SBML Model Report

“Untitled”

July 2, 2015

1 General Overview

This is a document in SBML Level 2 Version 4 format. Table 1 shows an overview of the quantities of all components of this model.

Table 1: The SBML components in this model.
All components are described in more detail in the following sections.

Element	Quantity	Element	Quantity
compartment types	0	compartments	2
species types	0	species	71
events	0	constraints	0
reactions	72	function definitions	0
global parameters	141	unit definitions	6
rules	0	initial assignments	0

Model Notes

2 Unit Definitions

This is an overview of six unit definitions.

2.1 Unit `substance`

Name substance

Definition mmol

2.2 Unit volume

Name volume

Definition l

2.3 Unit area

Name area

Definition m^2

2.4 Unit length

Name length

Definition m

2.5 Unit time

Name time

Definition s

2.6 Unit per_second

Definition s^{-1}

3 Compartments

This model contains two compartments.

Table 2: Properties of all compartments.

Id	Name	SBO	Spatial Dimensions	Size	Unit	Constant	Outside
compartment	compartment		3	1	litre	☑	default
default			3	1	litre	☑	

3.1 Compartment compartment

This is a three-dimensional compartment with a constant size of one litre that is surrounded by default.

Name compartment

3.2 Compartment `default`

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

4 Species

This model contains 71 species. The boundary condition of seven of these species is set to `true` so that these species' amount cannot be changed by any reaction. Section 7 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
R	R	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
Ra	Ra	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
LR	LR	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
LRa	LRa	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
R_Gaq_GDP_bg	R_Gaq_GDP_bg	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
Ra_Gaq_GDP_bg	Ra_Gaq_GDP_bg	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
LR_Gaq_GDP_bg	LR_Gaq_GDP_bg	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
LRa_Gaq_GDP_bg	LRa_Gaq_GDP_bg	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
Gaq_GDP_bg	Gaq_GDP_bg	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
Ra_Gaq0_bg	Ra_Gaq0_bg	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
LRa_Gaq0_bg	LRa_Gaq0_bg	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
Ra_Gaq_GTP_bg	Ra_Gaq_GTP_bg	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
LRa_Gaq_GTP_bg	LRa_Gaq_GTP_bg	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
GaqGTP	GaqGTP	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
Gbg	Gbg	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
GaqGDP	GaqGDP	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
IP3	IP3	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
DAG	DAG	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
Ca	Ca	compartment	mmol	⊟	⊟
IP3R	IP3R	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
IP3R_Ca	IP3R_Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
IP3R_2Ca	IP3R_2Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
IP3R_3Ca	IP3R_3Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
IP3R_4Ca	IP3R_4Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
IP3R_IP3	IP3R_IP3	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
IP3R_Open	IP3R_Open	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
CaM	CaM	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
CaM_Ca	CaM_Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
CaM_2Ca	CaM_2Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
CaM_3Ca	CaM_3Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
CaM_4Ca	CaM_4Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
CaN	CaN	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
CaN_Ca	CaN_Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
CaN_2Ca	CaN_2Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
CaN_3Ca	CaN_3Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
CaN_4Ca	CaN_4Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
CaN_4Ca_CaM_2Ca	CaN_4Ca_CaM_2Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
CaN_4Ca_CaM_3Ca	CaN_4Ca_CaM_3Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
CaN_4Ca_CaM_4Ca	CaN_4Ca_CaM_4Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
PLC2_PIP2	PLC2_PIP2	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
PLC2_Ca_PIP2	PLC2_Ca_PIP2	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
PLC2_Ca	PLC2_Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
PLC2_Gq_PIP2	PLC2_Gq_PIP2	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
PLC2_Ca_Gq_PIP2	PLC2_Ca_Gq_PIP2	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
PLC2_Ca_Gq	PLC2_Ca_Gq	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
IP3K	IP3K	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
IP3K_Ca	IP3K_Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
IP3K_2Ca	IP3K_2Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
IP3K_2Ca_IP3	IP3K_2Ca_IP3	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
IP4	IP4	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
IP5P	IP5P	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
IP5P_IP3	IP5P_IP3	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
IP2	IP2	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
CaER	CaER	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
Ca_Cleft	Ca_Cleft	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
SERCA	SERCA	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
SERCA_Ca	SERCA_Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
SERCA_2Ca	SERCA_2Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
PMCA	PMCA	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
PMCA_Ca	PMCA_Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
NaCa_Exch	NaCa_Exch	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
NaCa_Exch_Ca	NaCa_Exch_Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
NaCa_Exch_2Ca	NaCa_Exch_2Ca	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
GDP	GDP	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	☑
GTP	GTP	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	☑
L	L	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	☑
RGS	RGS	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	☑
PIP2	PIP2	compartment	$\mathrm{mmol} \cdot \mathrm{l}^{-1}$	⊟	☑
iCaAMPAR	iCaAMPAR	compartment	mmol	⊟	☑
iCaNMDAR	iCaNMDAR	compartment	mmol	⊟	☑
CaPSD	CaPSD	compartment	mmol	⊟	⊟

5 Parameters

This model contains 141 global parameters.

