mathrm{F\_TOC1}\cdot\mathrm{n2}}{\mathrm{e}}}\cdot\mathrm{g4}}}{[\mathrm{cEC}]+\mathrm{g4}}}{\mathrm{vol}(\mathrm{def})} \tag{16}$$

6.17 Function definition function_4_cE4_trsl

Name function_4_cE4_trsl

Arguments [cE4_m], vol(def), p23

Mathematical Expression

$$\frac{\mathrm{p23} \cdot [\mathrm{cE4\_m}]}{\mathrm{vol}(\mathrm{def})} \tag{17}$$

6.18 Function definition function_4_cs_act_1

Name function_4_cs_act_1

Arguments L, vol (def), parameter_10, parameter_15, parameter_21, parameter_25, [species_3], [species_4]

Mathematical Expression

$$\frac{\frac{(\text{parameter\_25}+\text{parameter\_21}\cdot \text{L})\cdot(1-[\text{species\_4}])\cdot \text{parameter\_15}^{\text{parameter\_10}}}{\text{parameter\_15}^{\text{parameter\_10}}+[\text{species\_3}]^{\text{parameter\_10}}}}{\text{vol}\,(\text{def})} \tag{18}$$

6.19 Function definition function_4_cL_degr

Name function_4_cL_degr

Arguments c, [cL], vol (def), g3, m3, p3

Mathematical Expression

$$\frac{\text{m3}\cdot[\text{cL}]+\frac{\text{p3}\cdot[\text{cL}]^{\text{c}}}{[\text{cL}]^{\text{c}}+\text{g3}^{\text{c}}}}{\text{vol}\,(\text{def})} \tag{19}$$

6.20 Function definition function_4_cG_m_degr

Name function_4_cG_m_degr

Arguments [cG_m], vol (def), m18

Mathematical Expression

$$\frac{\text{m18}\cdot[\text{cG\_m}]}{\text{vol}\,(\text{def})} \tag{20}$$

6.21 Function definition function_4_cSnRK2_act_1

Name function_4_cSnRK2_act_1

Arguments vol (def), parameter_27

Mathematical Expression

$$\frac{\text{parameter\_27}}{\text{vol}\,(\text{def})} \tag{21}$$

6.22 Function definition function_4_cE4_m_degr

Name function_4_cE4_m_degr

Arguments [cE4_m], vol (def), m34

Mathematical Expression

$$\frac{\mathrm{m34} \cdot [\mathrm{cE4\_m}]}{\mathrm{vol}\,(\mathrm{def})} \tag{22}$$

6.23 Function definition function_4_cP9_degr

Name function_4_cP9_degr

Arguments L, [cP9], m13, m22

Mathematical Expression

$$(\mathrm{m13} + \mathrm{m22} \cdot (1 - \mathrm{L})) \cdot [\mathrm{cP9}] \tag{23}$$

6.24 Function definition function_4_cPP2C_degr_1

Name function_4_cPP2C_degr_1

Arguments vol (def), parameter_20, [species_2]

Mathematical Expression

$$\frac{\mathrm{parameter\_20} \cdot [\mathrm{species\_2}]}{\mathrm{vol}\,(\mathrm{def})} \tag{24}$$

6.25 Function definition function_4_cE4_m_trscr_1

Name function_4_cE4_m_trscr_1

Arguments [cEC], [cL], [cT], vol (def), e, g6, parameter_4, parameter_5, parameter_7, parameter_8

Mathematical Expression

$$\frac{\frac{\mathrm{parameter\_5}^{\mathrm{parameter\_7}}}{\mathrm{parameter\_5}^{\mathrm{parameter\_7}} + [\mathrm{cT}]^{\mathrm{parameter\_7}}} \cdot \frac{\frac{\mathrm{parameter\_8} \cdot \mathrm{parameter\_4}}{[\mathrm{cEC}] + \mathrm{parameter\_4}} \cdot \mathrm{g6}^{\mathrm{e}}}{[\mathrm{cL}]^{\mathrm{e}} + \mathrm{g6}^{\mathrm{e}}}}{\mathrm{vol}\,(\mathrm{def})} \tag{25}$$

6.26 Function definition function_4_cP9_trsl

Name function_4_cP9_trsl

Arguments [cP9_m], vol (def), p8

Mathematical Expression

$$\frac{\mathrm{p8} \cdot [\mathrm{cP9\_m}]}{\mathrm{vol}\,(\mathrm{def})} \tag{26}$$

6.27 Function definition function_4_cT_trsl

Name function_4_cT_trsl

Arguments [cT_m], vol (def), p4

Mathematical Expression

$$\frac{\mathrm{p4} \cdot [\mathrm{cT\_m}]}{\mathrm{vol}\,(\mathrm{def})} \tag{27}$$

6.28 Function definition function_4_cT_degr

Name function_4_cT_degr

Arguments L, [cT], [cZG], [cZTL], m6, m7, m8, p5

Mathematical Expression

$$(\mathrm{m6} + \mathrm{m7} \cdot (1 - \mathrm{L})) \cdot [\mathrm{cT}] \cdot (\mathrm{p5} \cdot [\mathrm{cZTL}] + [\mathrm{cZG}]) + \mathrm{m8} \cdot [\mathrm{cT}] \tag{28}$$

6.29 Function definition function_4_cT_m_degr

Name function_4_cT_m_degr

Arguments [cT_m], vol (def), m5

Mathematical Expression

$$\frac{\mathrm{m5} \cdot [\mathrm{cT\_m}]}{\mathrm{vol}\,(\mathrm{def})} \tag{29}$$

6.30 Function definition function_4_cE4_degr

Name function_4_cE4_degr

Arguments [cCOP1d], [cCOP1n], [cE3n], [cE4], [cLUX], vol (def), m10, m35, m9, p21, p25, p26

Mathematical Expression

$$\frac{\mathrm{m35} \cdot [\mathrm{cE4}] + \mathrm{p25} \cdot [\mathrm{cE4}] \cdot [\mathrm{cE3n}] - \frac{\mathrm{p21} \cdot \mathrm{p25} \cdot [\mathrm{cE4}] \cdot [\mathrm{cE3n}]}{\mathrm{p26} \cdot [\mathrm{cLUX}] + \mathrm{p21} + \mathrm{m9} \cdot [\mathrm{cCOP1d}] + \mathrm{m10} \cdot [\mathrm{cCOP1n}]}}{\mathrm{vol}\,(\mathrm{def})} \tag{30}$$

6.31 Function definition function_4_cZTL_trsl

Name function_4_cZTL_trsl

Arguments vol(def), p14

Mathematical Expression

$$\frac{\mathrm{p14}}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{31}$$

6.32 Function definition function_4_cL_modif

Name function_4_cL_modif

Arguments c, [cL], vol(def), g3, p3

Mathematical Expression

$$\frac{\frac{\mathrm{p3}\cdot[\mathrm{cL}]^{\mathrm{c}}}{[\mathrm{cL}]^{\mathrm{c}}+\mathrm{g3}^{\mathrm{c}}}}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{32}$$

6.33 Function definition function_4_cEG_degr_1

Name function_4_cEG_degr_1

Arguments [cCOP1c], [cCOP1d], [cCOP1n], [cE3n], [cEG], [cG], vol(def), m10, m19, m9, p17, p18, p28, p29, parameter_26

Mathematical Expression

$$\frac{\mathrm{m10}\cdot[\mathrm{cEG}]\cdot[\mathrm{cCOP1c}]+\mathrm{p18}\cdot[\mathrm{cEG}]-\frac{\mathrm{parameter\_26}\cdot\left(\mathrm{p18}\cdot[\mathrm{cEG}]+\frac{\mathrm{p17}\cdot[\mathrm{cE3n}]\cdot\mathrm{p28}\cdot[\mathrm{cG}]}{\mathrm{p29}+\mathrm{m19}+\mathrm{p17}\cdot[\mathrm{cE3n}]}\right)}{\mathrm{m10}\cdot[\mathrm{cCOP1n}]+\mathrm{m9}\cdot[\mathrm{cCOP1d}]+\mathrm{parameter\_26}}}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{33}$$

6.34 Function definition function_4_cEC_degr

Name function_4_cEC_degr

Arguments L, [cCOP1d], [cCOP1n], [cE3n], [cEC], [cEG], [cG], d, g7, m10, m19, m32, m9, p17, p18, p24, p28, p29, parameter_26

Mathematical Expression

$$\mathrm{m10}\cdot[\mathrm{cCOP1n}]\cdot[\mathrm{cEC}]+\mathrm{m9}\cdot[\mathrm{cCOP1d}]\cdot[\mathrm{cEC}]+\mathrm{m32}\cdot[\mathrm{cEC}]\cdot\left(1+\frac{\mathrm{p24}\cdot\mathrm{L}\cdot\left(\frac{\mathrm{p28}\cdot[\mathrm{cG}]}{\mathrm{p29}+\mathrm{m19}+\mathrm{p17}\cdot[\mathrm{cE3n}]}+\frac{\mathrm{p18}\cdot[\mathrm{cEG}]+\frac{\mathrm{p17}\cdot[\mathrm{cE3n}]\cdot\mathrm{p28}\cdot[\mathrm{cG}]}{\mathrm{p29}+\mathrm{m19}+\mathrm{p17}\cdot[\mathrm{cE3n}]}}{\mathrm{m10}\cdot[\mathrm{cCOP1n}]+\mathrm{m9}\cdot[\mathrm{cCOP1d}]+\mathrm{parameter\_26}}\right)^{\mathrm{d}}}{\left(\frac{\mathrm{p28}\cdot[\mathrm{cG}]}{\mathrm{p29}+\mathrm{m19}+\mathrm{p17}\cdot[\mathrm{cE3n}]}+\frac{\mathrm{p18}\cdot[\mathrm{cEG}]+\frac{\mathrm{p17}\cdot[\mathrm{cE3n}]\cdot\mathrm{p28}\cdot[\mathrm{cG}]}{\mathrm{p29}+\mathrm{m19}+\mathrm{p17}\cdot[\mathrm{cE3n}]}}{\mathrm{m10}\cdot[\mathrm{cCOP1n}]+\mathrm{m9}\cdot[\mathrm{cCOP1d}]+\mathrm{parameter\_26}}\right)^{\mathrm{d}}+\mathrm{g7}^{\mathrm{d}}}\right) \tag{34}$$

6.35 Function definition function_4_cG_cE3_assoc

Name function_4_cG_cE3_assoc

Arguments [cE3], [cG], vol (def), p17

Mathematical Expression

$$\frac{\mathrm{p17}\cdot[\mathrm{cE3}]\cdot[\mathrm{cG}]}{\mathrm{vol}\,(\mathrm{def})} \tag{35}$$

6.36 Function definition function_4_cSnRK2_degr

Name function_4_cSnRK2_degr

Arguments vol (def), m30, [species_2], [species_3]

Mathematical Expression

$$\frac{\mathrm{m30}\cdot[\mathrm{species\_3}]\cdot[\mathrm{species\_2}]}{\mathrm{vol}\,(\mathrm{def})} \tag{36}$$

6.37 Function definition function_4_cCOP1d_activ

Name function_4_cCOP1d_activ

Arguments L, [cCOP1n], [cP], n14, n6

Mathematical Expression

$$\mathrm{n6}\cdot\mathrm{L}\cdot[\mathrm{cP}]\cdot[\mathrm{cCOP1n}]+\mathrm{n14}\cdot[\mathrm{cCOP1n}] \tag{37}$$

6.38 Function definition function_4_cG_m_trscr_1

Name function_4_cG_m_trscr_1

Arguments L, [cEC], [cL], [cP], [cT], e, g14, g15, n12, parameter_1, parameter_7, q2

Mathematical Expression

$$\frac{\text{parameter\_1}^{\text{parameter\_7}}}{\text{parameter\_1}^{\text{parameter\_7}} + [\text{cT}]^{\text{parameter\_7}}} \cdot \left(\text{L} \cdot \text{q2} \cdot [\text{cP}] + \frac{\frac{\text{n12} \cdot \text{g14}}{[\text{cEC}] + \text{g14}} \cdot \text{g15}^{\text{e}}}{[\text{cL}]^{\text{e}} + \text{g15}^{\text{e}}} \right) \tag{38}$$

6.39 Function definition function_4_cP_degr

Name function_4_cP_degr

Arguments L, [cP], m11

Mathematical Expression

$$\text{m11} \cdot [\text{cP}] \cdot \text{L} \tag{39}$$

6.40 Function definition function_4_cE3_trsl

Name function_4_cE3_trsl

Arguments [cE3_m], vol (def), p16

Mathematical Expression

$$\frac{\text{p16} \cdot [\text{cE3\_m}]}{\text{vol}\,(\text{def})} \tag{40}$$

6.41 Function definition function_4_cE3_m_degr

Name function_4_cE3_m_degr

Arguments [cE3_m], vol (def), m26

Mathematical Expression

$$\frac{\text{m26} \cdot [\text{cE3\_m}]}{\text{vol}\,(\text{def})} \tag{41}$$

6.42 Function definition function_4_cE3_m_trscr

Name function_4_cE3_m_trscr

Arguments [cL], vol (def), e, g16, n3

Mathematical Expression

$$\frac{\frac{\text{n3} \cdot \text{g16}^{\text{e}}}{[\text{cL}]^{\text{e}} + \text{g16}^{\text{e}}}}{\text{vol}\,(\text{def})} \tag{42}$$

6.43 Function definition function_4_cs_degr_1

Name function_4_cs_degr_1

Arguments vol (def), m29, [species_4]

Mathematical Expression

$$\frac{\text{m29} \cdot [\text{species\_4}]}{\text{vol}\,(\text{def})} \tag{43}$$

6.44 Function definition function_4_cLUX_trsl

Name function_4_cLUX_trsl

Arguments [cLUX_m], vol (def), p27

Mathematical Expression

$$\frac{\text{p27} \cdot [\text{cLUX\_m}]}{\text{vol}\,(\text{def})} \tag{44}$$

6.45 Function definition function_4_cLm_degr

Name function_4_cLm_degr

Arguments [cLm], vol (def), m4

Mathematical Expression

$$\frac{\text{m4} \cdot [\text{cLm}]}{\text{vol}\,(\text{def})} \tag{45}$$

6.46 Function definition function_4_cG_cZTL_assoc

Name function_4_cG_cZTL_assoc

Arguments L, [cG], [cZG], [cZTL], p12, p13

Mathematical Expression

$$\text{p12} \cdot \text{L} \cdot [\text{cZTL}] \cdot [\text{cG}] - \text{p13} \cdot (1 - \text{L}) \cdot [\text{cZG}] \tag{46}$$

6.47 Function definition function_4_cLUX_m_degr

Name function_4_cLUX_m_degr

Arguments [cLUX_m], vol (def), m34

Mathematical Expression

$$\frac{\text{m34} \cdot [\text{cLUX\_m}]}{\text{vol}\,(\text{def})} \tag{47}$$

6.48 Function definition function_4_cP9_m_degr

Name function_4_cP9_m_degr

Arguments [cP9_m], vol (def), m12

Mathematical Expression

$$\frac{\mathrm{m12} \cdot [\mathrm{cP9\_m}]}{\mathrm{vol}\,(\mathrm{def})} \tag{48}$$

6.49 Function definition function_4_cLUX_m_trscr

Name function_4_cLUX_m_trscr

Arguments [cEC], [cL], [cT], vol (def), e, g2, g6, n13, parameter_3, parameter_7

Mathematical Expression

$$\frac{\frac{\mathrm{parameter\_3}^{\mathrm{parameter\_7}}}{\mathrm{parameter\_3}^{\mathrm{parameter\_7}}+[\mathrm{cT}]^{\mathrm{parameter\_7}}} \cdot \frac{\frac{\mathrm{n13}\cdot \mathrm{g2}}{[\mathrm{cEC}]+\mathrm{g2}} \cdot \mathrm{g6}^{\mathrm{e}}}{[\mathrm{cL}]^{\mathrm{e}}+\mathrm{g6}^{\mathrm{e}}}}{\mathrm{vol}\,(\mathrm{def})} \tag{49}$$

6.50 Function definition function_4_cP9_m_trscr_1

Name function_4_cP9_m_trscr_1

Arguments L, [cEC], [cL], [cP], [cT], e, g8, g9, n4, n7, parameter_2, parameter_7, q3

Mathematical Expression

$$\frac{\mathrm{parameter\_2}^{\mathrm{parameter\_7}}}{\mathrm{parameter\_2}^{\mathrm{parameter\_7}} + [\mathrm{cT}]^{\mathrm{parameter\_7}}} \cdot \left(\mathrm{L}\cdot \mathrm{q3}\cdot [\mathrm{cP}] + \frac{\left(\mathrm{n4} + \frac{\mathrm{n7}\cdot [\mathrm{cL}]^{\mathrm{e}}}{[\mathrm{cL}]^{\mathrm{e}}+\mathrm{g9}^{\mathrm{e}}} \right) \cdot \mathrm{g8}}{[\mathrm{cEC}] + \mathrm{g8}} \right) \tag{50}$$

6.51 Function definition function_4_cE3n_import

Name function_4_cE3n_import

Arguments [cE3], [cE3n], vol (def), p19, p20

Mathematical Expression

$$\frac{\mathrm{p19} \cdot [\mathrm{cE3}] - \mathrm{p20} \cdot [\mathrm{cE3n}]}{\mathrm{vol}\,(\mathrm{def})} \tag{51}$$

6.52 Function definition function_4_cE3n_degr

Name function_4_cE3n_degr

Arguments [cCOP1d], [cCOP1n], [cE3n], [cE4], [cG], [cLUX], vol (def), m10, m19, m9, p17, p21, p25, p26, p28, p29

Mathematical Expression

$$\frac{\mathrm{m10}\cdot[\mathrm{cE3n}]\cdot[\mathrm{cCOP1n}]+\mathrm{m9}\cdot[\mathrm{cE3n}]\cdot[\mathrm{cCOP1d}]+\mathrm{p25}\cdot[\mathrm{cE4}]\cdot[\mathrm{cE3n}]-\frac{\mathrm{p21}\cdot\mathrm{p25}\cdot[\mathrm{cE4}]\cdot[\mathrm{cE3n}]}{\mathrm{p26}\cdot[\mathrm{cLUX}]+\mathrm{p21}+\mathrm{m9}\cdot[\mathrm{cCOP1d}]+\mathrm{m10}\cdot[\mathrm{cCOP1n}]}+}{\mathrm{vol}\,(\mathrm{def})} \tag{52}$$

6.53 Function definition function_4_cE3_degr

Name function_4_cE3_degr

Arguments [cCOP1c], [cE3], vol (def), m9

Mathematical Expression

$$\frac{\mathrm{m9}\cdot[\mathrm{cE3}]\cdot[\mathrm{cCOP1c}]}{\mathrm{vol}\,(\mathrm{def})} \tag{53}$$

6.54 Function definition function_4_cLUX_degr_1

Name function_4_cLUX_degr_1

Arguments [cCOP1d], [cCOP1n], [cE3n], [cE4], [cLUX], vol (def), m10, m36, m9, p21, p25, p26

Mathematical Expression

$$\frac{\mathrm{m36}\cdot[\mathrm{cLUX}]+\frac{\mathrm{p26}\cdot[\mathrm{cLUX}]\cdot\mathrm{p25}\cdot[\mathrm{cE4}]\cdot[\mathrm{cE3n}]}{\mathrm{p26}\cdot[\mathrm{cLUX}]+\mathrm{p21}+\mathrm{m9}\cdot[\mathrm{cCOP1d}]+\mathrm{m10}\cdot[\mathrm{cCOP1n}]}}{\mathrm{vol}\,(\mathrm{def})} \tag{54}$$

6.55 Function definition function_4_cZTL_degr

Name function_4_cZTL_degr

Arguments [cZTL], vol (def), m20

Mathematical Expression

$$\frac{\mathrm{m20}\cdot[\mathrm{cZTL}]}{\mathrm{vol}\,(\mathrm{def})} \tag{55}$$

6.56 Function definition function_4_cEC_form

Name function_4_cEC_form

Arguments [cCOP1d], [cCOP1n], [cE3n], [cE4], [cLUX], vol (def), m10, m9, p21, p25, p26

Mathematical Expression

$$\frac{\frac{\mathrm{p26}\cdot[\mathrm{cLUX}]\cdot\mathrm{p25}\cdot[\mathrm{cE4}]\cdot[\mathrm{cE3n}]}{\mathrm{p26}\cdot[\mathrm{cLUX}]+\mathrm{p21}+\mathrm{m9}\cdot[\mathrm{cCOP1d}]+\mathrm{m10}\cdot[\mathrm{cCOP1n}]}}{\mathrm{vol}\,(\mathrm{def})} \tag{56}$$

6.57 Function definition function_4_cG_degr_1

Name function_4_cG_degr_1

Arguments [cE3n], [cG], vol (def), m19, p17, p28, p29

Mathematical Expression

$$\frac{\mathrm{m19}\cdot[\mathrm{cG}]+\mathrm{p28}\cdot[\mathrm{cG}]-\frac{\mathrm{p29}\cdot\mathrm{p28}\cdot[\mathrm{cG}]}{\mathrm{p29}+\mathrm{m19}+\mathrm{p17}\cdot[\mathrm{cE3n}]}}{\mathrm{vol}\,(\mathrm{def})} \tag{57}$$

6.58 Function definition function_4_cG_trsl

Name function_4_cG_trsl

Arguments [cG_m], vol (def), p11

Mathematical Expression

$$\frac{\mathrm{p11}\cdot[\mathrm{cG\_m}]}{\mathrm{vol}\,(\mathrm{def})} \tag{58}$$

6.59 Function definition function_4_cL_m_trscr

Name function_4_cL_m_trscr

Arguments L, a, [cNI], [cP], [cP7], [cP9], [cT], g1, n1, q1, F_LHY

Mathematical Expression

$$\mathrm{F\_LHY}\cdot\left(\mathrm{L}\cdot\mathrm{q1}\cdot[\mathrm{cP}]+\frac{\mathrm{n1}\cdot\mathrm{g1}^{\mathrm{a}}}{([\mathrm{cP9}]+[\mathrm{cP7}]+[\mathrm{cNI}]+[\mathrm{cT}])^{\mathrm{a}}+\mathrm{g1}^{\mathrm{a}}}\right) \tag{59}$$

6.60 Function definition function_4_cCOP1n_import

Name function_4_cCOP1n_import

Arguments [cCOP1c], vol (def), p6

Mathematical Expression

$$\frac{\mathrm{p6} \cdot [\mathrm{cCOP1c}]}{\mathrm{vol}\,(\mathrm{def})} \tag{60}$$

6.61 Function definition function_4_cCOP1c_degr

Name function_4_cCOP1c_degr

Arguments L, [cCOP1c], m27, p15

Mathematical Expression

$$\mathrm{m27} \cdot [\mathrm{cCOP1c}] \cdot (1 + \mathrm{p15} \cdot \mathrm{L}) \tag{61}$$

6.62 Function definition function_4_cCOP1c_trsl

Name function_4_cCOP1c_trsl

Arguments vol (def), n5

Mathematical Expression

$$\frac{\mathrm{n5}}{\mathrm{vol}\,(\mathrm{def})} \tag{62}$$

6.63 Function definition function_4_cP_trsl

Name function_4_cP_trsl

Arguments L, [cP], p7

Mathematical Expression

$$\mathrm{p7} \cdot (1 - \mathrm{L}) \cdot (1 - [\mathrm{cP}]) \tag{63}$$

6.64 Function definition function_4_cCOP1n_degr

Name function_4_cCOP1n_degr

Arguments L, [cCOP1n], m27, p15

Mathematical Expression

$$\mathrm{m27} \cdot [\mathrm{cCOP1n}] \cdot (1 + \mathrm{p15} \cdot \mathrm{L}) \tag{64}$$

7 Rules

This is an overview of 18 rules.

7.1 Rule D

Rule D is an assignment rule for parameter D:

$$\mathrm{D} = 1 - \mathrm{L} \tag{65}$$

7.2 Rule NPR1_WT

Rule NPR1_WT is an assignment rule for parameter NPR1_WT:

$$\mathrm{NPR1\_WT} \tag{66}$$

$$= \begin{cases} 1 & \\ 0.0113 \cdot \left(\mathrm{time} - 28 - \left\lfloor \frac{\mathrm{time} - 28}{24} \right\rfloor \cdot 24\right) + 0.6286 & \\ 0.0030 \cdot \left(\mathrm{time} - 28 - \left\lfloor \frac{\mathrm{time} - 28}{24} \right\rfloor \cdot 24\right) + 0.5716 & \\ 0.0774 \cdot \left(\mathrm{time} - 28 - \left\lfloor \frac{\mathrm{time} - 28}{24} \right\rfloor \cdot 24\right) - 0.0232 & \\ 0.1815 \cdot \left(\mathrm{time} - 28 - \left\lfloor \frac{\mathrm{time} - 28}{24} \right\rfloor \cdot 24\right) - 1.2732 & \\ 0.0085 \cdot \left(\mathrm{time} - 28 - \left\lfloor \frac{\mathrm{time} - 28}{24} \right\rfloor \cdot 24\right) + 1.4947 & \\ \begin{cases} 0.2591 \cdot \left(\mathrm{time} - 28 - \left\lfloor \frac{\mathrm{time} - 28}{24} \right\rfloor \cdot 24\right) + 6.8481 & \text{if } \left(\begin{cases} \mathrm{time} - 28 - 24 \cdot \left\lfloor \frac{\mathrm{time} - 28}{24} \right\rfloor & \text{if} \\ \mathrm{time} - 28 - 24 \cdot \left\lfloor \frac{\mathrm{time} - 28}{24} \right\rfloor & \text{ot} \end{cases} \right. \\ 0 & \text{otherwise} \end{cases} & \end{cases}$$

7.3 Rule NPR1_SA

Rule NPR1_SA is an assignment rule for parameter NPR1_SA:

$$\text{NPR1\_SA} = \begin{cases} \begin{cases} \begin{cases} \begin{cases} \begin{cases} \begin{cases} \begin{cases} \begin{cases} \begin{cases} \begin{cases} \begin{cases} 1.2393 \cdot (\text{time} - 28) + 0.6286 \\ 0.5562 \cdot (\text{time} - 28) + 3.3613 \end{cases} \\ 0.5897 \cdot (\text{time} - 28) + 3.093 \end{cases} \\ 1.1649 \cdot (\text{time} - 28) - 3.8089 \end{cases} \\ 0.6696 \cdot (\text{time} - 28) + 4.1157 \end{cases} \\ 0.8328 \cdot (\text{time} - 28) + 34.1643 \end{cases} \\ 0.4128 \cdot (\text{time} - 28) + 24.0839 \end{cases} \\ 1.7801 \cdot (\text{time} - 28) + 62.3676 \end{cases} \\ 0.2292 \cdot (\text{time} - 28) + 12.7375 \end{cases} \\ 1.2106 \cdot (\text{time} - 28) - 39.0947 \end{cases} \\ \begin{cases} 0.6097 \cdot (\text{time} - 28) + 33.7203 & \text{if } (\text{time} > 68) \wedge (\\ \begin{cases} 1.5657 \cdot (\text{time} - 28) + 75.7827 & \text{if } (\text{time} > 72) \wedge (\text{time} \leq 76) \\ 0 & \text{otherwise} \end{cases} & \text{otherwise} \end{cases} \\ \text{NPR1\_WT} \end{cases} \tag{67}$$

7.4 Rule PRR7_on

Rule PRR7_on is an assignment rule for parameter PRR7_on:

$$\text{PRR7\_on} = \begin{cases} 1 & \text{if true} \\ 0 & \text{otherwise} \end{cases} \tag{68}$$

7.5 Rule LHY_on

Rule LHY_on is an assignment rule for parameter LHY_on:

$$\text{LHY\_on} = 1 \tag{69}$$

7.6 Rule nb_TOC1

Rule nb_TOC1 is an assignment rule for parameter nb_TOC1:

$$\text{nb\_TOC1} = \begin{cases} 0.5606 & \text{if } (\text{LHY\_on} = 1) \wedge (\text{PRR7\_on} = 1) \\ \begin{cases} 0.5782 & \text{if LHY\_on} = 1 \\ \begin{cases} 0.5502 & \text{if PRR7\_on} = 1 \\ 0.5689 & \text{otherwise} \end{cases} & \text{otherwise} \end{cases} & \text{otherwise} \end{cases} \tag{70}$$

7.7 Rule nb_LHY

Rule nb_LHY is an assignment rule for parameter nb_LHY:

$$\text{nb\_LHY} = \begin{cases} 0.4808 & \text{if } (\text{LHY\_on} = 1) \wedge (\text{PRR7\_on} = 1) \\ \begin{cases} 0.3646 & \text{if LHY\_on} = 1 \\ 1 & \text{otherwise} \end{cases} & \text{otherwise} \end{cases} \tag{71}$$

7.8 Rule nb_PRR7

Rule nb_PRR7 is an assignment rule for parameter nb_PRR7:

$$\text{nb\_PRR7} = \begin{cases} 0.3918 & \text{if } (\text{LHY\_on} = 1) \wedge (\text{PRR7\_on} = 1) \\ \begin{cases} 0.2113 & \text{if PRR7\_on} = 1 \\ 1 & \text{otherwise} \end{cases} & \text{otherwise} \end{cases} \tag{72}$$

7.9 Rule Kd_TOC1

Rule Kd_TOC1 is an assignment rule for parameter Kd_TOC1:

$$\text{Kd\_TOC1} = \begin{cases} 1.3371 & \text{if } (\text{LHY\_on} = 1) \wedge (\text{PRR7\_on} = 1) \\ \begin{cases} 1.3925 & \text{if LHY\_on} = 1 \\ \begin{cases} 1.0212 & \text{if PRR7\_on} = 1 \\ 1.0714 & \text{otherwise} \end{cases} & \text{otherwise} \end{cases} & \text{otherwise} \end{cases} \tag{73}$$

7.10 Rule Kd_LHY

Rule Kd_LHY is an assignment rule for parameter Kd_LHY:

$$\text{Kd\_LHY} = \begin{cases} 2.5062 & \text{if } (\text{LHY\_on} = 1) \wedge (\text{PRR7\_on} = 1) \\ \begin{cases} 1.9185 & \text{if LHY\_on} = 1 \\ 0 & \text{otherwise} \end{cases} & \text{otherwise} \end{cases} \tag{74}$$

7.11 Rule WT

Rule WT is an assignment rule for parameter WT:

$$\text{WT} = \begin{cases} 1 & \text{if true} \\ 0 & \text{otherwise} \end{cases} \tag{75}$$

7.12 Rule na_TOC1

Rule na_TOC1 is an assignment rule for parameter na_TOC1:

$$\text{na\_TOC1} = \begin{cases} (1 - \text{nb\_TOC1}) \cdot (1 + \text{Kd\_TOC1}) & \text{if WT} = 1 \\ 0 & \text{otherwise} \end{cases} \tag{76}$$

7.13 Rule na_LHY

Rule na_LHY is an assignment rule for parameter na_LHY:

$$\text{na\_LHY} = \begin{cases} (1 - \text{nb\_LHY}) \cdot (1 + \text{Kd\_LHY}) & \text{if WT} = 1 \\ 0 & \text{otherwise} \end{cases} \tag{77}$$

7.14 Rule na_PRR7

Rule na_PRR7 is an assignment rule for parameter na_PRR7:

$$\text{na\_PRR7} = \begin{cases} (1 - \text{nb\_PRR7}) \cdot (1 + \text{Kd\_PRR7}) & \text{if WT} = 1 \\ 0 & \text{otherwise} \end{cases} \tag{78}$$

7.15 Rule SA

Rule SA is an assignment rule for parameter SA:

$$\text{SA} = \begin{cases} 1 & \text{if true} \\ 0 & \text{otherwise} \end{cases} \tag{79}$$

7.16 Rule F_TOC1

Rule F_TOC1 is an assignment rule for parameter F_TOC1:

$$\text{F\_TOC1} = \begin{cases} \text{nb\_TOC1} + \dfrac{\text{na\_TOC1} \cdot \text{NPR1\_SA}}{\text{Kd\_TOC1} + \text{NPR1\_SA}} & \text{if SA} = 1 \\ \text{nb\_TOC1} + \dfrac{\text{na\_TOC1} \cdot \text{NPR1\_WT}}{\text{Kd\_TOC1} + \text{NPR1\_WT}} & \text{otherwise} \end{cases} \tag{80}$$

7.17 Rule F_LHY

Rule F_LHY is an assignment rule for parameter F_LHY:

$$\text{F\_LHY} = \begin{cases} \text{nb\_LHY} + \dfrac{\text{na\_LHY} \cdot \text{NPR1\_SA}}{\text{Kd\_LHY} + \text{NPR1\_SA}} & \text{if SA} = 1 \\ \text{nb\_LHY} + \dfrac{\text{na\_LHY} \cdot \text{NPR1\_WT}}{\text{Kd\_LHY} + \text{NPR1\_WT}} & \text{otherwise} \end{cases} \tag{81}$$

7.18 Rule F_PRR7

Rule F_PRR7 is an assignment rule for parameter F_PRR7:

$$\text{F\_PRR7} = \begin{cases} \text{nb\_PRR7} + \dfrac{\text{na\_PRR7} \cdot \text{NPR1\_SA}}{\text{Kd\_PRR7} + \text{NPR1\_SA}} & \text{if SA} = 1 \\ \text{nb\_PRR7} + \dfrac{\text{na\_PRR7} \cdot \text{NPR1\_WT}}{\text{Kd\_PRR7} + \text{NPR1\_WT}} & \text{otherwise} \end{cases} \tag{82}$$

8 Reactions

This model contains 64 reactions. All reactions are listed in the following table and are subsequently described in detail. If a reaction is affected by a modifier, the identifier of this species is written above the reaction arrow.

Table 5: Overview of all reactions

№	Id	Name	Reaction Equation	SBO
1	cL_m_trscr	cL_m_trscr	$\emptyset \xrightarrow{\text{cNI, cP, cP7, cP9, cT, cNI, cP, cP7, cP9, cT}} \text{cL\_m}$	
2	cL_m_degr	cL_m_degr	$\text{cL\_m} \xrightarrow{\text{cL\_m}} \emptyset$	
3	cL_trsl	cL_trsl	$\emptyset \xrightarrow{\text{cL\_m, cL\_m}} \text{cL}$	
4	cL_degr	cL_degr	$\text{cL} \xrightarrow{\text{cL}} \emptyset$	
5	cL_modif	cL_modif	$\emptyset \xrightarrow{\text{cL, cL}} \text{cLm}$	
6	cLm_degr	cLm_degr	$\text{cLm} \xrightarrow{\text{cLm}} \emptyset$	
7	cP_trsl	cP_trsl	$\emptyset \xrightarrow{\text{cP}} \text{cP}$	
8	cP_degr	cP_degr	$\text{cP} \xrightarrow{\text{cP}} \emptyset$	
9	cP9_m_trscr	cP9_m_trscr	$\emptyset \xrightarrow{\text{cP, cL, cEC, cT, cEC, cL, cP, cT}} \text{cP9\_m}$	
10	cP9_m_degr	cP9_m_degr	$\text{cP9\_m} \xrightarrow{\text{cP9\_m}} \emptyset$	
11	cP9_trsl	cP9_trsl	$\emptyset \xrightarrow{\text{cP9\_m, cP9\_m}} \text{cP9}$	
12	cP9_degr	cP9_degr	$\text{cP9} \xrightarrow{\text{cP9}} \emptyset$	
13	cP7_m_trscr	cP7_m_trscr	$\emptyset \xrightarrow{\text{cL, cLm, cP9, cT, cL, cLm, cP9, cT}} \text{cP7\_m}$	
14	cP7_m_degr	cP7_m_degr	$\text{cP7\_m} \xrightarrow{\text{cP7\_m}} \emptyset$	
15	cP7_trsl	cP7_trsl	$\emptyset \xrightarrow{\text{cP7\_m, cP7\_m}} \text{cP7}$	
16	cP7_degr	cP7_degr	$\text{cP7} \xrightarrow{\text{cP7}} \emptyset$	

№	Id	Name	Reaction Equation	SBO
17	cNI_m_trscr	cNI_m_trscr	$\emptyset \xrightarrow{\text{cT, cLm, cP7, cLm, cP7, cT}} \text{cNI\_m}$	
18	cNI_m_degr	cNI_m_degr	$\text{cNI\_m} \xrightarrow{\text{cNI\_m}} \emptyset$	
19	cNI_trsl	cNI_trsl	$\emptyset \xrightarrow{\text{cNI\_m, cNI\_m}} \text{cNI}$	
20	cNI_degr	cNI_degr	$\text{cNI} \xrightarrow{\text{cNI}} \emptyset$	
21	cT_m_trscr	cT_m_trscr	$\emptyset \xrightarrow{\text{cEC, cL, species\_3, cEC, cL, species\_3}} \text{cT\_m}$	
22	cT_m_degr	cT_m_degr	$\text{cT\_m} \xrightarrow{\text{cT\_m}} \emptyset$	
23	cT_trsl	cT_trsl	$\emptyset \xrightarrow{\text{cT\_m, cT\_m}} \text{cT}$	
24	cT_degr	cT_degr	$\text{cT} \xrightarrow{\text{cZTL, cZG, cT, cZG, cZTL}} \emptyset$	
25	cE4_m_trscr	cE4_m_trscr	$\emptyset \xrightarrow{\text{cT, cEC, cL, cEC, cL, cT}} \text{cE4\_m}$	
26	cE4_m_degr	cE4_m_degr	$\text{cE4\_m} \xrightarrow{\text{cE4\_m}} \emptyset$	
27	cE4_trsl	cE4_trsl	$\emptyset \xrightarrow{\text{cE4\_m, cE4\_m}} \text{cE4}$	
28	cE4_degr	cE4_degr	$\text{cE4} \xrightarrow{\text{cE3n, cLUX, cCOP1d, cCOP1n, cCOP1d, cCOP1n, cE3n, cE4, cLUX}} \emptyset$	
29	cE3_m_trscr	cE3_m_trscr	$\emptyset \xrightarrow{\text{cL, cL}} \text{cE3\_m}$	
30	cE3_m_degr	cE3_m_degr	$\text{cE3\_m} \xrightarrow{\text{cE3\_m}} \emptyset$	
31	cE3_trsl	cE3_trsl	$\emptyset \xrightarrow{\text{cE3\_m, cE3\_m}} \text{cE3}$	
32	cE3_degr	cE3_degr	$\text{cE3} \xrightarrow{\text{cCOP1c, cCOP1c, cE3}} \emptyset$	
33	cE3n_import	cE3n_import	$\text{cE3} \xrightarrow{\text{cE3, cE3n}} \text{cE3n}$	
34	cE3n_degr	cE3n_degr	$\text{cE3n} \xrightarrow{\text{cCOP1n, cCOP1d, cE4, cLUX, cG, cE3n, cCOP1d, cCOP1n, cE3n, cE4, cG, cL}$	
35	cLUX_m_trscr	cLUX_m_trscr	$\emptyset \xrightarrow{\text{cT, cEC, cL, cEC, cL, cT}} \text{cLUX\_m}$	
36	cLUX_m_degr	cLUX_m_degr	$\text{cLUX\_m} \xrightarrow{\text{cLUX\_m}} \emptyset$	

№	Id	Name	Reaction Equation	SBO
37	cLUX_trsl	cLUX_trsl	$\emptyset \xrightarrow{\text{cLUX\_m, cLUX\_m}} \text{cLUX}$	
38	cLUX_degr	cLUX_degr	$\text{cLUX} \xrightarrow{\text{cE4, cE3n, cCOP1d, cCOP1n, cCOP1d, cCOP1n, cE3n, cE4, cLUX}} \emptyset$	
39	cCOP1c_trsl	cCOP1c_trsl	$\emptyset \longrightarrow \text{cCOP1c}$	
40	cCOP1c_degr	cCOP1c_degr	$\text{cCOP1c} \xrightarrow{\text{cCOP1c}} \emptyset$	
41	cCOP1n_import	cCOP1n_import	$\text{cCOP1c} \xrightarrow{\text{cCOP1c}} \text{cCOP1n}$	
42	cCOP1n_degr	cCOP1n_degr	$\text{cCOP1n} \xrightarrow{\text{cCOP1n}} \emptyset$	
43	cCOP1d_activ	cCOP1d_activ	$\text{cCOP1n} \xrightarrow{\text{cP, cCOP1n, cP}} \text{cCOP1d}$	
44	cCOP1d_degr	cCOP1d_degr	$\text{cCOP1d} \xrightarrow{\text{cCOP1d}} \emptyset$	
45	cG_m_trscr	cG_m_trscr	$\emptyset \xrightarrow{\text{cT, cP, cEC, cL, cEC, cL, cP, cT}} \text{cG\_m}$	
46	cG_m_degr	cG_m_degr	$\text{cG\_m} \xrightarrow{\text{cG\_m}} \emptyset$	
47	cG_trsl	cG_trsl	$\emptyset \xrightarrow{\text{cG\_m, cG\_m}} \text{cG}$	
48	cG_degr	cG_degr	$\text{cG} \xrightarrow{\text{cE3n, cE3n, cG}} \emptyset$	
49	cG_cZTL_assoc	cG_cZTL_assoc	$\text{cG} + \text{cZTL} \underset{}{\overset{\text{cG, cZG, cZTL}}{\rightleftharpoons}} \text{cZG}$	
50	cZTL_trsl	cZTL_trsl	$\emptyset \longrightarrow \text{cZTL}$	
51	cZTL_degr	cZTL_degr	$\text{cZTL} \xrightarrow{\text{cZTL}} \emptyset$	
52	cZG_degr	cZG_degr	$\text{cZG} \xrightarrow{\text{cZG}} \emptyset$	
53	cG_cE3_assoc	cG_cE3_assoc	$\text{cE3} + \text{cG} \xrightarrow{\text{cE3, cG}} \text{cEG}$	
54	cEG_degr	cEG_degr	$\text{cEG} \xrightarrow{\text{cCOP1c, cE3n, cG, cCOP1n, cCOP1d, cCOP1c, cCOP1d, cCOP1n, cE3n, cEG, c}$	
55	cEC_form	cEC_form	$\emptyset \xrightarrow{\text{cLUX, cE4, cE3n, cCOP1d, cCOP1n, cCOP1d, cCOP1n, cE3n, cE4, cLUX}} \text{cEC}$	
56	cEC_degr	cEC_degr	$\text{cEC} \xrightarrow{\text{cCOP1n, cCOP1d, cG, cE3n, cEG, cCOP1d, cCOP1n, cE3n, cEC, cEG, cG}} \emptyset$	
57	reaction_1	cABAR_m_trscr	$\emptyset \xrightarrow{\text{cT, cL, cL, cT}} \text{species\_1}$	

№	Id	Name	Reaction Equation	SBO
58	reaction_2	cABAR_m_degr	$\text{species\_1} \xrightarrow{\text{species\_1}} \emptyset$	
59	reaction_3	cPP2C_act	$\emptyset \xrightarrow{\text{species\_1, species\_1}} \text{species\_2}$	
60	reaction_4	cPP2C_degr	$\text{species\_2} \xrightarrow{\text{species\_2}} \emptyset$	
61	reaction_5	cSnRK2_degr	$\text{species\_3} \xrightarrow{\text{species\_2, species\_2, species\_3}} \emptyset$	
62	reaction_6	cSnRK2_act	$\emptyset \longrightarrow \text{species\_3}$	
63	reaction_7	cs_act	$\emptyset \xrightarrow{\text{species\_4, species\_3, species\_3, species\_4}} \text{species\_4}$	
64	reaction_8	cs_degr	$\text{species\_4} \xrightarrow{\text{species\_4}} \emptyset$	

8.1 Reaction cL_m_trscr

This is an irreversible reaction of no reactant forming one product influenced by ten modifiers.