Table 4: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
position	Position relative to release site (nm)		100.000		☑
J0_k1			0.001	dimensionless	☑
J0_k2			1.000	dimensionless	☑
J1_k1			0.001	dimensionless	☑
J1_k2			1.000	dimensionless	☑
J2_k1			0.001	dimensionless	☑
J2_k2			1.000	dimensionless	☑
J3_k1			0.001	dimensionless	☑
J3_k2			1.000	dimensionless	☑
J4_k1			5000.000	dimensionless	☑
J4_k2			20.000	dimensionless	☑
J5_k1			5000.000	dimensionless	☑
J5_k2			20.000	dimensionless	☑
J6_k1			5000.000	dimensionless	☑
J6_k2			20.000	dimensionless	☑
J7_k1			5000.000	dimensionless	☑
J7_k2			20.000	dimensionless	☑
J8_k1			0.600	dimensionless	☑
J8_k2			0.001	dimensionless	☑
J9_k1			0.600	dimensionless	☑
J9_k2			0.001	dimensionless	☑
J10_k1			0.100	dimensionless	☑
J10_k2			$6.5 \cdot 10^{-5}$	dimensionless	☑
J11_k1			0.100	dimensionless	☑
J11_k2			$6.5 \cdot 10^{-5}$	dimensionless	☑
J12_k1			0.003	dimensionless	☑
J12_k2			30.000	dimensionless	☑
J13_k1			30.000	dimensionless	☑
J13_k2			$5 \cdot 10^{-6}$	dimensionless	☑
J14_k1			$1.5 \cdot 10^{-8}$	dimensionless	☑
J14_k2			0.000	dimensionless	☑
J15_k1			0.003	dimensionless	☑
J15_k2			30.000	dimensionless	☑
J16_k1			30.000	dimensionless	☑
J16_k2			$5 \cdot 10^{-6}$	dimensionless	☑

Id	Name	SBO	Value	Unit	Constant
J17_k1			150.000	dimensionless	☑
J17_k2			0.000	dimensionless	☑
J18_k1			10^{-6}	dimensionless	☑
J18_k2			0.000	dimensionless	☑
J19_k1			1000.000	dimensionless	☑
J19_k2			0.000	dimensionless	☑
J20_Vmax			0.000	dimensionless	☑
J20_Km1			0.100	dimensionless	☑
J21_Vmax			0.000	dimensionless	☑
J21_Km1			0.100	dimensionless	☑
J76_k1			8.990	dimensionless	☑
J76_k2			0.005	dimensionless	☑
J77_k1			20.000	dimensionless	☑
J77_k2			0.010	dimensionless	☑
J78_k1			40.000	dimensionless	☑
J78_k2			0.015	dimensionless	☑
J79_k1			60.000	dimensionless	☑
J79_k2			0.020	dimensionless	☑
J80_k1			12000.000	dimensionless	☑
J80_k2			25.000	dimensionless	☑
J81_k1			12000.000	dimensionless	☑
J81_k2			5.000	dimensionless	☑
J87_k1			16.000	dimensionless	☑
J87_k2			0.405	dimensionless	☑
J88_k1			16.000	dimensionless	☑
J88_k2			0.405	dimensionless	☑
J89_k1			1.500	dimensionless	☑
J89_k2			0.002	dimensionless	☑
J90_k1			1.500	dimensionless	☑
J90_k2			0.002	dimensionless	☑
J91_k1			100.000	dimensionless	☑
J91_k2			0.001	dimensionless	☑
J92_k1			100.000	dimensionless	☑
J92_k2			0.001	dimensionless	☑
J93_k1			1.897	dimensionless	☑
J93_k2			0.001	dimensionless	☑
J94_k1			1.897	dimensionless	☑
J94_k2			0.001	dimensionless	☑
J95_k1			0.240	dimensionless	☑
J95_k2			0.001	dimensionless	☑
J96_k1			2.238	dimensionless	☑
J96_k2			0.001	dimensionless	☑