Name cL_m_trscr

Reaction equation

$$\emptyset \xrightarrow{\text{cNI, cP, cP7, cP9, cT, cNI, cP, cP7, cP9, cT}} \text{cL\_m} \tag{83}$$

Modifiers

Table 6: Properties of each modifier.

Id	Name	SBO
cNI	cNI	
cP	cP	
cP7	cP7	
cP9	cP9	
cT	cT	
cNI	cNI	
cP	cP	
cP7	cP7	
cP9	cP9	
cT	cT	

Product

Table 7: Properties of each product.

Id	Name	SBO
cL_m	cL_m	

Kinetic Law

Derived unit contains undeclared units

$$v_1 = \text{vol}\,(\text{def}) \cdot \text{function\_4\_cL\_m\_trscr}\,(\text{L}, \text{a}, [\text{cNI}], [\text{cP}], [\text{cP7}], [\text{cP9}], [\text{cT}], \text{g1}, \text{n1}, \text{q1}, \text{F\_LHY}) \tag{84}$$

$$\begin{aligned} &\text{function\_4\_cL\_m\_trscr}\,(\text{L}, \text{a}, [\text{cNI}], [\text{cP}], [\text{cP7}], [\text{cP9}], [\text{cT}], \text{g1}, \text{n1}, \text{q1}, \text{F\_LHY}) \\ &= \text{F\_LHY} \cdot \left(\text{L} \cdot \text{q1} \cdot [\text{cP}] + \frac{\text{n1} \cdot \text{g1}^{\text{a}}}{([\text{cP9}] + [\text{cP7}] + [\text{cNI}] + [\text{cT}])^{\text{a}} + \text{g1}^{\text{a}}} \right) \end{aligned} \tag{85}$$

$$\begin{aligned}&\text{function\_4\_cL\_m\_trscr}(\text{L}, \text{a}, [\text{cNI}], [\text{cP}], [\text{cP7}], [\text{cP9}], [\text{cT}], \text{g1}, \text{n1}, \text{q1}, \text{F\_LHY})\\ &= \text{F\_LHY} \cdot \left(\text{L} \cdot \text{q1} \cdot [\text{cP}] + \frac{\text{n1} \cdot \text{g1}^{\text{a}}}{([\text{cP9}] + [\text{cP7}] + [\text{cNI}] + [\text{cT}])^{\text{a}} + \text{g1}^{\text{a}}}\right)\end{aligned} \tag{86}$$

8.2 Reaction cL_m_degr

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cL_m_degr

Reaction equation

$$\text{cL\_m} \xrightarrow{\text{cL\_m}} \emptyset \tag{87}$$

Reactant

Table 8: Properties of each reactant.

Id	Name	SBO
cL_m	cL_m	

Modifier

Table 9: Properties of each modifier.

Id	Name	SBO
cL_m	cL_m	

Kinetic Law

Derived unit contains undeclared units

$$v_2 = \text{vol}(\text{def}) \cdot \text{function\_4\_cL\_m\_degr}(\text{L}, [\text{cL\_m}], \text{m1}, \text{m2}) \tag{88}$$

$$\text{function\_4\_cL\_m\_degr}(\text{L}, [\text{cL\_m}], \text{m1}, \text{m2}) = (\text{m2} + (\text{m1} - \text{m2}) \cdot \text{L}) \cdot [\text{cL\_m}] \tag{89}$$

$$\text{function\_4\_cL\_m\_degr}(\text{L}, [\text{cL\_m}], \text{m1}, \text{m2}) = (\text{m2} + (\text{m1} - \text{m2}) \cdot \text{L}) \cdot [\text{cL\_m}] \tag{90}$$

8.3 Reaction cL_trsl

This is an irreversible reaction of no reactant forming one product influenced by two modifiers.

Name cL_trsl

Reaction equation

$$\emptyset \xrightarrow{\text{cL\_m, cL\_m}} \text{cL} \tag{91}$$

Modifiers

Table 10: Properties of each modifier.

Id	Name	SBO
cL_m	cL_m	
cL_m	cL_m	

Product

Table 11: Properties of each product.

Id	Name	SBO
cL	cL	

Kinetic Law

Derived unit contains undeclared units

$$v_3 = \text{vol}(\text{def}) \cdot \text{function\_4\_cL\_trsl}(\text{L}, [\text{cL\_m}], \text{p1}, \text{p2}) \tag{92}$$

$$\text{function\_4\_cL\_trsl}(\text{L}, [\text{cL\_m}], \text{p1}, \text{p2}) = [\text{cL\_m}] \cdot (\text{p1} \cdot \text{L} + \text{p2}) \tag{93}$$

$$\text{function\_4\_cL\_trsl}(\text{L}, [\text{cL\_m}], \text{p1}, \text{p2}) = [\text{cL\_m}] \cdot (\text{p1} \cdot \text{L} + \text{p2}) \tag{94}$$

8.4 Reaction cL_degr

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cL_degr

Reaction equation

$$\text{cL} \xrightarrow{\text{cL}} \emptyset \tag{95}$$

Reactant

Table 12: Properties of each reactant.

Id	Name	SBO
cL	cL	

Modifier

Table 13: Properties of each modifier.

Id	Name	SBO
cL	cL	

Kinetic Law

Derived unit contains undeclared units

$$v_4 = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cL\_degr}\left(\mathrm{c}, [\mathrm{cL}], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{g3}, \mathrm{m3}, \mathrm{p3}\right) \tag{96}$$

$$\mathrm{function\_4\_cL\_degr}\left(\mathrm{c}, [\mathrm{cL}], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{g3}, \mathrm{m3}, \mathrm{p3}\right) = \frac{\mathrm{m3} \cdot [\mathrm{cL}] + \frac{\mathrm{p3} \cdot [\mathrm{cL}]^{\mathrm{c}}}{[\mathrm{cL}]^{\mathrm{c}} + \mathrm{g3}^{\mathrm{c}}}}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{97}$$

$$\mathrm{function\_4\_cL\_degr}\left(\mathrm{c}, [\mathrm{cL}], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{g3}, \mathrm{m3}, \mathrm{p3}\right) = \frac{\mathrm{m3} \cdot [\mathrm{cL}] + \frac{\mathrm{p3} \cdot [\mathrm{cL}]^{\mathrm{c}}}{[\mathrm{cL}]^{\mathrm{c}} + \mathrm{g3}^{\mathrm{c}}}}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{98}$$

8.5 Reaction cL_modif

This is an irreversible reaction of no reactant forming one product influenced by two modifiers.

Name cL_modif

Reaction equation

$$\emptyset \xrightarrow{\mathrm{cL},\ \mathrm{cL}} \mathrm{cLm} \tag{99}$$

Modifiers

Table 14: Properties of each modifier.

Id	Name	SBO
cL	cL	
cL	cL	

Product

Table 15: Properties of each product.

Id	Name	SBO
cLm	cLm	

Kinetic Law

Derived unit contains undeclared units

$$v_5 = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cL\_modif}\left(\mathrm{c}, [\mathrm{cL}], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{g3}, \mathrm{p3}\right) \tag{100}$$

$$\mathrm{function\_4\_cL\_modif}\left(\mathrm{c}, [\mathrm{cL}], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{g3}, \mathrm{p3}\right) = \frac{\frac{\mathrm{p3} \cdot [\mathrm{cL}]^{\mathrm{c}}}{[\mathrm{cL}]^{\mathrm{c}} + \mathrm{g3}^{\mathrm{c}}}}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{101}$$

$$\mathrm{function\_4\_cL\_modif}\left(\mathrm{c}, [\mathrm{cL}], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{g3}, \mathrm{p3}\right) = \frac{\frac{\mathrm{p3} \cdot [\mathrm{cL}]^{\mathrm{c}}}{[\mathrm{cL}]^{\mathrm{c}} + \mathrm{g3}^{\mathrm{c}}}}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{102}$$

8.6 Reaction cLm_degr

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cLm_degr

Reaction equation

$$\mathrm{cLm} \xrightarrow{\mathrm{cLm}} \emptyset \tag{103}$$

Reactant

Table 16: Properties of each reactant.

Id	Name	SBO
cLm	cLm	

Modifier

Table 17: Properties of each modifier.

Id	Name	SBO
cLm	cLm	

Kinetic Law

Derived unit contains undeclared units

$$v_6 = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cLm\_degr}\left(\left[\mathrm{cLm}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m4}\right) \tag{104}$$

$$\mathrm{function\_4\_cLm\_degr}\left(\left[\mathrm{cLm}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m4}\right) = \frac{\mathrm{m4} \cdot \left[\mathrm{cLm}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{105}$$

$$\mathrm{function\_4\_cLm\_degr}\left(\left[\mathrm{cLm}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m4}\right) = \frac{\mathrm{m4} \cdot \left[\mathrm{cLm}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{106}$$

8.7 Reaction cP_trsl

This is an irreversible reaction of no reactant forming one product influenced by one modifier.

Name cP_trsl

Reaction equation

$$\emptyset \xrightarrow{\mathrm{cP}} \mathrm{cP} \tag{107}$$

Modifier

Table 18: Properties of each modifier.

Id	Name	SBO
cP	cP	

Product

Table 19: Properties of each product.

Id	Name	SBO
cP	cP	

Kinetic Law

Derived unit contains undeclared units

$$v_7 = \mathrm{vol}(\mathrm{def}) \cdot \mathrm{function\_4\_cP\_trsl}(\mathrm{L}, [\mathrm{cP}], \mathrm{p7}) \tag{108}$$

$$\mathrm{function\_4\_cP\_trsl}(\mathrm{L}, [\mathrm{cP}], \mathrm{p7}) = \mathrm{p7} \cdot (1 - \mathrm{L}) \cdot (1 - [\mathrm{cP}]) \tag{109}$$

$$\mathrm{function\_4\_cP\_trsl}(\mathrm{L}, [\mathrm{cP}], \mathrm{p7}) = \mathrm{p7} \cdot (1 - \mathrm{L}) \cdot (1 - [\mathrm{cP}]) \tag{110}$$

8.8 Reaction `cP_degr`

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cP_degr

Reaction equation

$$\mathrm{cP} \xrightarrow{\mathrm{cP}} \emptyset \tag{111}$$

Reactant

Table 20: Properties of each reactant.

Id	Name	SBO
cP	cP	

Modifier

Table 21: Properties of each modifier.

Id	Name	SBO
cP	cP	

Kinetic Law

Derived unit contains undeclared units

$$v_8 = \mathrm{vol}(\mathrm{def}) \cdot \mathrm{function\_4\_cP\_degr}(\mathrm{L}, [\mathrm{cP}], \mathrm{m11}) \tag{112}$$

$$\mathrm{function\_4\_cP\_degr}(\mathrm{L}, [\mathrm{cP}], \mathrm{m11}) = \mathrm{m11} \cdot [\mathrm{cP}] \cdot \mathrm{L} \tag{113}$$

$$\mathrm{function\_4\_cP\_degr}(\mathrm{L}, [\mathrm{cP}], \mathrm{m11}) = \mathrm{m11} \cdot [\mathrm{cP}] \cdot \mathrm{L} \tag{114}$$

8.9 Reaction cP9_m_trscr

This is an irreversible reaction of no reactant forming one product influenced by eight modifiers.

Name cP9_m_trscr

Reaction equation

$$\emptyset \xrightarrow{\text{cP, cL, cEC, cT, cEC, cL, cP, cT}} \text{cP9\_m} \tag{115}$$

Modifiers

Table 22: Properties of each modifier.

Id	Name	SBO
cP	cP	
cL	cL	
cEC	cEC	
cT	cT	
cEC	cEC	
cL	cL	
cP	cP	
cT	cT	

Product

Table 23: Properties of each product.

Id	Name	SBO
cP9_m	cP9_m	

Kinetic Law

Derived unit contains undeclared units

$$v_9 = \text{vol}(\text{def}) \cdot \text{function\_4\_cP9\_m\_trscr\_1}(\text{L}, [\text{cEC}], [\text{cL}], [\text{cP}], [\text{cT}], \text{e}, \text{g8}, \text{g9}, \text{n4}, \text{n7}, \text{parameter\_2}, \text{parameter\_7}, \text{q3}) \tag{116}$$

$$\begin{aligned}&\text{function\_4\_cP9\_m\_trscr\_1}\left(\text{L}, [\text{cEC}], [\text{cL}], [\text{cP}], [\text{cT}], \text{e}, \text{g8}, \text{g9}, \text{n4}, \text{n7},\right.\\&\left.\text{parameter\_2}, \text{parameter\_7}, \text{q3}\right) = \frac{\text{parameter\_2}^{\text{parameter\_7}}}{\text{parameter\_2}^{\text{parameter\_7}} + [\text{cT}]^{\text{parameter\_7}}}\\&\cdot \left(\text{L} \cdot \text{q3} \cdot [\text{cP}] + \frac{\left(\text{n4} + \frac{\text{n7} \cdot [\text{cL}]^{\text{e}}}{[\text{cL}]^{\text{e}} + \text{g9}^{\text{e}}}\right) \cdot \text{g8}}{[\text{cEC}] + \text{g8}}\right)\end{aligned} \tag{117}$$

$$\begin{aligned}&\text{function\_4\_cP9\_m\_trscr\_1}\left(\text{L}, [\text{cEC}], [\text{cL}], [\text{cP}], [\text{cT}], \text{e}, \text{g8}, \text{g9}, \text{n4}, \text{n7},\right.\\&\left.\text{parameter\_2}, \text{parameter\_7}, \text{q3}\right) = \frac{\text{parameter\_2}^{\text{parameter\_7}}}{\text{parameter\_2}^{\text{parameter\_7}} + [\text{cT}]^{\text{parameter\_7}}}\\&\cdot \left(\text{L} \cdot \text{q3} \cdot [\text{cP}] + \frac{\left(\text{n4} + \frac{\text{n7} \cdot [\text{cL}]^{\text{e}}}{[\text{cL}]^{\text{e}} + \text{g9}^{\text{e}}}\right) \cdot \text{g8}}{[\text{cEC}] + \text{g8}}\right)\end{aligned} \tag{118}$$

8.10 Reaction `cP9_m_degr`

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cP9_m_degr

Reaction equation

$$\text{cP9\_m} \xrightarrow{\text{cP9\_m}} \emptyset \tag{119}$$

Reactant

Table 24: Properties of each reactant.

Id	Name	SBO
`cP9_m`	cP9_m	

Modifier

Table 25: Properties of each modifier.

Id	Name	SBO
`cP9_m`	cP9_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{10} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cP9\_m\_degr}\left(\left[\mathrm{cP9\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m12}\right) \tag{120}$$

$$\mathrm{function\_4\_cP9\_m\_degr}\left(\left[\mathrm{cP9\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m12}\right) = \frac{\mathrm{m12} \cdot \left[\mathrm{cP9\_m}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{121}$$

$$\mathrm{function\_4\_cP9\_m\_degr}\left(\left[\mathrm{cP9\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m12}\right) = \frac{\mathrm{m12} \cdot \left[\mathrm{cP9\_m}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{122}$$

8.11 Reaction `cP9_trsl`

This is an irreversible reaction of no reactant forming one product influenced by two modifiers.

Name cP9_trsl

Reaction equation

$$\emptyset \xrightarrow{\mathrm{cP9\_m},\ \mathrm{cP9\_m}} \mathrm{cP9} \tag{123}$$

Modifiers

Table 26: Properties of each modifier.

Id	Name	SBO
`cP9_m`	cP9_m	
`cP9_m`	cP9_m	

Product

Table 27: Properties of each product.

Id	Name	SBO
`cP9`	cP9	

Kinetic Law

Derived unit contains undeclared units

$$v_{11} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cP9\_trsl}\left(\left[\mathrm{cP9\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{p8}\right) \tag{124}$$

$$\text{function\_4\_cP9\_trsl}\left(\left[\text{cP9\_m}\right], \text{vol}\left(\text{def}\right), \text{p8}\right) = \frac{\text{p8} \cdot \left[\text{cP9\_m}\right]}{\text{vol}\left(\text{def}\right)} \tag{125}$$

$$\text{function\_4\_cP9\_trsl}\left(\left[\text{cP9\_m}\right], \text{vol}\left(\text{def}\right), \text{p8}\right) = \frac{\text{p8} \cdot \left[\text{cP9\_m}\right]}{\text{vol}\left(\text{def}\right)} \tag{126}$$

8.12 Reaction cP9_degr

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cP9_degr

Reaction equation

$$\text{cP9} \xrightarrow{\text{cP9}} \emptyset \tag{127}$$

Reactant

Table 28: Properties of each reactant.

Id	Name	SBO
cP9	cP9	

Modifier

Table 29: Properties of each modifier.

Id	Name	SBO
cP9	cP9	

Kinetic Law

Derived unit contains undeclared units

$$v_{12} = \text{vol}\left(\text{def}\right) \cdot \text{function\_4\_cP9\_degr}\left(\text{L}, \left[\text{cP9}\right], \text{m13}, \text{m22}\right) \tag{128}$$

$$\text{function\_4\_cP9\_degr}\left(\text{L}, \left[\text{cP9}\right], \text{m13}, \text{m22}\right) = \left(\text{m13} + \text{m22} \cdot \left(1 - \text{L}\right)\right) \cdot \left[\text{cP9}\right] \tag{129}$$

$$\text{function\_4\_cP9\_degr}\left(\text{L}, \left[\text{cP9}\right], \text{m13}, \text{m22}\right) = \left(\text{m13} + \text{m22} \cdot \left(1 - \text{L}\right)\right) \cdot \left[\text{cP9}\right] \tag{130}$$

8.13 Reaction cP7_m_trscr

This is an irreversible reaction of no reactant forming one product influenced by eight modifiers.

Name cP7_m_trscr

Reaction equation

$$\emptyset \xrightarrow{\text{cL, cLm, cP9, cT, cL, cLm, cP9, cT}} \text{cP7\_m} \tag{131}$$

Modifiers

Table 30: Properties of each modifier.

Id	Name	SBO
cL	cL	
cLm	cLm	
cP9	cP9	
cT	cT	
cL	cL	
cLm	cLm	
cP9	cP9	
cT	cT	

Product

Table 31: Properties of each product.

Id	Name	SBO
cP7_m	cP7_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{13} = \text{vol}(\text{def}) \cdot \text{function\_4\_cP7\_m\_trscr\_1}([\text{cL}], [\text{cLm}], [\text{cP9}], [\text{cT}], \text{vol}(\text{def}), \text{e}, \text{f}, \text{g10}, \text{g11}, \text{n8}, \text{n9}, \text{parameter\_6}, \text{parameter\_7}, \text{F\_PRR7}) \tag{132}$$

$$\begin{aligned} &\text{function\_4\_cP7\_m\_trscr\_1}([\text{cL}], [\text{cLm}], [\text{cP9}], [\text{cT}], \\ &\quad \text{vol}(\text{def}), \text{e}, \text{f}, \text{g10}, \text{g11}, \text{n8}, \text{n9}, \text{parameter\_6}, \text{parameter\_7}, \\ &\quad \text{F\_PRR7}) = \frac{\frac{\text{F\_PRR7} \cdot \text{parameter\_6}^{\text{parameter\_7}}}{\text{parameter\_6}^{\text{parameter\_7}} + [\text{cT}]^{\text{parameter\_7}}} \cdot \left(\frac{\text{n8} \cdot ([\text{cLm}] + [\text{cL}])^{\text{e}}}{([\text{cLm}] + [\text{cL}])^{\text{e}} + \text{g10}^{\text{e}}} + \frac{\text{n9} \cdot [\text{cP9}]^{\text{f}}}{[\text{cP9}]^{\text{f}} + \text{g11}^{\text{f}}} \right)}{\text{vol}(\text{def})} \end{aligned} \tag{133}$$

$$\begin{aligned} &\text{function\_4\_cP7\_m\_trscr\_1}([\text{cL}], [\text{cLm}], [\text{cP9}], [\text{cT}], \\ &\quad \text{vol}(\text{def}), \text{e}, \text{f}, \text{g10}, \text{g11}, \text{n8}, \text{n9}, \text{parameter\_6}, \text{parameter\_7}, \\ &\quad \text{F\_PRR7}) = \frac{\frac{\text{F\_PRR7} \cdot \text{parameter\_6}^{\text{parameter\_7}}}{\text{parameter\_6}^{\text{parameter\_7}} + [\text{cT}]^{\text{parameter\_7}}} \cdot \left(\frac{\text{n8} \cdot ([\text{cLm}] + [\text{cL}])^{\text{e}}}{([\text{cLm}] + [\text{cL}])^{\text{e}} + \text{g10}^{\text{e}}} + \frac{\text{n9} \cdot [\text{cP9}]^{\text{f}}}{[\text{cP9}]^{\text{f}} + \text{g11}^{\text{f}}} \right)}{\text{vol}(\text{def})} \end{aligned} \tag{134}$$

8.14 Reaction cP7_m_degr

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cP7_m_degr

Reaction equation

$$\mathrm{cP7\_m} \xrightarrow{\mathrm{cP7\_m}} \emptyset \tag{135}$$

Reactant

Table 32: Properties of each reactant.

Id	Name	SBO
cP7_m	cP7_m	

Modifier

Table 33: Properties of each modifier.

Id	Name	SBO
cP7_m	cP7_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{14} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cP7\_m\_degr}\left(\left[\mathrm{cP7\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m14}\right) \tag{136}$$

$$\mathrm{function\_4\_cP7\_m\_degr}\left(\left[\mathrm{cP7\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m14}\right) = \frac{\mathrm{m14} \cdot \left[\mathrm{cP7\_m}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{137}$$

$$\mathrm{function\_4\_cP7\_m\_degr}\left(\left[\mathrm{cP7\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m14}\right) = \frac{\mathrm{m14} \cdot \left[\mathrm{cP7\_m}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{138}$$

8.15 Reaction cP7_trsl

This is an irreversible reaction of no reactant forming one product influenced by two modifiers.

Name cP7_trsl

Reaction equation

$$\emptyset \xrightarrow{\text{cP7\_m, cP7\_m}} \text{cP7} \tag{139}$$

Modifiers

Table 34: Properties of each modifier.

Id	Name	SBO
cP7_m	cP7_m	
cP7_m	cP7_m	

Product

Table 35: Properties of each product.

Id	Name	SBO
cP7	cP7	

Kinetic Law

Derived unit contains undeclared units

$$v_{15} = \text{vol}(\text{def}) \cdot \text{function\_4\_cP7\_trsl}([\text{cP7\_m}], \text{vol}(\text{def}), \text{p9}) \tag{140}$$

$$\text{function\_4\_cP7\_trsl}([\text{cP7\_m}], \text{vol}(\text{def}), \text{p9}) = \frac{\text{p9} \cdot [\text{cP7\_m}]}{\text{vol}(\text{def})} \tag{141}$$

$$\text{function\_4\_cP7\_trsl}([\text{cP7\_m}], \text{vol}(\text{def}), \text{p9}) = \frac{\text{p9} \cdot [\text{cP7\_m}]}{\text{vol}(\text{def})} \tag{142}$$

8.16 Reaction cP7_degr

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cP7_degr

Reaction equation

$$\text{cP7} \xrightarrow{\text{cP7}} \emptyset \tag{143}$$

Reactant

Table 36: Properties of each reactant.

Id	Name	SBO
cP7	cP7	

Modifier

Table 37: Properties of each modifier.

Id	Name	SBO
cP7	cP7	

Kinetic Law

Derived unit contains undeclared units

$$v_{16} = \mathrm{vol}\,(\mathrm{def}) \cdot \mathrm{function\_4\_cP7\_degr}\,(\mathrm{L}, [\mathrm{cP7}], \mathrm{m15}, \mathrm{m23}) \tag{144}$$

$$\mathrm{function\_4\_cP7\_degr}\,(\mathrm{L}, [\mathrm{cP7}], \mathrm{m15}, \mathrm{m23}) = (\mathrm{m15} + \mathrm{m23} \cdot (1 - \mathrm{L})) \cdot [\mathrm{cP7}] \tag{145}$$

$$\mathrm{function\_4\_cP7\_degr}\,(\mathrm{L}, [\mathrm{cP7}], \mathrm{m15}, \mathrm{m23}) = (\mathrm{m15} + \mathrm{m23} \cdot (1 - \mathrm{L})) \cdot [\mathrm{cP7}] \tag{146}$$

8.17 Reaction cNI_m_trscr

This is an irreversible reaction of no reactant forming one product influenced by six modifiers.

Name cNI_m_trscr

Reaction equation

$$\emptyset \xrightarrow{\text{cT, cLm, cP7, cLm, cP7, cT}} \text{cNI\_m} \tag{147}$$

Modifiers

Table 38: Properties of each modifier.

Id	Name	SBO
cT	cT	
cLm	cLm	
cP7	cP7	
cLm	cLm	
cP7	cP7	
cT	cT	

Product

Table 39: Properties of each product.

Id	Name	SBO
cNI_m	cNI_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{17} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cNI\_m\_trscr\_1}\left(\mathrm{b}, [\mathrm{cLm}], [\mathrm{cP7}], [\mathrm{cT}], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{e}, \mathrm{g12}, \mathrm{g13}, \mathrm{n10}, \mathrm{n11}, \mathrm{parameter\_12}, \mathrm{parameter\_7}\right) \tag{148}$$

$$\mathrm{function\_4\_cNI\_m\_trscr\_1}\left(\mathrm{b}, [\mathrm{cLm}], [\mathrm{cP7}], [\mathrm{cT}], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{e}, \mathrm{g12}, \mathrm{g13}, \mathrm{n10}, \mathrm{n11}, \mathrm{parameter\_12}, \mathrm{parameter\_7}\right) = \frac{\frac{\mathrm{parameter\_12}^{\mathrm{parameter\_7}}}{\mathrm{parameter\_12}^{\mathrm{parameter\_7}} + [\mathrm{cT}]^{\mathrm{parameter\_7}}} \cdot \left(\frac{\mathrm{n10} \cdot [\mathrm{cLm}]^{\mathrm{e}}}{[\mathrm{cLm}]^{\mathrm{e}} + \mathrm{g12}^{\mathrm{e}}} + \frac{\mathrm{n11} \cdot [\mathrm{cP7}]^{\mathrm{b}}}{[\mathrm{cP7}]^{\mathrm{b}} + \mathrm{g13}^{\mathrm{b}}}\right)}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{149}$$

$$\mathrm{function\_4\_cNI\_m\_trscr\_1}\left(\mathrm{b}, [\mathrm{cLm}], [\mathrm{cP7}], [\mathrm{cT}], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{e}, \mathrm{g12}, \mathrm{g13}, \mathrm{n10}, \mathrm{n11}, \mathrm{parameter\_12}, \mathrm{parameter\_7}\right) = \frac{\frac{\mathrm{parameter\_12}^{\mathrm{parameter\_7}}}{\mathrm{parameter\_12}^{\mathrm{parameter\_7}} + [\mathrm{cT}]^{\mathrm{parameter\_7}}} \cdot \left(\frac{\mathrm{n10} \cdot [\mathrm{cLm}]^{\mathrm{e}}}{[\mathrm{cLm}]^{\mathrm{e}} + \mathrm{g12}^{\mathrm{e}}} + \frac{\mathrm{n11} \cdot [\mathrm{cP7}]^{\mathrm{b}}}{[\mathrm{cP7}]^{\mathrm{b}} + \mathrm{g13}^{\mathrm{b}}}\right)}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{150}$$

8.18 Reaction cNI_m_degr

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cNI_m_degr

Reaction equation

$$\mathrm{cNI\_m} \xrightarrow{\mathrm{cNI\_m}} \emptyset \tag{151}$$

Reactant

Table 40: Properties of each reactant.

Id	Name	SBO
cNI_m	cNI_m	

Modifier

Table 41: Properties of each modifier.

Id	Name	SBO
cNI_m	cNI_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{18} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cNI\_m\_degr}\left(\left[\mathrm{cNI\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m16}\right) \tag{152}$$

$$\mathrm{function\_4\_cNI\_m\_degr}\left(\left[\mathrm{cNI\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m16}\right) = \frac{\mathrm{m16} \cdot \left[\mathrm{cNI\_m}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{153}$$

$$\mathrm{function\_4\_cNI\_m\_degr}\left(\left[\mathrm{cNI\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m16}\right) = \frac{\mathrm{m16} \cdot \left[\mathrm{cNI\_m}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{154}$$

8.19 Reaction cNI_trsl

This is an irreversible reaction of no reactant forming one product influenced by two modifiers.

Name cNI_trsl

Reaction equation

$$\emptyset \xrightarrow{\mathrm{cNI\_m},\ \mathrm{cNI\_m}} \mathrm{cNI} \tag{155}$$

Modifiers

Table 42: Properties of each modifier.

Id	Name	SBO
cNI_m	cNI_m	
cNI_m	cNI_m	

Product

Table 43: Properties of each product.

Id	Name	SBO
cNI	cNI	

Kinetic Law

Derived unit contains undeclared units

$$v_{19} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cNI\_trsl}\left(\left[\mathrm{cNI\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{p10}\right) \tag{156}$$

$$\mathrm{function\_4\_cNI\_trsl}\left(\left[\mathrm{cNI\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{p10}\right) = \frac{\mathrm{p10} \cdot \left[\mathrm{cNI\_m}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{157}$$

$$\mathrm{function\_4\_cNI\_trsl}\left(\left[\mathrm{cNI\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{p10}\right) = \frac{\mathrm{p10} \cdot \left[\mathrm{cNI\_m}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{158}$$

8.20 Reaction cNI_degr

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cNI_degr

Reaction equation

$$\mathrm{cNI} \xrightarrow{\mathrm{cNI}} \emptyset \tag{159}$$

Reactant

Table 44: Properties of each reactant.

Id	Name	SBO
cNI	cNI	

Modifier

Table 45: Properties of each modifier.

Id	Name	SBO
cNI	cNI	

Kinetic Law

Derived unit contains undeclared units

$$v_{20} = \mathrm{vol}\,(\mathrm{def}) \cdot \mathrm{function\_4\_cNI\_degr}\,(\mathrm{L}, [\mathrm{cNI}], \mathrm{m17}, \mathrm{m24}) \tag{160}$$

$$\mathrm{function\_4\_cNI\_degr}\,(\mathrm{L}, [\mathrm{cNI}], \mathrm{m17}, \mathrm{m24}) = (\mathrm{m17} + \mathrm{m24} \cdot (1 - \mathrm{L})) \cdot [\mathrm{cNI}] \tag{161}$$

$$\mathrm{function\_4\_cNI\_degr}\,(\mathrm{L}, [\mathrm{cNI}], \mathrm{m17}, \mathrm{m24}) = (\mathrm{m17} + \mathrm{m24} \cdot (1 - \mathrm{L})) \cdot [\mathrm{cNI}] \tag{162}$$

8.21 Reaction cT_m_trscr

This is an irreversible reaction of no reactant forming one product influenced by six modifiers.

Name cT_m_trscr

Reaction equation

$$\emptyset \xrightarrow{\mathrm{cEC},\ \mathrm{cL},\ \mathrm{species\_3},\ \mathrm{cEC},\ \mathrm{cL},\ \mathrm{species\_3}} \mathrm{cT\_m} \tag{163}$$

Modifiers

Table 46: Properties of each modifier.

Id	Name	SBO
cEC	cEC	
cL	cL	
species_3	cSnRK2	
cEC	cEC	
cL	cL	
species_3	cSnRK2	

Product

Table 47: Properties of each product.

Id	Name	SBO
cT_m	cT_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{21} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cT\_m\_trscr}\left(\left[\mathrm{cEC}\right], \left[\mathrm{cL}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{e}, \mathrm{g4}, \mathrm{g5}, \mathrm{n2}, \mathrm{parameter\_11}, \mathrm{parameter\_14}, \left[\mathrm{species\_3}\right], \mathrm{F\_TOC1}\right) \tag{164}$$

$$\mathrm{function\_4\_cT\_m\_trscr}\left(\left[\mathrm{cEC}\right], \left[\mathrm{cL}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{e}, \mathrm{g4}, \mathrm{g5}, \mathrm{n2}, \mathrm{parameter\_11}, \mathrm{parameter\_14}, \left[\mathrm{species\_3}\right], \mathrm{F\_TOC1}\right) = \frac{\left(1+\left(\frac{\left[\mathrm{cL}\right]}{\mathrm{g5}\cdot\left(1+\left(\frac{\left[\mathrm{species\_3}\right]}{\mathrm{parameter\_14}}\right)^{\mathrm{parameter\_11}}\right)}\right)^{\frac{\mathrm{F\_TOC1}\cdot\mathrm{n2}}{\mathrm{e}}}\cdot\mathrm{g4}\right)\left[\mathrm{cEC}\right]+\mathrm{g4}}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{165}$$

$$\mathrm{function\_4\_cT\_m\_trscr}\left(\left[\mathrm{cEC}\right], \left[\mathrm{cL}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{e}, \mathrm{g4}, \mathrm{g5}, \mathrm{n2}, \mathrm{parameter\_11}, \mathrm{parameter\_14}, \left[\mathrm{species\_3}\right], \mathrm{F\_TOC1}\right) = \frac{\left(1+\left(\frac{\left[\mathrm{cL}\right]}{\mathrm{g5}\cdot\left(1+\left(\frac{\left[\mathrm{species\_3}\right]}{\mathrm{parameter\_14}}\right)^{\mathrm{parameter\_11}}\right)}\right)^{\frac{\mathrm{F\_TOC1}\cdot\mathrm{n2}}{\mathrm{e}}}\cdot\mathrm{g4}\right)\left[\mathrm{cEC}\right]+\mathrm{g4}}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{166}$$

8.22 Reaction `cT_m_degr`

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cT_m_degr

Reaction equation

$$\mathrm{cT\_m} \xrightarrow{\mathrm{cT\_m}} \emptyset \tag{167}$$

Reactant

Table 48: Properties of each reactant.

Id	Name	SBO
`cT_m`	cT_m	

Modifier

Table 49: Properties of each modifier.

Id	Name	SBO
`cT_m`	cT_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{22} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cT\_m\_degr}\left(\left[\mathrm{cT\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m5}\right) \tag{168}$$

$$\mathrm{function\_4\_cT\_m\_degr}\left(\left[\mathrm{cT\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m5}\right) = \frac{\mathrm{m5} \cdot \left[\mathrm{cT\_m}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{169}$$

$$\mathrm{function\_4\_cT\_m\_degr}\left(\left[\mathrm{cT\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m5}\right) = \frac{\mathrm{m5} \cdot \left[\mathrm{cT\_m}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{170}$$

8.23 Reaction `cT_trsl`

This is an irreversible reaction of no reactant forming one product influenced by two modifiers.

Name cT_trsl

Reaction equation

$$\emptyset \xrightarrow{\mathrm{cT\_m},\ \mathrm{cT\_m}} \mathrm{cT} \tag{171}$$

Modifiers

Table 50: Properties of each modifier.

Id	Name	SBO
`cT_m`	cT_m	
`cT_m`	cT_m	

Product

Table 51: Properties of each product.

Id	Name	SBO
`cT`	cT	

Kinetic Law

Derived unit contains undeclared units

$$v_{23} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cT\_trsl}\left(\left[\mathrm{cT\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{p4}\right) \tag{172}$$

$$\text{function\_4\_cT\_trsl}\left(\left[\text{cT\_m}\right], \text{vol}\left(\text{def}\right), \text{p4}\right) = \frac{\text{p4} \cdot \left[\text{cT\_m}\right]}{\text{vol}\left(\text{def}\right)} \tag{173}$$

$$\text{function\_4\_cT\_trsl}\left(\left[\text{cT\_m}\right], \text{vol}\left(\text{def}\right), \text{p4}\right) = \frac{\text{p4} \cdot \left[\text{cT\_m}\right]}{\text{vol}\left(\text{def}\right)} \tag{174}$$

8.24 Reaction `cT_degr`

This is an irreversible reaction of one reactant forming no product influenced by five modifiers.

Name cT_degr

Reaction equation

$$\text{cT} \xrightarrow{\text{cZTL, cZG, cT, cZG, cZTL}} \emptyset \tag{175}$$

Reactant

Table 52: Properties of each reactant.

Id	Name	SBO
cT	cT	

Modifiers

Table 53: Properties of each modifier.

Id	Name	SBO
cZTL	cZTL	
cZG	cZG	
cT	cT	
cZG	cZG	
cZTL	cZTL	

Kinetic Law

Derived unit contains undeclared units

$$v_{24} = \text{vol}\left(\text{def}\right) \cdot \text{function\_4\_cT\_degr}\left(\text{L}, \left[\text{cT}\right], \left[\text{cZG}\right], \left[\text{cZTL}\right], \text{m6}, \text{m7}, \text{m8}, \text{p5}\right) \tag{176}$$

$$\begin{aligned} &\text{function\_4\_cT\_degr}\left(\text{L}, \left[\text{cT}\right], \left[\text{cZG}\right], \left[\text{cZTL}\right], \text{m6}, \text{m7}, \text{m8}, \text{p5}\right) \\ &\quad = \left(\text{m6} + \text{m7} \cdot \left(1 - \text{L}\right)\right) \cdot \left[\text{cT}\right] \cdot \left(\text{p5} \cdot \left[\text{cZTL}\right] + \left[\text{cZG}\right]\right) + \text{m8} \cdot \left[\text{cT}\right] \end{aligned} \tag{177}$$

$$\begin{aligned}&\text{function\_4\_cT\_degr}\left(\text{L}, [\text{cT}], [\text{cZG}], [\text{cZTL}], \text{m6}, \text{m7}, \text{m8}, \text{p5}\right)\\ &\quad = (\text{m6} + \text{m7} \cdot (1 - \text{L})) \cdot [\text{cT}] \cdot (\text{p5} \cdot [\text{cZTL}] + [\text{cZG}]) + \text{m8} \cdot [\text{cT}]\end{aligned} \tag{178}$$

8.25 Reaction cE4_m_trscr

This is an irreversible reaction of no reactant forming one product influenced by six modifiers.

Name cE4_m_trscr

Reaction equation

$$\emptyset \xrightarrow{\text{cT, cEC, cL, cEC, cL, cT}} \text{cE4\_m} \tag{179}$$

Modifiers

Table 54: Properties of each modifier.

Id	Name	SBO
cT	cT	
cEC	cEC	
cL	cL	
cEC	cEC	
cL	cL	
cT	cT	

Product

Table 55: Properties of each product.

Id	Name	SBO
cE4_m	cE4_m	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned}v_{25} = \text{vol}\left(\text{def}\right) \cdot \text{function\_4\_cE4\_m\_trscr\_1}\left([\text{cEC}], [\text{cL}], [\text{cT}], \text{vol}\left(\text{def}\right), \text{e}, \text{g6},\right.\\ \left.\text{parameter\_4}, \text{parameter\_5}, \text{parameter\_7}, \text{parameter\_8}\right)\end{aligned} \tag{180}$$

$$\text{function\_4\_cE4\_m\_trscr\_1}\left(\left[\text{cEC}\right],\left[\text{cL}\right],\left[\text{cT}\right],\text{vol}\left(\text{def}\right),\text{e},\text{g6},\text{parameter\_4},\text{parameter\_5},\right.$$
$$\left.\text{parameter\_7},\text{parameter\_8}\right) = \frac{\frac{\text{parameter\_5}^{\text{parameter\_7}}}{\text{parameter\_5}^{\text{parameter\_7}}+\left[\text{cT}\right]^{\text{parameter\_7}}} \cdot \frac{\frac{\text{parameter\_8}\cdot\text{parameter\_4}}{\left[\text{cEC}\right]+\text{parameter\_4}}\cdot \text{g6}^{\text{e}}}{\left[\text{cL}\right]^{\text{e}}+\text{g6}^{\text{e}}}}{\text{vol}\left(\text{def}\right)} \tag{181}$$

$$\text{function\_4\_cE4\_m\_trscr\_1}\left(\left[\text{cEC}\right],\left[\text{cL}\right],\left[\text{cT}\right],\text{vol}\left(\text{def}\right),\text{e},\text{g6},\text{parameter\_4},\text{parameter\_5},\right.$$
$$\left.\text{parameter\_7},\text{parameter\_8}\right) = \frac{\frac{\text{parameter\_5}^{\text{parameter\_7}}}{\text{parameter\_5}^{\text{parameter\_7}}+\left[\text{cT}\right]^{\text{parameter\_7}}} \cdot \frac{\frac{\text{parameter\_8}\cdot\text{parameter\_4}}{\left[\text{cEC}\right]+\text{parameter\_4}}\cdot \text{g6}^{\text{e}}}{\left[\text{cL}\right]^{\text{e}}+\text{g6}^{\text{e}}}}{\text{vol}\left(\text{def}\right)} \tag{182}$$

8.26 Reaction `cE4_m_degr`

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cE4_m_degr

Reaction equation

$$\text{cE4\_m} \xrightarrow{\text{cE4\_m}} \emptyset \tag{183}$$

Reactant

Table 56: Properties of each reactant.

Id	Name	SBO
`cE4_m`	cE4_m	

Modifier

Table 57: Properties of each modifier.

Id	Name	SBO
`cE4_m`	cE4_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{26} = \text{vol}\left(\text{def}\right) \cdot \text{function\_4\_cE4\_m\_degr}\left(\left[\text{cE4\_m}\right],\text{vol}\left(\text{def}\right),\text{m34}\right) \tag{184}$$

$$\text{function\_4\_cE4\_m\_degr}\left(\left[\text{cE4\_m}\right],\text{vol}\left(\text{def}\right),\text{m34}\right) = \frac{\text{m34}\cdot\left[\text{cE4\_m}\right]}{\text{vol}\left(\text{def}\right)} \tag{185}$$

$$\text{function\_4\_cE4\_m\_degr}\left(\left[\text{cE4\_m}\right], \text{vol}\left(\text{def}\right), \text{m34}\right) = \frac{\text{m34} \cdot \left[\text{cE4\_m}\right]}{\text{vol}\left(\text{def}\right)} \tag{186}$$

8.27 Reaction cE4_trsl

This is an irreversible reaction of no reactant forming one product influenced by two modifiers.

Name cE4_trsl

Reaction equation

$$\emptyset \xrightarrow{\text{cE4\_m, cE4\_m}} \text{cE4} \tag{187}$$

Modifiers

Table 58: Properties of each modifier.

Id	Name	SBO
cE4_m	cE4_m	
cE4_m	cE4_m	

Product

Table 59: Properties of each product.

Id	Name	SBO
cE4	cE4	

Kinetic Law

Derived unit contains undeclared units

$$v_{27} = \text{vol}\left(\text{def}\right) \cdot \text{function\_4\_cE4\_trsl}\left(\left[\text{cE4\_m}\right], \text{vol}\left(\text{def}\right), \text{p23}\right) \tag{188}$$

$$\text{function\_4\_cE4\_trsl}\left(\left[\text{cE4\_m}\right], \text{vol}\left(\text{def}\right), \text{p23}\right) = \frac{\text{p23} \cdot \left[\text{cE4\_m}\right]}{\text{vol}\left(\text{def}\right)} \tag{189}$$

$$\text{function\_4\_cE4\_trsl}\left(\left[\text{cE4\_m}\right], \text{vol}\left(\text{def}\right), \text{p23}\right) = \frac{\text{p23} \cdot \left[\text{cE4\_m}\right]}{\text{vol}\left(\text{def}\right)} \tag{190}$$

8.28 Reaction cE4_degr

This is an irreversible reaction of one reactant forming no product influenced by nine modifiers.

Name cE4_degr

Reaction equation

$$\text{cE4} \xrightarrow{\text{cE3n, cLUX, cCOP1d, cCOP1n, cCOP1d, cCOP1n, cE3n, cE4, cLUX}} \emptyset \tag{191}$$

Reactant

Table 60: Properties of each reactant.

Id	Name	SBO
cE4	cE4	

Modifiers

Table 61: Properties of each modifier.

Id	Name	SBO
cE3n	cE3n	
cLUX	cLUX	
cCOP1d	cCOP1d	
cCOP1n	cCOP1n	
cCOP1d	cCOP1d	
cCOP1n	cCOP1n	
cE3n	cE3n	
cE4	cE4	
cLUX	cLUX	

Kinetic Law

Derived unit contains undeclared units

$$v_{28} = \text{vol}(\text{def}) \cdot \text{function\_4\_cE4\_degr}([\text{cCOP1d}], [\text{cCOP1n}], [\text{cE3n}], [\text{cE4}], [\text{cLUX}], \text{vol}(\text{def}), \text{m10}, \text{m35}, \text{m9}, \text{p21}, \text{p25}, \text{p26}) \tag{192}$$

$$\text{function\_4\_cE4\_degr}([\text{cCOP1d}], [\text{cCOP1n}], [\text{cE3n}], [\text{cE4}], [\text{cLUX}], \text{vol}(\text{def}), \text{m10}, \text{m35}, \text{m9}, \text{p21}, \text{p25}, \text{p26}) = \frac{\text{m35} \cdot [\text{cE4}] + \text{p25} \cdot [\text{cE4}] \cdot [\text{cE3n}] - \frac{\text{p21} \cdot \text{p25} \cdot [\text{cE4}] \cdot [\text{cE3n}]}{\text{p26} \cdot [\text{cLUX}] + \text{p21} + \text{m9} \cdot [\text{cCOP1d}] + \text{m10} \cdot [\text{cCOP1n}]}}{\text{vol}(\text{def})} \tag{193}$$

$$\begin{aligned}\text{function\_4\_cE4\_degr}&\left([\text{cCOP1d}],[\text{cCOP1n}],[\text{cE3n}],\right.\\&\left.[\text{cE4}],[\text{cLUX}],\text{vol}\left(\text{def}\right),\text{m10},\text{m35},\text{m9},\text{p21},\text{p25},\right.\\\text{p26}) &= \frac{\text{m35}\cdot[\text{cE4}]+\text{p25}\cdot[\text{cE4}]\cdot[\text{cE3n}]-\frac{\text{p21}\cdot\text{p25}\cdot[\text{cE4}]\cdot[\text{cE3n}]}{\text{p26}\cdot[\text{cLUX}]+\text{p21}+\text{m9}\cdot[\text{cCOP1d}]+\text{m10}\cdot[\text{cCOP1n}]}}{\text{vol}\left(\text{def}\right)}\end{aligned} \tag{194}$$

8.29 Reaction cE3_m_trscr

This is an irreversible reaction of no reactant forming one product influenced by two modifiers.

Name cE3_m_trscr

Reaction equation

$$\emptyset \xrightarrow{\text{cL, cL}} \text{cE3\_m} \tag{195}$$

Modifiers

Table 62: Properties of each modifier.

Id	Name	SBO
cL	cL	
cL	cL	

Product

Table 63: Properties of each product.

Id	Name	SBO
cE3_m	cE3_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{29} = \text{vol}\left(\text{def}\right)\cdot\text{function\_4\_cE3\_m\_trscr}\left([\text{cL}],\text{vol}\left(\text{def}\right),\text{e},\text{g16},\text{n3}\right) \tag{196}$$

$$\text{function\_4\_cE3\_m\_trscr}\left([\text{cL}],\text{vol}\left(\text{def}\right),\text{e},\text{g16},\text{n3}\right) = \frac{\frac{\text{n3}\cdot\text{g16}^{\text{e}}}{[\text{cL}]^{\text{e}}+\text{g16}^{\text{e}}}}{\text{vol}\left(\text{def}\right)} \tag{197}$$

$$\text{function\_4\_cE3\_m\_trscr}\left([\text{cL}],\text{vol}\left(\text{def}\right),\text{e},\text{g16},\text{n3}\right) = \frac{\frac{\text{n3}\cdot\text{g16}^{\text{e}}}{[\text{cL}]^{\text{e}}+\text{g16}^{\text{e}}}}{\text{vol}\left(\text{def}\right)} \tag{198}$$

8.30 Reaction cE3_m_degr

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cE3_m_degr

Reaction equation

$$\mathrm{cE3\_m} \xrightarrow{\mathrm{cE3\_m}} \emptyset \tag{199}$$

Reactant

Table 64: Properties of each reactant.

Id	Name	SBO
cE3_m	cE3_m	

Modifier

Table 65: Properties of each modifier.

Id	Name	SBO
cE3_m	cE3_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{30} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cE3\_m\_degr}\left(\left[\mathrm{cE3\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m26}\right) \tag{200}$$

$$\mathrm{function\_4\_cE3\_m\_degr}\left(\left[\mathrm{cE3\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m26}\right) = \frac{\mathrm{m26} \cdot \left[\mathrm{cE3\_m}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{201}$$

$$\mathrm{function\_4\_cE3\_m\_degr}\left(\left[\mathrm{cE3\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m26}\right) = \frac{\mathrm{m26} \cdot \left[\mathrm{cE3\_m}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{202}$$

8.31 Reaction cE3_trsl

This is an irreversible reaction of no reactant forming one product influenced by two modifiers.

Name cE3_trsl

Reaction equation

$$\emptyset \xrightarrow{\text{cE3\_m, cE3\_m}} \text{cE3} \tag{203}$$

Modifiers

Table 66: Properties of each modifier.

Id	Name	SBO
cE3_m	cE3_m	
cE3_m	cE3_m	

Product

Table 67: Properties of each product.

Id	Name	SBO
cE3	cE3	

Kinetic Law

Derived unit contains undeclared units

$$v_{31} = \text{vol}\left(\text{def}\right) \cdot \text{function\_4\_cE3\_trsl}\left(\left[\text{cE3\_m}\right], \text{vol}\left(\text{def}\right), \text{p16}\right) \tag{204}$$

$$\text{function\_4\_cE3\_trsl}\left(\left[\text{cE3\_m}\right], \text{vol}\left(\text{def}\right), \text{p16}\right) = \frac{\text{p16} \cdot \left[\text{cE3\_m}\right]}{\text{vol}\left(\text{def}\right)} \tag{205}$$

$$\text{function\_4\_cE3\_trsl}\left(\left[\text{cE3\_m}\right], \text{vol}\left(\text{def}\right), \text{p16}\right) = \frac{\text{p16} \cdot \left[\text{cE3\_m}\right]}{\text{vol}\left(\text{def}\right)} \tag{206}$$

8.32 Reaction cE3_degr

This is an irreversible reaction of one reactant forming no product influenced by three modifiers.

Name cE3_degr

Reaction equation

$$\text{cE3} \xrightarrow{\text{cCOP1c, cCOP1c, cE3}} \emptyset \tag{207}$$

Reactant

Table 68: Properties of each reactant.

Id	Name	SBO
cE3	cE3	

Modifiers

Table 69: Properties of each modifier.

Id	Name	SBO
cCOP1c	cCOP1c	
cCOP1c	cCOP1c	
cE3	cE3	

Kinetic Law

Derived unit contains undeclared units

$$v_{32} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cE3\_degr}\left(\left[\mathrm{cCOP1c}\right], \left[\mathrm{cE3}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m9}\right) \tag{208}$$

$$\mathrm{function\_4\_cE3\_degr}\left(\left[\mathrm{cCOP1c}\right], \left[\mathrm{cE3}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m9}\right) = \frac{\mathrm{m9} \cdot \left[\mathrm{cE3}\right] \cdot \left[\mathrm{cCOP1c}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{209}$$

$$\mathrm{function\_4\_cE3\_degr}\left(\left[\mathrm{cCOP1c}\right], \left[\mathrm{cE3}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m9}\right) = \frac{\mathrm{m9} \cdot \left[\mathrm{cE3}\right] \cdot \left[\mathrm{cCOP1c}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{210}$$

8.33 Reaction cE3n_import

This is an irreversible reaction of one reactant forming one product influenced by two modifiers.

Name cE3n_import

Reaction equation

$$\mathrm{cE3} \xrightarrow{\mathrm{cE3,\ cE3n}} \mathrm{cE3n} \tag{211}$$

Reactant

Table 70: Properties of each reactant.

Id	Name	SBO
cE3	cE3	

Modifiers

Table 71: Properties of each modifier.

Id	Name	SBO
cE3	cE3	
cE3n	cE3n	

Product

Table 72: Properties of each product.

Id	Name	SBO
cE3n	cE3n	

Kinetic Law

Derived unit contains undeclared units

$$v_{33} = \text{vol}(\text{def}) \cdot \text{function\_4\_cE3n\_import}([\text{cE3}], [\text{cE3n}], \text{vol}(\text{def}), \text{p19}, \text{p20}) \tag{212}$$

$$\text{function\_4\_cE3n\_import}([\text{cE3}], [\text{cE3n}], \text{vol}(\text{def}), \text{p19}, \text{p20}) = \frac{\text{p19} \cdot [\text{cE3}] - \text{p20} \cdot [\text{cE3n}]}{\text{vol}(\text{def})} \tag{213}$$

$$\text{function\_4\_cE3n\_import}([\text{cE3}], [\text{cE3n}], \text{vol}(\text{def}), \text{p19}, \text{p20}) = \frac{\text{p19} \cdot [\text{cE3}] - \text{p20} \cdot [\text{cE3n}]}{\text{vol}(\text{def})} \tag{214}$$

8.34 Reaction cE3n_degr

This is an irreversible reaction of one reactant forming no product influenced by twelve modifiers.

Name cE3n_degr

Reaction equation

$$\text{cE3n} \xrightarrow{\text{cCOP1n, cCOP1d, cE4, cLUX, cG, cE3n, cCOP1d, cCOP1n, cE3n, cE4, cG, cLUX}} \emptyset \tag{215}$$

Reactant

Table 73: Properties of each reactant.

Id	Name	SBO
cE3n	cE3n	

Modifiers

Table 74: Properties of each modifier.

Id	Name	SBO
cCOP1n	cCOP1n	
cCOP1d	cCOP1d	
cE4	cE4	
cLUX	cLUX	
cG	cG	
cE3n	cE3n	
cCOP1d	cCOP1d	
cCOP1n	cCOP1n	
cE3n	cE3n	
cE4	cE4	
cG	cG	
cLUX	cLUX	

Kinetic Law

Derived unit contains undeclared units

$$v_{34} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cE3n\_degr}\left(\left[\mathrm{cCOP1d}\right], \left[\mathrm{cCOP1n}\right], \left[\mathrm{cE3n}\right], \left[\mathrm{cE4}\right], \left[\mathrm{cG}\right], \left[\mathrm{cLUX}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m10}, \mathrm{m19}, \mathrm{m9}, \mathrm{p17}, \mathrm{p21}, \mathrm{p25}, \mathrm{p26}, \mathrm{p28}, \mathrm{p29}\right) \tag{216}$$

$$\mathrm{function\_4\_cE3n\_degr}\left(\left[\mathrm{cCOP1d}\right], \left[\mathrm{cCOP1n}\right], \left[\mathrm{cE3n}\right], \left[\mathrm{cE4}\right], \left[\mathrm{cG}\right], \left[\mathrm{cLUX}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m10}, \mathrm{m19}, \mathrm{m9}, \mathrm{p17}, \mathrm{p21}, \mathrm{p25}, \mathrm{p26}, \mathrm{p28}, \mathrm{p29}\right) \tag{217}$$

$$= \frac{\mathrm{m10} \cdot \left[\mathrm{cE3n}\right] \cdot \left[\mathrm{cCOP1n}\right] + \mathrm{m9} \cdot \left[\mathrm{cE3n}\right] \cdot \left[\mathrm{cCOP1d}\right] + \mathrm{p25} \cdot \left[\mathrm{cE4}\right] \cdot \left[\mathrm{cE3n}\right] - \frac{\mathrm{p21} \cdot \mathrm{p25} \cdot \left[\mathrm{cE4}\right] \cdot \left[\mathrm{cE3n}\right]}{\mathrm{p26} \cdot \left[\mathrm{cLUX}\right] + \mathrm{p21} + \mathrm{m9} \cdot \left[\mathrm{cCOP1d}\right] + \mathrm{m10} \cdot \left[\mathrm{cCOP1n}\right]}}{\mathrm{vol}\left(\mathrm{def}\right)}$$

$$\mathrm{function\_4\_cE3n\_degr}\left(\left[\mathrm{cCOP1d}\right], \left[\mathrm{cCOP1n}\right], \left[\mathrm{cE3n}\right], \left[\mathrm{cE4}\right], \left[\mathrm{cG}\right], \left[\mathrm{cLUX}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m10}, \mathrm{m19}, \mathrm{m9}, \mathrm{p17}, \mathrm{p21}, \mathrm{p25}, \mathrm{p26}, \mathrm{p28}, \mathrm{p29}\right) \tag{218}$$

$$= \frac{\mathrm{m10} \cdot \left[\mathrm{cE3n}\right] \cdot \left[\mathrm{cCOP1n}\right] + \mathrm{m9} \cdot \left[\mathrm{cE3n}\right] \cdot \left[\mathrm{cCOP1d}\right] + \mathrm{p25} \cdot \left[\mathrm{cE4}\right] \cdot \left[\mathrm{cE3n}\right] - \frac{\mathrm{p21} \cdot \mathrm{p25} \cdot \left[\mathrm{cE4}\right] \cdot \left[\mathrm{cE3n}\right]}{\mathrm{p26} \cdot \left[\mathrm{cLUX}\right] + \mathrm{p21} + \mathrm{m9} \cdot \left[\mathrm{cCOP1d}\right] + \mathrm{m10} \cdot \left[\mathrm{cCOP1n}\right]}}{\mathrm{vol}\left(\mathrm{def}\right)}$$

8.35 Reaction cLUX_m_trscr

This is an irreversible reaction of no reactant forming one product influenced by six modifiers.

Name cLUX_m_trscr

Reaction equation

$$\emptyset \xrightarrow{\text{cT, cEC, cL, cEC, cL, cT}} \text{cLUX\_m} \tag{219}$$

Modifiers

Table 75: Properties of each modifier.

Id	Name	SBO
cT	cT	
cEC	cEC	
cL	cL	
cEC	cEC	
cL	cL	
cT	cT	

Product

Table 76: Properties of each product.

Id	Name	SBO
cLUX_m	cLUX_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{35} = \text{vol}(\text{def}) \cdot \text{function\_4\_cLUX\_m\_trscr}([\text{cEC}], [\text{cL}], [\text{cT}], \text{vol}(\text{def}), \text{e}, \text{g2}, \text{g6}, \text{n13}, \text{parameter\_3}, \text{parameter\_7}) \tag{220}$$

$$\text{function\_4\_cLUX\_m\_trscr}([\text{cEC}], [\text{cL}], [\text{cT}], \text{vol}(\text{def}), \text{e}, \text{g2}, \text{g6}, \text{n13}, \text{parameter\_3}, \text{parameter\_7}) = \frac{\frac{\text{parameter\_3}^{\text{parameter\_7}}}{\text{parameter\_3}^{\text{parameter\_7}} + [\text{cT}]^{\text{parameter\_7}}} \cdot \frac{\frac{\text{n13} \cdot \text{g2}}{[\text{cEC}] + \text{g2}} \cdot \text{g6}^{\text{e}}}{[\text{cL}]^{\text{e}} + \text{g6}^{\text{e}}}}{\text{vol}(\text{def})} \tag{221}$$

$$\begin{aligned}&\text{function\_4\_cLUX\_m\_trscr}\left(\left[\text{cEC}\right],\left[\text{cL}\right],\left[\text{cT}\right],\text{vol}\left(\text{def}\right),\text{e},\text{g2},\text{g6},\text{n13},\right.\\&\left.\text{parameter\_3},\text{parameter\_7}\right)=\frac{\frac{\text{parameter\_3}^{\text{parameter\_7}}}{\text{parameter\_3}^{\text{parameter\_7}}+\left[\text{cT}\right]^{\text{parameter\_7}}}\cdot\frac{\frac{\text{n13}\cdot\text{g2}}{\left[\text{cEC}\right]+\text{g2}}\cdot\text{g6}^{\text{e}}}{\left[\text{cL}\right]^{\text{e}}+\text{g6}^{\text{e}}}}{\text{vol}\left(\text{def}\right)}\end{aligned}\tag{222}$$

8.36 Reaction cLUX_m_degr

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cLUX_m_degr

Reaction equation

$$\text{cLUX\_m}\xrightarrow{\text{cLUX\_m}}\emptyset\tag{223}$$

Reactant

Table 77: Properties of each reactant.

Id	Name	SBO
cLUX_m	cLUX_m	

Modifier

Table 78: Properties of each modifier.

Id	Name	SBO
cLUX_m	cLUX_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{36}=\text{vol}\left(\text{def}\right)\cdot\text{function\_4\_cLUX\_m\_degr}\left(\left[\text{cLUX\_m}\right],\text{vol}\left(\text{def}\right),\text{m34}\right)\tag{224}$$

$$\text{function\_4\_cLUX\_m\_degr}\left(\left[\text{cLUX\_m}\right],\text{vol}\left(\text{def}\right),\text{m34}\right)=\frac{\text{m34}\cdot\left[\text{cLUX\_m}\right]}{\text{vol}\left(\text{def}\right)}\tag{225}$$

$$\text{function\_4\_cLUX\_m\_degr}\left(\left[\text{cLUX\_m}\right],\text{vol}\left(\text{def}\right),\text{m34}\right)=\frac{\text{m34}\cdot\left[\text{cLUX\_m}\right]}{\text{vol}\left(\text{def}\right)}\tag{226}$$

8.37 Reaction cLUX_trsl

This is an irreversible reaction of no reactant forming one product influenced by two modifiers.

Name cLUX_trsl

Reaction equation

$$\emptyset \xrightarrow{\text{cLUX\_m, cLUX\_m}} \text{cLUX} \tag{227}$$

Modifiers

Table 79: Properties of each modifier.

Id	Name	SBO
cLUX_m	cLUX_m	
cLUX_m	cLUX_m	

Product

Table 80: Properties of each product.

Id	Name	SBO
cLUX	cLUX	

Kinetic Law

Derived unit contains undeclared units

$$v_{37} = \text{vol}(\text{def}) \cdot \text{function\_4\_cLUX\_trsl}([\text{cLUX\_m}], \text{vol}(\text{def}), \text{p27}) \tag{228}$$

$$\text{function\_4\_cLUX\_trsl}([\text{cLUX\_m}], \text{vol}(\text{def}), \text{p27}) = \frac{\text{p27} \cdot [\text{cLUX\_m}]}{\text{vol}(\text{def})} \tag{229}$$

$$\text{function\_4\_cLUX\_trsl}([\text{cLUX\_m}], \text{vol}(\text{def}), \text{p27}) = \frac{\text{p27} \cdot [\text{cLUX\_m}]}{\text{vol}(\text{def})} \tag{230}$$

8.38 Reaction cLUX_degr

This is an irreversible reaction of one reactant forming no product influenced by nine modifiers.

Name cLUX_degr

Reaction equation

$$\text{cLUX} \xrightarrow{\text{cE4, cE3n, cCOP1d, cCOP1n, cCOP1d, cCOP1n, cE3n, cE4, cLUX}} \emptyset \tag{231}$$

Reactant

Table 81: Properties of each reactant.

Id	Name	SBO
cLUX	cLUX	

Modifiers

Table 82: Properties of each modifier.

Id	Name	SBO
cE4	cE4	
cE3n	cE3n	
cCOP1d	cCOP1n	
cCOP1n	cCOP1n	
cCOP1d	cCOP1d	
cCOP1n	cCOP1n	
cE3n	cE3n	
cE4	cE4	
cLUX	cLUX	

Kinetic Law

Derived unit contains undeclared units

$$v_{38} = \text{vol}\left(\text{def}\right) \cdot \text{function\_4\_cLUX\_degr\_1}\left(\left[\text{cCOP1d}\right], \left[\text{cCOP1n}\right], \left[\text{cE3n}\right], \left[\text{cE4}\right], \left[\text{cLUX}\right], \text{vol}\left(\text{def}\right), \text{m10}, \text{m36}, \text{m9}, \text{p21}, \text{p25}, \text{p26}\right) \tag{232}$$

$$\text{function\_4\_cLUX\_degr\_1}\left(\left[\text{cCOP1d}\right], \left[\text{cCOP1n}\right], \left[\text{cE3n}\right], \left[\text{cE4}\right], \left[\text{cLUX}\right], \text{vol}\left(\text{def}\right), \text{m10}, \text{m36}, \text{m9}, \text{p21}, \text{p25}, \text{p26}\right) = \frac{\text{m36} \cdot \left[\text{cLUX}\right] + \frac{\text{p26} \cdot \left[\text{cLUX}\right] \cdot \text{p25} \cdot \left[\text{cE4}\right] \cdot \left[\text{cE3n}\right]}{\text{p26} \cdot \left[\text{cLUX}\right] + \text{p21} + \text{m9} \cdot \left[\text{cCOP1d}\right] + \text{m10} \cdot \left[\text{cCOP1n}\right]}}{\text{vol}\left(\text{def}\right)} \tag{233}$$

$$\text{function\_4\_cLUX\_degr\_1}\left(\left[\text{cCOP1d}\right], \left[\text{cCOP1n}\right], \left[\text{cE3n}\right], \left[\text{cE4}\right], \left[\text{cLUX}\right], \text{vol}\left(\text{def}\right), \text{m10}, \text{m36}, \text{m9}, \text{p21}, \text{p25}, \text{p26}\right) = \frac{\text{m36} \cdot \left[\text{cLUX}\right] + \frac{\text{p26} \cdot \left[\text{cLUX}\right] \cdot \text{p25} \cdot \left[\text{cE4}\right] \cdot \left[\text{cE3n}\right]}{\text{p26} \cdot \left[\text{cLUX}\right] + \text{p21} + \text{m9} \cdot \left[\text{cCOP1d}\right] + \text{m10} \cdot \left[\text{cCOP1n}\right]}}{\text{vol}\left(\text{def}\right)} \tag{234}$$

8.39 Reaction cCOP1c_trsl

This is an irreversible reaction of no reactant forming one product.

Name cCOP1c_trsl

Reaction equation

$$\emptyset \longrightarrow \text{cCOP1c} \tag{235}$$

Product

Table 83: Properties of each product.

Id	Name	SBO
cCOP1c	cCOP1c	

Kinetic Law

Derived unit contains undeclared units

$$v_{39} = \text{vol}(\text{def}) \cdot \text{function\_4\_cCOP1c\_trsl}(\text{vol}(\text{def}), \text{n5}) \tag{236}$$

$$\text{function\_4\_cCOP1c\_trsl}(\text{vol}(\text{def}), \text{n5}) = \frac{\text{n5}}{\text{vol}(\text{def})} \tag{237}$$

$$\text{function\_4\_cCOP1c\_trsl}(\text{vol}(\text{def}), \text{n5}) = \frac{\text{n5}}{\text{vol}(\text{def})} \tag{238}$$

8.40 Reaction cCOP1c_degr

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cCOP1c_degr

Reaction equation

$$\text{cCOP1c} \xrightarrow{\text{cCOP1c}} \emptyset \tag{239}$$

Reactant

Table 84: Properties of each reactant.

Id	Name	SBO
cCOP1c	cCOP1c	

Modifier

Table 85: Properties of each modifier.

Id	Name	SBO
cCOP1c	cCOP1c	

Kinetic Law

Derived unit contains undeclared units

$$v_{40} = \mathrm{vol}\,(\mathrm{def}) \cdot \mathrm{function\_4\_cCOP1c\_degr}\,(\mathrm{L}, [\mathrm{cCOP1c}], \mathrm{m27}, \mathrm{p15}) \tag{240}$$

$$\mathrm{function\_4\_cCOP1c\_degr}\,(\mathrm{L}, [\mathrm{cCOP1c}], \mathrm{m27}, \mathrm{p15}) = \mathrm{m27} \cdot [\mathrm{cCOP1c}] \cdot (1 + \mathrm{p15} \cdot \mathrm{L}) \tag{241}$$

$$\mathrm{function\_4\_cCOP1c\_degr}\,(\mathrm{L}, [\mathrm{cCOP1c}], \mathrm{m27}, \mathrm{p15}) = \mathrm{m27} \cdot [\mathrm{cCOP1c}] \cdot (1 + \mathrm{p15} \cdot \mathrm{L}) \tag{242}$$

8.41 Reaction cCOP1n_import

This is an irreversible reaction of one reactant forming one product influenced by one modifier.

Name cCOP1n_import

Reaction equation

$$\mathrm{cCOP1c} \xrightarrow{\mathrm{cCOP1c}} \mathrm{cCOP1n} \tag{243}$$

Reactant

Table 86: Properties of each reactant.

Id	Name	SBO
cCOP1c	cCOP1c	

Modifier

Table 87: Properties of each modifier.

Id	Name	SBO
cCOP1c	cCOP1c	

Product

Table 88: Properties of each product.

Id	Name	SBO
cCOP1n	cCOP1n	

Kinetic Law

Derived unit contains undeclared units

$$v_{41} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cCOP1n\_import}\left(\left[\mathrm{cCOP1c}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{p6}\right) \tag{244}$$

$$\mathrm{function\_4\_cCOP1n\_import}\left(\left[\mathrm{cCOP1c}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{p6}\right) = \frac{\mathrm{p6} \cdot \left[\mathrm{cCOP1c}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{245}$$

$$\mathrm{function\_4\_cCOP1n\_import}\left(\left[\mathrm{cCOP1c}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{p6}\right) = \frac{\mathrm{p6} \cdot \left[\mathrm{cCOP1c}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{246}$$

8.42 Reaction cCOP1n_degr

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cCOP1n_degr

Reaction equation

$$\mathrm{cCOP1n} \xrightarrow{\mathrm{cCOP1n}} \emptyset \tag{247}$$

Reactant

Table 89: Properties of each reactant.

Id	Name	SBO
cCOP1n	cCOP1n	

Modifier

Table 90: Properties of each modifier.

Id	Name	SBO
cCOP1n	cCOP1n	

Kinetic Law

Derived unit contains undeclared units

$$v_{42} = \mathrm{vol}\,(\mathrm{def}) \cdot \mathrm{function\_4\_cCOP1n\_degr}\,(\mathrm{L}, [\mathrm{cCOP1n}], \mathrm{m27}, \mathrm{p15}) \tag{248}$$

$$\mathrm{function\_4\_cCOP1n\_degr}\,(\mathrm{L}, [\mathrm{cCOP1n}], \mathrm{m27}, \mathrm{p15}) = \mathrm{m27} \cdot [\mathrm{cCOP1n}] \cdot (1 + \mathrm{p15} \cdot \mathrm{L}) \tag{249}$$

$$\mathrm{function\_4\_cCOP1n\_degr}\,(\mathrm{L}, [\mathrm{cCOP1n}], \mathrm{m27}, \mathrm{p15}) = \mathrm{m27} \cdot [\mathrm{cCOP1n}] \cdot (1 + \mathrm{p15} \cdot \mathrm{L}) \tag{250}$$

8.43 Reaction cCOP1d_activ

This is an irreversible reaction of one reactant forming one product influenced by three modifiers.

Name cCOP1d_activ

Reaction equation

$$\mathrm{cCOP1n} \xrightarrow{\mathrm{cP,\ cCOP1n,\ cP}} \mathrm{cCOP1d} \tag{251}$$

Reactant

Table 91: Properties of each reactant.

Id	Name	SBO
cCOP1n	cCOP1n	

Modifiers

Table 92: Properties of each modifier.

Id	Name	SBO
cP	cP	
cCOP1n	cCOP1n	

Id	Name	SBO
cP	cP	

Product

Table 93: Properties of each product.

Id	Name	SBO
cCOP1d	cCOP1d	

Kinetic Law

Derived unit contains undeclared units

$$v_{43} = \mathrm{vol}\,(\mathrm{def}) \cdot \mathrm{function\_4\_cCOP1d\_activ}\,(\mathrm{L}, [\mathrm{cCOP1n}], [\mathrm{cP}], \mathrm{n14}, \mathrm{n6}) \tag{252}$$

$$\mathrm{function\_4\_cCOP1d\_activ}\,(\mathrm{L}, [\mathrm{cCOP1n}], [\mathrm{cP}], \mathrm{n14}, \mathrm{n6}) = \mathrm{n6} \cdot \mathrm{L} \cdot [\mathrm{cP}] \cdot [\mathrm{cCOP1n}] + \mathrm{n14} \cdot [\mathrm{cCOP1n}] \tag{253}$$

$$\mathrm{function\_4\_cCOP1d\_activ}\,(\mathrm{L}, [\mathrm{cCOP1n}], [\mathrm{cP}], \mathrm{n14}, \mathrm{n6}) = \mathrm{n6} \cdot \mathrm{L} \cdot [\mathrm{cP}] \cdot [\mathrm{cCOP1n}] + \mathrm{n14} \cdot [\mathrm{cCOP1n}] \tag{254}$$

8.44 Reaction cCOP1d_degr

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cCOP1d_degr

Reaction equation

$$\mathrm{cCOP1d} \xrightarrow{\mathrm{cCOP1d}} \emptyset \tag{255}$$

Reactant

Table 94: Properties of each reactant.

Id	Name	SBO
cCOP1d	cCOP1d	

Modifier

Table 95: Properties of each modifier.

Id	Name	SBO
cCOP1d	cCOP1d	

Kinetic Law

Derived unit contains undeclared units

$$v_{44} = \mathrm{vol}\,(\mathrm{def}) \cdot \mathrm{function\_4\_cCOP1d\_degr}\,(\mathrm{L}, [\mathrm{cCOP1d}], \mathrm{m31}, \mathrm{m33}) \tag{256}$$

$$\mathrm{function\_4\_cCOP1d\_degr}\,(\mathrm{L}, [\mathrm{cCOP1d}], \mathrm{m31}, \mathrm{m33}) = \mathrm{m31} \cdot (1 + \mathrm{m33} \cdot (1 - \mathrm{L})) \cdot [\mathrm{cCOP1d}] \tag{257}$$

$$\mathrm{function\_4\_cCOP1d\_degr}\,(\mathrm{L}, [\mathrm{cCOP1d}], \mathrm{m31}, \mathrm{m33}) = \mathrm{m31} \cdot (1 + \mathrm{m33} \cdot (1 - \mathrm{L})) \cdot [\mathrm{cCOP1d}] \tag{258}$$

8.45 Reaction cG_m_trscr

This is an irreversible reaction of no reactant forming one product influenced by eight modifiers.

Name cG_m_trscr

Reaction equation

$$\emptyset \xrightarrow{\mathrm{cT,\ cP,\ cEC,\ cL,\ cEC,\ cL,\ cP,\ cT}} \mathrm{cG\_m} \tag{259}$$

Modifiers

Table 96: Properties of each modifier.

Id	Name	SBO
cT	cT	
cP	cP	
cEC	cEC	
cL	cL	
cEC	cEC	
cL	cL	
cP	cP	
cT	cT	

Product

Table 97: Properties of each product.

Id	Name	SBO
cG_m	cG_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{45} = \mathrm{vol}\,(\mathrm{def}) \cdot \mathrm{function\_4\_cG\_m\_trscr\_1}\,(\mathrm{L}, [\mathrm{cEC}], [\mathrm{cL}], [\mathrm{cP}], [\mathrm{cT}], \mathrm{e}, \mathrm{g14}, \mathrm{g15}, \mathrm{n12}, \mathrm{parameter\_1}, \mathrm{parameter\_7}, \mathrm{q2}) \tag{260}$$

$$\mathrm{function\_4\_cG\_m\_trscr\_1}\,(\mathrm{L}, [\mathrm{cEC}], [\mathrm{cL}], [\mathrm{cP}], [\mathrm{cT}], \mathrm{e}, \mathrm{g14}, \mathrm{g15}, \mathrm{n12}, \mathrm{parameter\_1}, \mathrm{parameter\_7}, \mathrm{q2}) = \frac{\mathrm{parameter\_1}^{\mathrm{parameter\_7}}}{\mathrm{parameter\_1}^{\mathrm{parameter\_7}} + [\mathrm{cT}]^{\mathrm{parameter\_7}}} \cdot \left(\mathrm{L} \cdot \mathrm{q2} \cdot [\mathrm{cP}] + \frac{\frac{\mathrm{n12} \cdot \mathrm{g14}}{[\mathrm{cEC}] + \mathrm{g14}} \cdot \mathrm{g15}^{\mathrm{e}}}{[\mathrm{cL}]^{\mathrm{e}} + \mathrm{g15}^{\mathrm{e}}} \right) \tag{261}$$

$$\mathrm{function\_4\_cG\_m\_trscr\_1}\,(\mathrm{L}, [\mathrm{cEC}], [\mathrm{cL}], [\mathrm{cP}], [\mathrm{cT}], \mathrm{e}, \mathrm{g14}, \mathrm{g15}, \mathrm{n12}, \mathrm{parameter\_1}, \mathrm{parameter\_7}, \mathrm{q2}) = \frac{\mathrm{parameter\_1}^{\mathrm{parameter\_7}}}{\mathrm{parameter\_1}^{\mathrm{parameter\_7}} + [\mathrm{cT}]^{\mathrm{parameter\_7}}} \cdot \left(\mathrm{L} \cdot \mathrm{q2} \cdot [\mathrm{cP}] + \frac{\frac{\mathrm{n12} \cdot \mathrm{g14}}{[\mathrm{cEC}] + \mathrm{g14}} \cdot \mathrm{g15}^{\mathrm{e}}}{[\mathrm{cL}]^{\mathrm{e}} + \mathrm{g15}^{\mathrm{e}}} \right) \tag{262}$$

8.46 Reaction cG_m_degr

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cG_m_degr

Reaction equation

$$\mathrm{cG\_m} \xrightarrow{\mathrm{cG\_m}} \emptyset \tag{263}$$

Reactant

Table 98: Properties of each reactant.

Id	Name	SBO
cG_m	cG_m	

Modifier

Table 99: Properties of each modifier.

Id	Name	SBO
cG_m	cG_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{46} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cG\_m\_degr}\left(\left[\mathrm{cG\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m18}\right) \tag{264}$$

$$\mathrm{function\_4\_cG\_m\_degr}\left(\left[\mathrm{cG\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m18}\right) = \frac{\mathrm{m18} \cdot \left[\mathrm{cG\_m}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{265}$$

$$\mathrm{function\_4\_cG\_m\_degr}\left(\left[\mathrm{cG\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m18}\right) = \frac{\mathrm{m18} \cdot \left[\mathrm{cG\_m}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{266}$$

8.47 Reaction cG_trsl

This is an irreversible reaction of no reactant forming one product influenced by two modifiers.

Name cG_trsl

Reaction equation

$$\emptyset \xrightarrow{\mathrm{cG\_m},\ \mathrm{cG\_m}} \mathrm{cG} \tag{267}$$

Modifiers

Table 100: Properties of each modifier.

Id	Name	SBO
cG_m	cG_m	
cG_m	cG_m	

Product

Table 101: Properties of each product.

Id	Name	SBO
cG	cG	

Kinetic Law

Derived unit contains undeclared units

$$v_{47} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cG\_trsl}\left(\left[\mathrm{cG\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{p11}\right) \tag{268}$$

$$\mathrm{function\_4\_cG\_trsl}\left(\left[\mathrm{cG\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{p11}\right) = \frac{\mathrm{p11} \cdot \left[\mathrm{cG\_m}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{269}$$

$$\mathrm{function\_4\_cG\_trsl}\left(\left[\mathrm{cG\_m}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{p11}\right) = \frac{\mathrm{p11} \cdot \left[\mathrm{cG\_m}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{270}$$

8.48 Reaction cG_degr

This is an irreversible reaction of one reactant forming no product influenced by three modifiers.

Name cG_degr

Reaction equation

$$\mathrm{cG} \xrightarrow{\mathrm{cE3n},\ \mathrm{cE3n},\ \mathrm{cG}} \emptyset \tag{271}$$

Reactant

Table 102: Properties of each reactant.

Id	Name	SBO
cG	cG	

Modifiers

Table 103: Properties of each modifier.

Id	Name	SBO
cE3n	cE3n	
cE3n	cE3n	
cG	cG	

Kinetic Law

Derived unit contains undeclared units

$$v_{48} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cG\_degr\_1}\left(\left[\mathrm{cE3n}\right], \left[\mathrm{cG}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m19}, \mathrm{p17}, \mathrm{p28}, \mathrm{p29}\right) \tag{272}$$

$$\begin{aligned} &\mathrm{function\_4\_cG\_degr\_1}\left(\left[\mathrm{cE3n}\right], \left[\mathrm{cG}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m19}, \mathrm{p17}, \mathrm{p28}, \mathrm{p29}\right) \\ &= \frac{\mathrm{m19} \cdot \left[\mathrm{cG}\right] + \mathrm{p28} \cdot \left[\mathrm{cG}\right] - \frac{\mathrm{p29} \cdot \mathrm{p28} \cdot \left[\mathrm{cG}\right]}{\mathrm{p29} + \mathrm{m19} + \mathrm{p17} \cdot \left[\mathrm{cE3n}\right]}}{\mathrm{vol}\left(\mathrm{def}\right)} \end{aligned} \tag{273}$$

$$\begin{aligned} &\mathrm{function\_4\_cG\_degr\_1}\left(\left[\mathrm{cE3n}\right], \left[\mathrm{cG}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m19}, \mathrm{p17}, \mathrm{p28}, \mathrm{p29}\right) \\ &= \frac{\mathrm{m19} \cdot \left[\mathrm{cG}\right] + \mathrm{p28} \cdot \left[\mathrm{cG}\right] - \frac{\mathrm{p29} \cdot \mathrm{p28} \cdot \left[\mathrm{cG}\right]}{\mathrm{p29} + \mathrm{m19} + \mathrm{p17} \cdot \left[\mathrm{cE3n}\right]}}{\mathrm{vol}\left(\mathrm{def}\right)} \end{aligned} \tag{274}$$

8.49 Reaction cG_cZTL_assoc

This is a reversible reaction of two reactants forming one product influenced by three modifiers.

Name cG_cZTL_assoc

Reaction equation

$$\mathrm{cG} + \mathrm{cZTL} \xrightleftharpoons{\mathrm{cG,\ cZG,\ cZTL}} \mathrm{cZG} \tag{275}$$

Reactants

Table 104: Properties of each reactant.

Id	Name	SBO
cG	cG	
cZTL	cZTL	

Modifiers

Table 105: Properties of each modifier.

Id	Name	SBO
cG	cG	
cZG	cZG	
cZTL	cZTL	

Product

Table 106: Properties of each product.

Id	Name	SBO
cZG	cZG	

Kinetic Law

Derived unit contains undeclared units

$$v_{49} = \mathrm{vol}\,(\mathrm{def}) \cdot \mathrm{function\_4\_cG\_cZTL\_assoc}\,(\mathrm{L}, [\mathrm{cG}], [\mathrm{cZG}], [\mathrm{cZTL}], \mathrm{p12}, \mathrm{p13}) \tag{276}$$

$$\begin{aligned} &\mathrm{function\_4\_cG\_cZTL\_assoc}\,(\mathrm{L}, [\mathrm{cG}], [\mathrm{cZG}], [\mathrm{cZTL}], \mathrm{p12}, \mathrm{p13}) \\ &\quad = \mathrm{p12} \cdot \mathrm{L} \cdot [\mathrm{cZTL}] \cdot [\mathrm{cG}] - \mathrm{p13} \cdot (1 - \mathrm{L}) \cdot [\mathrm{cZG}] \end{aligned} \tag{277}$$

$$\begin{aligned} &\mathrm{function\_4\_cG\_cZTL\_assoc}\,(\mathrm{L}, [\mathrm{cG}], [\mathrm{cZG}], [\mathrm{cZTL}], \mathrm{p12}, \mathrm{p13}) \\ &\quad = \mathrm{p12} \cdot \mathrm{L} \cdot [\mathrm{cZTL}] \cdot [\mathrm{cG}] - \mathrm{p13} \cdot (1 - \mathrm{L}) \cdot [\mathrm{cZG}] \end{aligned} \tag{278}$$

8.50 Reaction cZTL_trsl

This is an irreversible reaction of no reactant forming one product.

Name cZTL_trsl

Reaction equation

$$\emptyset \longrightarrow \mathrm{cZTL} \tag{279}$$

Product

Table 107: Properties of each product.

Id	Name	SBO
cZTL	cZTL	

Kinetic Law

Derived unit contains undeclared units

$$v_{50} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cZTL\_trsl}\left(\mathrm{vol}\left(\mathrm{def}\right), \mathrm{p14}\right) \tag{280}$$

$$\mathrm{function\_4\_cZTL\_trsl}\left(\mathrm{vol}\left(\mathrm{def}\right), \mathrm{p14}\right) = \frac{\mathrm{p14}}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{281}$$

$$\mathrm{function\_4\_cZTL\_trsl}\left(\mathrm{vol}\left(\mathrm{def}\right), \mathrm{p14}\right) = \frac{\mathrm{p14}}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{282}$$

8.51 Reaction cZTL_degr

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cZTL_degr

Reaction equation

$$\mathrm{cZTL} \xrightarrow{\mathrm{cZTL}} \emptyset \tag{283}$$

Reactant

Table 108: Properties of each reactant.

Id	Name	SBO
cZTL	cZTL	

Modifier

Table 109: Properties of each modifier.

Id	Name	SBO
cZTL	cZTL	

Kinetic Law

Derived unit contains undeclared units

$$v_{51} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cZTL\_degr}\left(\left[\mathrm{cZTL}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m20}\right) \tag{284}$$

$$\mathrm{function\_4\_cZTL\_degr}\left(\left[\mathrm{cZTL}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m20}\right) = \frac{\mathrm{m20} \cdot \left[\mathrm{cZTL}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{285}$$

$$\mathrm{function\_4\_cZTL\_degr}\left(\left[\mathrm{cZTL}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m20}\right) = \frac{\mathrm{m20} \cdot \left[\mathrm{cZTL}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{286}$$

8.52 Reaction `cZG_degr`

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cZG_degr

Reaction equation

$$\mathrm{cZG} \xrightarrow{\mathrm{cZG}} \emptyset \tag{287}$$

Reactant

Table 110: Properties of each reactant.

Id	Name	SBO
`cZG`	cZG	

Modifier

Table 111: Properties of each modifier.

Id	Name	SBO
`cZG`	cZG	

Kinetic Law

Derived unit contains undeclared units

$$v_{52} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cZG\_degr}\left(\left[\mathrm{cZG}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m21}\right) \tag{288}$$

$$\text{function\_4\_cZG\_degr}\left(\left[\text{cZG}\right], \text{vol}\left(\text{def}\right), \text{m21}\right) = \frac{\text{m21} \cdot \left[\text{cZG}\right]}{\text{vol}\left(\text{def}\right)} \tag{289}$$

$$\text{function\_4\_cZG\_degr}\left(\left[\text{cZG}\right], \text{vol}\left(\text{def}\right), \text{m21}\right) = \frac{\text{m21} \cdot \left[\text{cZG}\right]}{\text{vol}\left(\text{def}\right)} \tag{290}$$

8.53 Reaction cG_cE3_assoc

This is an irreversible reaction of two reactants forming one product influenced by two modifiers.

Name cG_cE3_assoc

Reaction equation

$$\text{cE3} + \text{cG} \xrightarrow{\text{cE3, cG}} \text{cEG} \tag{291}$$

Reactants

Table 112: Properties of each reactant.

Id	Name	SBO
cE3	cE3	
cG	cG	

Modifiers

Table 113: Properties of each modifier.

Id	Name	SBO
cE3	cE3	
cG	cG	

Product

Table 114: Properties of each product.

Id	Name	SBO
cEG	cEG	

Kinetic Law

Derived unit contains undeclared units

$$v_{53} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cG\_cE3\_assoc}\left(\left[\mathrm{cE3}\right], \left[\mathrm{cG}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{p17}\right) \tag{292}$$

$$\mathrm{function\_4\_cG\_cE3\_assoc}\left(\left[\mathrm{cE3}\right], \left[\mathrm{cG}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{p17}\right) = \frac{\mathrm{p17} \cdot \left[\mathrm{cE3}\right] \cdot \left[\mathrm{cG}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{293}$$

$$\mathrm{function\_4\_cG\_cE3\_assoc}\left(\left[\mathrm{cE3}\right], \left[\mathrm{cG}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{p17}\right) = \frac{\mathrm{p17} \cdot \left[\mathrm{cE3}\right] \cdot \left[\mathrm{cG}\right]}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{294}$$

8.54 Reaction cEG_degr

This is an irreversible reaction of one reactant forming no product influenced by eleven modifiers.

Name cEG_degr

Reaction equation

$$\mathrm{cEG} \xrightarrow{\mathrm{cCOP1c,\ cE3n,\ cG,\ cCOP1n,\ cCOP1d,\ cCOP1c,\ cCOP1d,\ cCOP1n,\ cE3n,\ cEG,\ cG}} \emptyset \tag{295}$$

Reactant

Table 115: Properties of each reactant.

Id	Name	SBO
cEG	cEG	

Modifiers

Table 116: Properties of each modifier.

Id	Name	SBO
cCOP1c	cCOP1c	
cE3n	cE3n	
cG	cG	
cCOP1n	cCOP1n	
cCOP1d	cCOP1d	
cCOP1c	cCOP1c	

Id	Name	SBO
cCOP1d	cCOP1d	
cCOP1n	cCOP1n	
cE3n	cE3n	
cEG	cEG	
cG	cG	

Kinetic Law

Derived unit contains undeclared units

$$v_{54} = \mathrm{vol}\,(\mathrm{def}) \cdot \mathrm{function\_4\_cEG\_degr\_1}\,([\mathrm{cCOP1c}], [\mathrm{cCOP1d}], [\mathrm{cCOP1n}], [\mathrm{cE3n}], [\mathrm{cEG}], [\mathrm{cG}], \mathrm{vol}\,(\mathrm{def}), \mathrm{m10}, \mathrm{m19}, \mathrm{m9}, \mathrm{p17}, \mathrm{p18}, \mathrm{p28}, \mathrm{p29}, \mathrm{parameter\_26}) \tag{296}$$

$$\begin{aligned} &\mathrm{function\_4\_cEG\_degr\_1}\,([\mathrm{cCOP1c}], [\mathrm{cCOP1d}], [\mathrm{cCOP1n}], [\mathrm{cE3n}], [\mathrm{cEG}], \\ &\quad [\mathrm{cG}], \mathrm{vol}\,(\mathrm{def}), \mathrm{m10}, \mathrm{m19}, \mathrm{m9}, \mathrm{p17}, \mathrm{p18}, \mathrm{p28}, \mathrm{p29}, \mathrm{parameter\_26}) \\ &\quad = \frac{\mathrm{m10} \cdot [\mathrm{cEG}] \cdot [\mathrm{cCOP1c}] + \mathrm{p18} \cdot [\mathrm{cEG}] - \frac{\mathrm{parameter\_26} \cdot \left(\mathrm{p18} \cdot [\mathrm{cEG}] + \frac{\mathrm{p17} \cdot [\mathrm{cE3n}] \cdot \mathrm{p28} \cdot [\mathrm{cG}]}{\mathrm{p29} + \mathrm{m19} + \mathrm{p17} \cdot [\mathrm{cE3n}]}\right)}{\mathrm{m10} \cdot [\mathrm{cCOP1n}] + \mathrm{m9} \cdot [\mathrm{cCOP1d}] + \mathrm{parameter\_26}}}{\mathrm{vol}\,(\mathrm{def})} \end{aligned} \tag{297}$$

$$\begin{aligned} &\mathrm{function\_4\_cEG\_degr\_1}\,([\mathrm{cCOP1c}], [\mathrm{cCOP1d}], [\mathrm{cCOP1n}], [\mathrm{cE3n}], [\mathrm{cEG}], \\ &\quad [\mathrm{cG}], \mathrm{vol}\,(\mathrm{def}), \mathrm{m10}, \mathrm{m19}, \mathrm{m9}, \mathrm{p17}, \mathrm{p18}, \mathrm{p28}, \mathrm{p29}, \mathrm{parameter\_26}) \\ &\quad = \frac{\mathrm{m10} \cdot [\mathrm{cEG}] \cdot [\mathrm{cCOP1c}] + \mathrm{p18} \cdot [\mathrm{cEG}] - \frac{\mathrm{parameter\_26} \cdot \left(\mathrm{p18} \cdot [\mathrm{cEG}] + \frac{\mathrm{p17} \cdot [\mathrm{cE3n}] \cdot \mathrm{p28} \cdot [\mathrm{cG}]}{\mathrm{p29} + \mathrm{m19} + \mathrm{p17} \cdot [\mathrm{cE3n}]}\right)}{\mathrm{m10} \cdot [\mathrm{cCOP1n}] + \mathrm{m9} \cdot [\mathrm{cCOP1d}] + \mathrm{parameter\_26}}}{\mathrm{vol}\,(\mathrm{def})} \end{aligned} \tag{298}$$

8.55 Reaction cEC_form

This is an irreversible reaction of no reactant forming one product influenced by ten modifiers.

Name cEC_form

Reaction equation

$$\emptyset \xrightarrow{\text{cLUX, cE4, cE3n, cCOP1d, cCOP1n, cCOP1d, cCOP1n, cE3n, cE4, cLUX}} \text{cEC} \tag{299}$$

Modifiers

Table 117: Properties of each modifier.

Id	Name	SBO
cLUX	cLUX	
cE4	cE4	
cE3n	cE3n	
cCOP1d	cCOP1d	
cCOP1n	cCOP1n	
cCOP1d	cCOP1d	
cCOP1n	cCOP1n	
cE3n	cE3n	
cE4	cE4	
cLUX	cLUX	

Product

Table 118: Properties of each product.

Id	Name	SBO
cEC	cEC	

Kinetic Law

Derived unit contains undeclared units

$$v_{55} = \mathrm{vol}\left(\mathrm{def}\right) \cdot \mathrm{function\_4\_cEC\_form}\left(\left[\mathrm{cCOP1d}\right], \left[\mathrm{cCOP1n}\right], \left[\mathrm{cE3n}\right], \left[\mathrm{cE4}\right], \left[\mathrm{cLUX}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m10}, \mathrm{m9}, \mathrm{p21}, \mathrm{p25}, \mathrm{p26}\right) \tag{300}$$

$$\mathrm{function\_4\_cEC\_form}\left(\left[\mathrm{cCOP1d}\right], \left[\mathrm{cCOP1n}\right], \left[\mathrm{cE3n}\right], \left[\mathrm{cE4}\right], \left[\mathrm{cLUX}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m10}, \mathrm{m9}, \mathrm{p21}, \mathrm{p25}, \mathrm{p26}\right) = \frac{\frac{\mathrm{p26} \cdot \left[\mathrm{cLUX}\right] \cdot \mathrm{p25} \cdot \left[\mathrm{cE4}\right] \cdot \left[\mathrm{cE3n}\right]}{\mathrm{p26} \cdot \left[\mathrm{cLUX}\right] + \mathrm{p21} + \mathrm{m9} \cdot \left[\mathrm{cCOP1d}\right] + \mathrm{m10} \cdot \left[\mathrm{cCOP1n}\right]}}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{301}$$

$$\mathrm{function\_4\_cEC\_form}\left(\left[\mathrm{cCOP1d}\right], \left[\mathrm{cCOP1n}\right], \left[\mathrm{cE3n}\right], \left[\mathrm{cE4}\right], \left[\mathrm{cLUX}\right], \mathrm{vol}\left(\mathrm{def}\right), \mathrm{m10}, \mathrm{m9}, \mathrm{p21}, \mathrm{p25}, \mathrm{p26}\right) = \frac{\frac{\mathrm{p26} \cdot \left[\mathrm{cLUX}\right] \cdot \mathrm{p25} \cdot \left[\mathrm{cE4}\right] \cdot \left[\mathrm{cE3n}\right]}{\mathrm{p26} \cdot \left[\mathrm{cLUX}\right] + \mathrm{p21} + \mathrm{m9} \cdot \left[\mathrm{cCOP1d}\right] + \mathrm{m10} \cdot \left[\mathrm{cCOP1n}\right]}}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{302}$$

8.56 Reaction cEC_degr

This is an irreversible reaction of one reactant forming no product influenced by eleven modifiers.

Name cEC_degr

Reaction equation

$$\text{cEC} \xrightarrow{\text{cCOP1n, cCOP1d, cG, cE3n, cEG, cCOP1d, cCOP1n, cE3n, cEC, cEG, cG}} \emptyset \tag{303}$$

Reactant

Table 119: Properties of each reactant.

Id	Name	SBO
cEC	cEC	

Modifiers

Table 120: Properties of each modifier.

Id	Name	SBO
cCOP1n	cCOP1n	
cCOP1d	cCOP1d	
cG	cG	
cE3n	cE3n	
cEG	cEG	
cCOP1d	cCOP1d	
cCOP1n	cCOP1n	
cE3n	cE3n	
cEC	cEC	
cEG	cEG	
cG	cG	

Kinetic Law

Derived unit contains undeclared units

$$v_{56} = \text{vol}(\text{def}) \cdot \text{function\_4\_cEC\_degr}(\text{L}, [\text{cCOP1d}], [\text{cCOP1n}], [\text{cE3n}], [\text{cEC}], [\text{cEG}], [\text{cG}], \text{d}, \text{g7}, \text{m10}, \text{m19}, \text{m32}, \text{m9}, \text{p17}, \text{p18}, \text{p24}, \text{p28}, \text{p29}, \text{parameter\_26}) \tag{304}$$

$$\begin{aligned}\text{function\_4\_cEC\_degr}(\text{L}, [\text{cCOP1d}], [\text{cCOP1n}], [\text{cE3n}], [\text{cEC}], [\text{cEG}], [\text{cG}], \\ \text{d}, \text{g7}, \text{m10}, \text{m19}, \text{m32}, \text{m9}, \text{p17}, \text{p18}, \text{p24}, \text{p28}, \text{p29}, \text{parameter\_26}) = \text{m10} \\ \cdot [\text{cCOP1n}] \cdot [\text{cEC}] + \text{m9} \cdot [\text{cCOP1d}] \cdot [\text{cEC}] + \text{m32} \cdot [\text{cEC}] \\ \cdot \left(1 + \frac{\text{p24} \cdot \text{L} \cdot \left(\frac{\text{p28} \cdot [\text{cG}]}{\text{p29}+\text{m19}+\text{p17} \cdot [\text{cE3n}]} + \frac{\text{p18} \cdot [\text{cEG}] + \frac{\text{p17} \cdot [\text{cE3n}] \cdot \text{p28} \cdot [\text{cG}]}{\text{p29}+\text{m19}+\text{p17} \cdot [\text{cE3n}]}}{\text{m10} \cdot [\text{cCOP1n}] + \text{m9} \cdot [\text{cCOP1d}] + \text{parameter\_26}} \right)^{\text{d}}}{\left(\frac{\text{p28} \cdot [\text{cG}]}{\text{p29}+\text{m19}+\text{p17} \cdot [\text{cE3n}]} + \frac{\text{p18} \cdot [\text{cEG}] + \frac{\text{p17} \cdot [\text{cE3n}] \cdot \text{p28} \cdot [\text{cG}]}{\text{p29}+\text{m19}+\text{p17} \cdot [\text{cE3n}]}}{\text{m10} \cdot [\text{cCOP1n}] + \text{m9} \cdot [\text{cCOP1d}] + \text{parameter\_26}} \right)^{\text{d}} + \text{g7}^{\text{d}}} \right)\end{aligned} \tag{305}$$

$$\begin{aligned}&\text{function\_4\_cEC\_degr}\left(\text{L}, [\text{cCOP1d}], [\text{cCOP1n}], [\text{cE3n}], [\text{cEC}], [\text{cEG}], [\text{cG}],\right.\\&\left.\text{d}, \text{g7}, \text{m10}, \text{m19}, \text{m32}, \text{m9}, \text{p17}, \text{p18}, \text{p24}, \text{p28}, \text{p29}, \text{parameter\_26}\right) = \text{m10}\\&\quad\cdot [\text{cCOP1n}] \cdot [\text{cEC}] + \text{m9} \cdot [\text{cCOP1d}] \cdot [\text{cEC}] + \text{m32} \cdot [\text{cEC}]\\&\quad\cdot \left(\frac{\text{p24} \cdot \text{L} \cdot \left(\frac{\text{p28}\cdot[\text{cG}]}{\text{p29}+\text{m19}+\text{p17}\cdot[\text{cE3n}]} + \frac{\text{p18}\cdot[\text{cEG}]+\frac{\text{p17}\cdot[\text{cE3n}]\cdot\text{p28}\cdot[\text{cG}]}{\text{p29}+\text{m19}+\text{p17}\cdot[\text{cE3n}]}}{\text{m10}\cdot[\text{cCOP1n}]+\text{m9}\cdot[\text{cCOP1d}]+\text{parameter\_26}}\right)^{\text{d}}}{\left(\frac{\text{p28}\cdot[\text{cG}]}{\text{p29}+\text{m19}+\text{p17}\cdot[\text{cE3n}]} + \frac{\text{p18}\cdot[\text{cEG}]+\frac{\text{p17}\cdot[\text{cE3n}]\cdot\text{p28}\cdot[\text{cG}]}{\text{p29}+\text{m19}+\text{p17}\cdot[\text{cE3n}]}}{\text{m10}\cdot[\text{cCOP1n}]+\text{m9}\cdot[\text{cCOP1d}]+\text{parameter\_26}}\right)^{\text{d}} + \text{g7}^{\text{d}}} + 1\right)\end{aligned} \tag{306}$$

8.57 Reaction `reaction_1`

This is an irreversible reaction of no reactant forming one product influenced by four modifiers.

Name cABAR_m_trscr

Reaction equation

$$\emptyset \xrightarrow{\text{cT, cL, cL, cT}} \text{species\_1} \tag{307}$$

Modifiers

Table 121: Properties of each modifier.

Id	Name	SBO
cT	cT	
cL	cL	
cL	cL	
cT	cT	

Product

Table 122: Properties of each product.

Id	Name	SBO
species_1	cABAR_m	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned}v_{57} = \text{vol}\left(\text{default}\right) \cdot \text{function\_4\_cABAR\_m\_trscr\_1}\left([\text{cL}], [\text{cT}], \text{vol}\left(\text{def}\right), \text{e}, \text{parameter\_13},\right.\\\left.\text{parameter\_17}, \text{parameter\_24}, \text{parameter\_7}\right)\end{aligned} \tag{308}$$

$$\text{function\_4\_cABAR\_m\_trscr\_1}\left([\text{cL}],[\text{cT}],\text{vol}\left(\text{def}\right),\text{e},\text{parameter\_13},\text{parameter\_17},\right.$$
$$\left.\text{parameter\_24},\text{parameter\_7}\right) = \frac{\frac{\text{parameter\_13}^{\text{parameter\_7}}}{\text{parameter\_13}^{\text{parameter\_7}}+[\text{cT}]^{\text{parameter\_7}}}\cdot\text{parameter\_24}\cdot[\text{cL}]^{\text{e}}}{[\text{cL}]^{\text{e}}+\text{parameter\_17}^{\text{e}}}}{\text{vol}\left(\text{def}\right)} \tag{309}$$

$$\text{function\_4\_cABAR\_m\_trscr\_1}\left([\text{cL}],[\text{cT}],\text{vol}\left(\text{def}\right),\text{e},\text{parameter\_13},\text{parameter\_17},\right.$$
$$\left.\text{parameter\_24},\text{parameter\_7}\right) = \frac{\frac{\text{parameter\_13}^{\text{parameter\_7}}}{\text{parameter\_13}^{\text{parameter\_7}}+[\text{cT}]^{\text{parameter\_7}}}\cdot\text{parameter\_24}\cdot[\text{cL}]^{\text{e}}}{[\text{cL}]^{\text{e}}+\text{parameter\_17}^{\text{e}}}}{\text{vol}\left(\text{def}\right)} \tag{310}$$

8.58 Reaction `reaction_2`

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cABAR_m_degr

Reaction equation

$$\text{species\_1} \xrightarrow{\text{species\_1}} \emptyset \tag{311}$$

Reactant

Table 123: Properties of each reactant.

Id	Name	SBO
`species_1`	cABAR_m	

Modifier

Table 124: Properties of each modifier.

Id	Name	SBO
`species_1`	cABAR_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{58} = \text{vol}\left(\text{default}\right)\cdot\text{function\_4\_cABAR\_m\_degr}\left(\text{vol}\left(\text{def}\right),\text{m37},[\text{species\_1}]\right) \tag{312}$$

$$\text{function\_4\_cABAR\_m\_degr}\left(\text{vol}\left(\text{def}\right),\text{m37},[\text{species\_1}]\right) = \frac{\text{m37}\cdot[\text{species\_1}]}{\text{vol}\left(\text{def}\right)} \tag{313}$$

$$\text{function\_4\_cABAR\_m\_degr}\left(\text{vol}\left(\text{def}\right), \text{m37}, \left[\text{species\_1}\right]\right) = \frac{\text{m37} \cdot \left[\text{species\_1}\right]}{\text{vol}\left(\text{def}\right)} \tag{314}$$

8.59 Reaction `reaction_3`

This is an irreversible reaction of no reactant forming one product influenced by two modifiers.

Name cPP2C_act

Reaction equation

$$\emptyset \xrightarrow{\text{species\_1, species\_1}} \text{species\_2} \tag{315}$$

Modifiers

Table 125: Properties of each modifier.

Id	Name	SBO
`species_1`	cABAR_m	
`species_1`	cABAR_m	

Product

Table 126: Properties of each product.

Id	Name	SBO
`species_2`	cPP2C	

Kinetic Law

Derived unit contains undeclared units

$$v_{59} = \text{vol}\left(\text{default}\right) \cdot \text{function\_4\_cPP2C\_act\_1}\left(\text{vol}\left(\text{def}\right), \text{parameter\_16}, \text{parameter\_18}, \text{parameter\_28}, \text{parameter\_29}, \text{parameter\_9}, \left[\text{species\_1}\right]\right) \tag{316}$$

$$\text{function\_4\_cPP2C\_act\_1}\left(\text{vol}\left(\text{def}\right), \text{parameter\_16}, \text{parameter\_18}, \text{parameter\_28}, \text{parameter\_29}, \text{parameter\_9}, \left[\text{species\_1}\right]\right) \tag{317}$$

$$= \frac{\text{parameter\_28} \cdot \text{parameter\_16}^{\text{parameter\_9}}}{\left(0.5 \cdot \left(\text{parameter\_29} + \left[\text{species\_1}\right] + \text{parameter\_18} - \left(\left(\text{parameter\_29} + \left[\text{species\_1}\right] + \text{parameter\_18}\right)^2 - 4 \cdot \text{parameter\_29} \cdot \left[\text{species\_1}\right]\right)^{\frac{1}{2}}\right)\right)^{\text{parameter\_9}} + \text{parameter\_}}$$
$$\text{vol}\left(\text{def}\right)$$

$$\text{function\_4\_cPP2C\_act\_1}\left(\text{vol}\left(\text{def}\right), \text{parameter\_16}, \text{parameter\_18}, \text{parameter\_28}, \text{parameter\_29}, \text{parameter\_9}, [\text{species\_1}]\right) \tag{318}$$

$$= \frac{\text{parameter\_28} \cdot \text{parameter\_16}^{\text{parameter\_9}}}{\left(0.5 \cdot \left(\text{parameter\_29} + [\text{species\_1}] + \text{parameter\_18} - \left(\left(\text{parameter\_29} + [\text{species\_1}] + \text{parameter\_18}\right)^2 - 4 \cdot \text{parameter\_29} \cdot [\text{species\_1}]\right)^{\frac{1}{2}}\right)\right)^{\text{parameter\_9}} + \text{parameter\_}}{\text{vol}\left(\text{def}\right)}$$

8.60 Reaction `reaction_4`

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cPP2C_degr

Reaction equation

$$\text{species\_2} \xrightarrow{\text{species\_2}} \emptyset \tag{319}$$

Reactant

Table 127: Properties of each reactant.

Id	Name	SBO
`species_2`	cPP2C	

Modifier

Table 128: Properties of each modifier.

Id	Name	SBO
`species_2`	cPP2C	

Kinetic Law

Derived unit contains undeclared units

$$v_{60} = \text{vol}\left(\text{default}\right) \cdot \text{function\_4\_cPP2C\_degr\_1}\left(\text{vol}\left(\text{def}\right), \text{parameter\_20}, [\text{species\_2}]\right) \tag{320}$$

$$\text{function\_4\_cPP2C\_degr\_1}\left(\text{vol}\left(\text{def}\right), \text{parameter\_20}, [\text{species\_2}]\right) = \frac{\text{parameter\_20} \cdot [\text{species\_2}]}{\text{vol}\left(\text{def}\right)} \tag{321}$$

$$\text{function\_4\_cPP2C\_degr\_1}\left(\text{vol}\left(\text{def}\right), \text{parameter\_20}, [\text{species\_2}]\right) = \frac{\text{parameter\_20} \cdot [\text{species\_2}]}{\text{vol}\left(\text{def}\right)} \tag{322}$$

8.61 Reaction reaction_5

This is an irreversible reaction of one reactant forming no product influenced by three modifiers.

Name cSnRK2_degr

Reaction equation

$$\text{species\_3} \xrightarrow{\text{species\_2, species\_2, species\_3}} \emptyset \tag{323}$$

Reactant

Table 129: Properties of each reactant.

Id	Name	SBO
species_3	cSnRK2	

Modifiers

Table 130: Properties of each modifier.

Id	Name	SBO
species_2	cPP2C	
species_2	cPP2C	
species_3	cSnRK2	

Kinetic Law

Derived unit contains undeclared units

$$v_{61} = \text{vol}(\text{default}) \cdot \text{function\_4\_cSnRK2\_degr}(\text{vol}(\text{def}), \text{m30}, [\text{species\_2}], [\text{species\_3}]) \tag{324}$$

$$\begin{aligned} &\text{function\_4\_cSnRK2\_degr}(\text{vol}(\text{def}), \text{m30}, [\text{species\_2}], [\text{species\_3}]) \\ &= \frac{\text{m30} \cdot [\text{species\_3}] \cdot [\text{species\_2}]}{\text{vol}(\text{def})} \end{aligned} \tag{325}$$

$$\begin{aligned} &\text{function\_4\_cSnRK2\_degr}(\text{vol}(\text{def}), \text{m30}, [\text{species\_2}], [\text{species\_3}]) \\ &= \frac{\text{m30} \cdot [\text{species\_3}] \cdot [\text{species\_2}]}{\text{vol}(\text{def})} \end{aligned} \tag{326}$$

8.62 Reaction reaction_6

This is an irreversible reaction of no reactant forming one product.

Name cSnRK2_act

Reaction equation

$$\emptyset \longrightarrow \text{species\_3} \tag{327}$$

Product

Table 131: Properties of each product.

Id	Name	SBO
species_3	cSnRK2	

Kinetic Law

Derived unit contains undeclared units

$$v_{62} = \text{vol}(\text{default}) \cdot \text{function\_4\_cSnRK2\_act\_1}(\text{vol}(\text{def}), \text{parameter\_27}) \tag{328}$$

$$\text{function\_4\_cSnRK2\_act\_1}(\text{vol}(\text{def}), \text{parameter\_27}) = \frac{\text{parameter\_27}}{\text{vol}(\text{def})} \tag{329}$$

$$\text{function\_4\_cSnRK2\_act\_1}(\text{vol}(\text{def}), \text{parameter\_27}) = \frac{\text{parameter\_27}}{\text{vol}(\text{def})} \tag{330}$$

8.63 Reaction reaction_7

This is an irreversible reaction of no reactant forming one product influenced by four modifiers.

Name cs_act

Reaction equation

$$\emptyset \xrightarrow{\text{species\_4, species\_3, species\_3, species\_4}} \text{species\_4} \tag{331}$$

Modifiers

Table 132: Properties of each modifier.

Id	Name	SBO
species_4	cs	
species_3	cSnRK2	
species_3	cSnRK2	
species_4	cs	

Product

Table 133: Properties of each product.

Id	Name	SBO
species_4	cs	

Kinetic Law

Derived unit contains undeclared units

$$v_{63} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_4\_cs\_act\_1}\left(\mathrm{L}, \mathrm{vol}\left(\mathrm{def}\right), \mathrm{parameter\_10}, \mathrm{parameter\_15}, \mathrm{parameter\_21}, \mathrm{parameter\_25}, [\mathrm{species\_3}], [\mathrm{species\_4}]\right) \tag{332}$$

$$\mathrm{function\_4\_cs\_act\_1}\left(\mathrm{L}, \mathrm{vol}\left(\mathrm{def}\right), \mathrm{parameter\_10}, \mathrm{parameter\_15}, \mathrm{parameter\_21}, \mathrm{parameter\_25}, [\mathrm{species\_3}], [\mathrm{species\_4}]\right) = \frac{\frac{(\mathrm{parameter\_25}+\mathrm{parameter\_21}\cdot \mathrm{L})\cdot(1-[\mathrm{species\_4}])\cdot \mathrm{parameter\_15}^{\mathrm{parameter\_10}}}{\mathrm{parameter\_15}^{\mathrm{parameter\_10}}+[\mathrm{species\_3}]^{\mathrm{parameter\_10}}}}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{333}$$

$$\mathrm{function\_4\_cs\_act\_1}\left(\mathrm{L}, \mathrm{vol}\left(\mathrm{def}\right), \mathrm{parameter\_10}, \mathrm{parameter\_15}, \mathrm{parameter\_21}, \mathrm{parameter\_25}, [\mathrm{species\_3}], [\mathrm{species\_4}]\right) = \frac{\frac{(\mathrm{parameter\_25}+\mathrm{parameter\_21}\cdot \mathrm{L})\cdot(1-[\mathrm{species\_4}])\cdot \mathrm{parameter\_15}^{\mathrm{parameter\_10}}}{\mathrm{parameter\_15}^{\mathrm{parameter\_10}}+[\mathrm{species\_3}]^{\mathrm{parameter\_10}}}}{\mathrm{vol}\left(\mathrm{def}\right)} \tag{334}$$

8.64 Reaction reaction_8

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name cs_degr

Reaction equation

$$\mathrm{species\_4} \xrightarrow{\mathrm{species\_4}} \emptyset \tag{335}$$

Reactant

Table 134: Properties of each reactant.

Id	Name	SBO
species_4	cs	

Modifier

Table 135: Properties of each modifier.

Id	Name	SBO
species_4	cs	

Kinetic Law

Derived unit contains undeclared units

$$v_{64} = \text{vol}\left(\text{default}\right) \cdot \text{function\_4\_cs\_degr\_1}\left(\text{vol}\left(\text{def}\right), \text{m29}, \left[\text{species\_4}\right]\right) \tag{336}$$

$$\text{function\_4\_cs\_degr\_1}\left(\text{vol}\left(\text{def}\right), \text{m29}, \left[\text{species\_4}\right]\right) = \frac{\text{m29} \cdot \left[\text{species\_4}\right]}{\text{vol}\left(\text{def}\right)} \tag{337}$$

$$\text{function\_4\_cs\_degr\_1}\left(\text{vol}\left(\text{def}\right), \text{m29}, \left[\text{species\_4}\right]\right) = \frac{\text{m29} \cdot \left[\text{species\_4}\right]}{\text{vol}\left(\text{def}\right)} \tag{338}$$

9 Derived Rate Equations

When interpreted as an ordinary differential equation framework, this model implies the following set of equations for the rates of change of each species.

Identifiers for kinetic laws highlighted in gray cannot be verified to evaluate to units of SBML `substance` per `time`. As a result, some SBML interpreters may not be able to verify the consistency of the units on quantities in the model. Please check if

- parameters without an unit definition are involved or
- volume correction is necessary because the `hasOnlySubstanceUnits` flag may be set to `false` and `spacialDimensions`> 0 for certain species.

9.1 Species species_1

Name cABAR_m

Initial concentration $0.856\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in five reactions (as a reactant in reaction_2 and as a product in reaction_1 and as a modifier in reaction_2, reaction_3, reaction_3).

$$\frac{\text{d}}{\text{d}t}\text{species\_1} = v_{57} - v_{58} \tag{339}$$

9.2 Species species_2

Name cPP2C

Initial concentration $0.4027\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in five reactions (as a reactant in reaction_4 and as a product in reaction_3 and as a modifier in reaction_4, reaction_5, reaction_5).

$$\frac{\text{d}}{\text{d}t}\text{species\_2} = v_{59} - v_{60} \tag{340}$$

9.3 Species species_3

Name cSnRK2

Initial concentration $0.2362\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in seven reactions (as a reactant in reaction_5 and as a product in reaction_6 and as a modifier in cT_m_trscr, cT_m_trscr, reaction_5, reaction_7, reaction_7).

$$\frac{\text{d}}{\text{d}t}\text{species\_3} = v_{62} - v_{61} \tag{341}$$

9.4 Species species_4

Name cs

Initial concentration $0.2843\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in five reactions (as a reactant in reaction_8 and as a product in reaction_7 and as a modifier in reaction_7, reaction_7, reaction_8).

$$\frac{\text{d}}{\text{d}t}\text{species\_4} = v_{63} - v_{64} \tag{342}$$

9.5 Species cCOP1c

Name cCOP1c

Initial concentration $1.3143\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in nine reactions (as a reactant in cCOP1c_degr, cCOP1n_import and as a product in cCOP1c_trsl and as a modifier in cE3_degr, cE3_degr, cCOP1c_degr, cCOP1n_import, cEG_degr, cEG_degr).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cCOP1c} = v_{39} - v_{40} - v_{41} \tag{343}$$

9.6 Species cCOP1d

Name cCOP1d

Initial concentration $0.4068\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in 15 reactions (as a reactant in cCOP1d_degr and as a product in cCOP1d_activ and as a modifier in cE4_degr, cE4_degr, cE3n_degr, cE3n_degr, cLUX_degr, cLUX_degr, cCOP1d_degr, cEG_degr, cEG_degr, cEC_form, cEC_form, cEC_degr, cEC_degr).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cCOP1d} = v_{43} - v_{44} \tag{344}$$

9.7 Species cCOP1n

Name cCOP1n

Initial concentration $0.8445\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in 17 reactions (as a reactant in cCOP1n_degr, cCOP1d_activ and as a product in cCOP1n_import and as a modifier in cE4_degr, cE4_degr, cE3n_degr, cE3n_degr, cLUX_degr, cLUX_degr, cCOP1n_degr, cCOP1d_activ, cEG_degr, cEG_degr, cEC_form, cEC_form, cEC_degr, cEC_degr).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cCOP1n} = v_{41} - v_{42} - v_{43} \tag{345}$$

9.8 Species cE3

Name cE3

Initial concentration $0.1485\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in seven reactions (as a reactant in cE3_degr, cE3n_import, cG_cE3_assoc and as a product in cE3_trsl and as a modifier in cE3_degr, cE3n_import, cG_cE3_assoc).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cE3} = v_{31} - v_{32} - v_{33} - v_{53} \tag{346}$$

9.9 Species cE3_m

Name cE3_m

Initial concentration $0.2893\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in five reactions (as a reactant in cE3_m_degr and as a product in cE3_m_trscr and as a modifier in cE3_m_degr, cE3_trsl, cE3_trsl).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{cE3\_m} = v_{29} - v_{30} \tag{347}$$

9.10 Species cE3n

Name cE3n

Initial concentration $0.2234\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in 17 reactions (as a reactant in cE3n_degr and as a product in cE3n_import and as a modifier in cE4_degr, cE4_degr, cE3n_import, cE3n_degr, cE3n_degr, cLUX_degr, cLUX_degr, cG_degr, cG_degr, cEG_degr, cEG_degr, cEC_form, cEC_form, cEC_degr, cEC_degr).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{cE3n} = v_{33} - v_{34} \tag{348}$$

9.11 Species cE4

Name cE4

Initial concentration $0.4923\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in nine reactions (as a reactant in cE4_degr and as a product in cE4_trsl and as a modifier in cE4_degr, cE3n_degr, cE3n_degr, cLUX_degr, cLUX_degr, cEC_form, cEC_form).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{cE4} = v_{27} - v_{28} \tag{349}$$

9.12 Species cE4_m

Name cE4_m

Initial concentration $0.2527\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in five reactions (as a reactant in cE4_m_degr and as a product in cE4_m_trscr and as a modifier in cE4_m_degr, cE4_trsl, cE4_trsl).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{cE4\_m} = v_{25} - v_{26} \tag{350}$$

9.13 Species cEC

Name cEC

Initial concentration $0.1419\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in 13 reactions (as a reactant in cEC_degr and as a product in cEC_form and as a modifier in cP9_m_trscr, cP9_m_trscr, cT_m_trscr, cT_m_trscr, cE4_m_trscr, cE4_m_trscr, cLUX_m_trscr, cLUX_m_trscr, cG_m_trscr, cG_m_trscr, cEC_degr).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cEC} = v_{55} - v_{56} \tag{351}$$

9.14 Species cEG

Name cEG

Initial concentration $0.0206\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in five reactions (as a reactant in cEG_degr and as a product in cG_cE3-_assoc and as a modifier in cEG_degr, cEC_degr, cEC_degr).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cEG} = v_{53} - v_{54} \tag{352}$$

9.15 Species cG

Name cG

Initial concentration $0.0137\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in 13 reactions (as a reactant in cG_degr, cG_cZTL_assoc, cG_cE3-_assoc and as a product in cG_trsl and as a modifier in cE3n_degr, cE3n_degr, cG_degr, cG_cZTL_assoc, cG_cE3_assoc, cEG_degr, cEG_degr, cEC_degr, cEC_degr).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cG} = v_{47} - v_{48} - v_{49} - v_{53} \tag{353}$$

9.16 Species cG_m

Name cG_m

Initial concentration $0.1554\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in five reactions (as a reactant in cG_m_degr and as a product in cG_m-_trscr and as a modifier in cG_m_degr, cG_trsl, cG_trsl).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cG\_m} = v_{45} - v_{46} \tag{354}$$

9.17 Species cL

Name cL

Initial concentration $0.5005\ \mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$

This species takes part in 21 reactions (as a reactant in cL_degr and as a product in cL_trsl and as a modifier in cL_degr, cL_modif, cL_modif, cP9_m_trscr, cP9_m_trscr, cP7_m_trscr, cP7_m_trscr, cT_m_trscr, cT_m_trscr, cE4_m_trscr, cE4_m_trscr, cE3_m_trscr, cE3_m_trscr, cLUX_m_trscr, cLUX_m_trscr, cG_m_trscr, cG_m_trscr, reaction_1, reaction_1).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cL} = v_3 - v_4 \tag{355}$$

9.18 Species cLUX

Name cLUX

Initial concentration $0.6628\ \mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$

This species takes part in nine reactions (as a reactant in cLUX_degr and as a product in cLUX_trsl and as a modifier in cE4_degr, cE4_degr, cE3n_degr, cE3n_degr, cLUX_degr, cEC_form, cEC_form).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cLUX} = v_{37} - v_{38} \tag{356}$$

9.19 Species cLUX_m

Name cLUX_m

Initial concentration $0.0995\ \mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$

This species takes part in five reactions (as a reactant in cLUX_m_degr and as a product in cLUX_m_trscr and as a modifier in cLUX_m_degr, cLUX_trsl, cLUX_trsl).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cLUX\_m} = v_{35} - v_{36} \tag{357}$$

9.20 Species cL_m

Name cL_m

Initial concentration $0.9548\ \mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$

This species takes part in five reactions (as a reactant in cL_m_degr and as a product in cL_m_trscr and as a modifier in cL_m_degr, cL_trsl, cL_trsl).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cL\_m} = v_1 - v_2 \tag{358}$$

9.21 Species cLm

Name cLm

Initial concentration $0.0811\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in seven reactions (as a reactant in cLm_degr and as a product in cL_modif and as a modifier in cLm_degr, cP7_m_trscr, cP7_m_trscr, cNI_m_trscr, cNI_m_trscr).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cLm} = v_5 - v_6 \tag{359}$$

9.22 Species cNI

Name cNI

Initial concentration $0.0699\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in five reactions (as a reactant in cNI_degr and as a product in cNI_trsl and as a modifier in cL_m_trscr, cL_m_trscr, cNI_degr).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cNI} = v_{19} - v_{20} \tag{360}$$

9.23 Species cNI_m

Name cNI_m

Initial concentration $0.1502\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in five reactions (as a reactant in cNI_m_degr and as a product in cNI_m_trscr and as a modifier in cNI_m_degr, cNI_trsl, cNI_trsl).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cNI\_m} = v_{17} - v_{18} \tag{361}$$

9.24 Species cP

Name cP

Initial concentration $0.955999953963223\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in twelve reactions (as a reactant in cP_degr and as a product in cP_trsl and as a modifier in cL_m_trscr, cL_m_trscr, cP_trsl, cP_degr, cP9_m_trscr, cP9_m_trscr, cCOP1d_activ, cCOP1d_activ, cG_m_trscr, cG_m_trscr).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cP} = v_7 - v_8 \tag{362}$$

9.25 Species cP7

Name cP7

Initial concentration $0.0849\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in seven reactions (as a reactant in cP7_degr and as a product in cP7_trsl and as a modifier in cL_m_trscr, cL_m_trscr, cP7_degr, cNI_m_trscr, cNI_m_trscr).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cP7} = v_{15} - v_{16} \tag{363}$$

9.26 Species cP7_m

Name cP7_m

Initial concentration $0.1811\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in five reactions (as a reactant in cP7_m_degr and as a product in cP7_m_trscr and as a modifier in cP7_m_degr, cP7_trsl, cP7_trsl).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cP7\_m} = v_{13} - v_{14} \tag{364}$$

9.27 Species cP9

Name cP9

Initial concentration $0.0251\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in seven reactions (as a reactant in cP9_degr and as a product in cP9_trsl and as a modifier in cL_m_trscr, cL_m_trscr, cP9_degr, cP7_m_trscr, cP7_m_trscr).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cP9} = v_{11} - v_{12} \tag{365}$$

9.28 Species cP9_m

Name cP9_m

Initial concentration $0.0663\ \text{nmol} \cdot \mu\text{l}^{-1}$

This species takes part in five reactions (as a reactant in cP9_m_degr and as a product in cP9_m_trscr and as a modifier in cP9_m_degr, cP9_trsl, cP9_trsl).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cP9\_m} = v_{9} - v_{10} \tag{366}$$

9.29 Species cT

Name cT

Initial concentration $0.0873\ \mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$

This species takes part in 19 reactions (as a reactant in cT_degr and as a product in cT_trsl and as a modifier in cL_m_trscr, cL_m_trscr, cP9_m_trscr, cP9_m_trscr, cP7_m_trscr, cP7_m_trscr, cNI_m_trscr, cNI_m_trscr, cT_degr, cE4_m_trscr, cE4_m_trscr, cLUX_m_trscr, cLUX_m_trscr, cG_m_trscr, cG_m_trscr, reaction_1, reaction_1).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cT} = v_{23} - v_{24} \tag{367}$$

9.30 Species cT_m

Name cT_m

Initial concentration $0.0656\ \mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$

This species takes part in five reactions (as a reactant in cT_m_degr and as a product in cT_m_trscr and as a modifier in cT_m_degr, cT_trsl, cT_trsl).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cT\_m} = v_{21} - v_{22} \tag{368}$$

9.31 Species cZG

Name cZG

Initial concentration $0.0768\ \mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in cZG_degr and as a product in cG_cZTL_assoc and as a modifier in cT_degr, cT_degr, cG_cZTL_assoc, cZG_degr).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cZG} = v_{49} - v_{52} \tag{369}$$

9.32 Species cZTL

Name cZTL

Initial concentration $0.2505\ \mathrm{nmol} \cdot \mu\mathrm{l}^{-1}$

This species takes part in seven reactions (as a reactant in cG_cZTL_assoc, cZTL_degr and as a product in cZTL_trsl and as a modifier in cT_degr, cT_degr, cG_cZTL_assoc, cZTL_degr).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cZTL} = v_{50} - v_{49} - v_{51} \tag{370}$$

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