Id	Name	SBO	Value	Unit	Constant
J97_k1			600.000	dimensionless	☑
J97_k2			0.001	dimensionless	☑
J163_k1			300.000	dimensionless	☑
J163_k2			0.100	dimensionless	☑
J164_k1			900.000	dimensionless	☑
J164_k2			0.030	dimensionless	☑
J165_k1			1000.000	dimensionless	☑
J165_k2			$6 \cdot 10^{-7}$	dimensionless	☑
J166_k1			1200.000	dimensionless	☑
J166_k2			$6 \cdot 10^{-7}$	dimensionless	☑
J167_k1			1000.000	dimensionless	☑
J167_k2			$6 \cdot 10^{-7}$	dimensionless	☑
J168_k1			$3 \cdot 10^{-5}$	dimensionless	☑
J168_k2			0.000	dimensionless	☑
J169_k1			250.600	dimensionless	☑
J169_k2			0.000	dimensionless	☑
J170_k1			1.000	dimensionless	☑
J170_k2			0.017	dimensionless	☑
J171_k1			1.000	dimensionless	☑
J171_k2			0.017	dimensionless	☑
J172_k1			0.003	dimensionless	☑
J172_k2			0.000	dimensionless	☑
J173_k1			0.003	dimensionless	☑
J173_k2			0.000	dimensionless	☑
J175_k1			33.332	dimensionless	☑
J175_k2			0.010	dimensionless	☑
J176_k1			33.332	dimensionless	☑
J176_k2			0.010	dimensionless	☑
J177_k1			100.000	dimensionless	☑
J177_k2			0.080	dimensionless	☑
J178_k1			0.020	dimensionless	☑
J178_k2			0.000	dimensionless	☑
J179_k1			10.000	dimensionless	☑
J179_k2			0.072	dimensionless	☑
J180_k1			0.018	dimensionless	☑
J180_k2			0.000	dimensionless	☑
J181_k1			10.500	dimensionless	☑
J181_k2			0.000	dimensionless	☑
J182_k1			130.950	dimensionless	☑
J182_k2			1.000	dimensionless	☑
J183_k1			130.950	dimensionless	☑
J183_k2			1.000	dimensionless	☑

Id	Name	SBO	Value	Unit	Constant
J184_k1			0.250	dimensionless	☑
J184_k2			0.000	dimensionless	☑
J185_k1			0.250	dimensionless	☑
J185_k2			0.000	dimensionless	☑
J186_k1			$1.5 \cdot 10^{-4}$	dimensionless	☑
J186_k2			0.000	dimensionless	☑
J187_k1			25000.000	dimensionless	☑
J187_k2			2.000	dimensionless	☑
J188_k1			0.500	dimensionless	☑
J188_k2			0.000	dimensionless	☑
J189_k1			93.827	dimensionless	☑
J189_k2			4.000	dimensionless	☑
J190_k1			93.827	dimensionless	☑
J190_k2			4.000	dimensionless	☑
J191_k1			1.000	dimensionless	☑
J191_k2			0.000	dimensionless	☑
J192_k1			1.000	dimensionless	☑
J192_k2			0.000	dimensionless	☑
J193_k1			10^{-5}	dimensionless	☑
J193_k2			0.000	dimensionless	☑
J174_k1			0.003	dimensionless	☑
J174_k2			0.000	dimensionless	☑

6 Reactions

This model contains 72 reactions. All reactions are listed in the following table and are subsequently described in detail. If a reaction is affected by one or more modifiers, the identifiers of the modifier species are written above the reaction arrow.

Table 5: Overview of all reactions

№	Id	Name	Reaction Equation	SBO
1	J0	J0	R $\longrightarrow$ Ra	
2	J1	J1	LR $\longrightarrow$ LRa	
3	J2	J2	R_Gaq_GDP_bg $\longrightarrow$ Ra_Gaq_GDP_bg	
4	J3	J3	LR_Gaq_GDP_bg $\longrightarrow$ LRa_Gaq_GDP_bg	
5	J4	J4	R + L $\longrightarrow$ LR	
6	J5	J5	Ra + L $\longrightarrow$ LRa	
7	J6	J6	R_Gaq_GDP_bg + L $\longrightarrow$ LR_Gaq_GDP_bg	
8	J7	J7	Ra_Gaq_GDP_bg + L $\longrightarrow$ LRa_Gaq_GDP_bg	
9	J8	J8	R + Gaq_GDP_bg $\longrightarrow$ R_Gaq_GDP_bg	
10	J9	J9	Ra + Gaq_GDP_bg $\longrightarrow$ Ra_Gaq_GDP_bg	
11	J10	J10	LRa + Gaq_GDP_bg $\longrightarrow$ LRa_Gaq_GDP_bg	
12	J11	J11	LR + Gaq_GDP_bg $\longrightarrow$ LR_Gaq_GDP_bg	
13	J12	J12	Ra_Gaq_GDP_bg $\longrightarrow$ GDP + Ra_Gaq0_bg	
14	J13	J13	Ra_Gaq0_bg + GTP $\longrightarrow$ Ra_Gaq_GTP_bg	
15	J14	J14	Ra_Gaq_GTP_bg $\longrightarrow$ GaqGTP + Gbg + Ra	
16	J15	J15	LRa_Gaq_GDP_bg $\longrightarrow$ GDP + LRa_Gaq0_bg	
17	J16	J16	LRa_Gaq0_bg + GTP $\longrightarrow$ LRa_Gaq_GTP_bg	
18	J17	J17	LRa_Gaq_GTP_bg $\longrightarrow$ GaqGTP + Gbg + LRa	
19	J18	J18	GaqGTP $\longrightarrow$ GaqGDP	
20	J19	J19	GaqGDP + Gbg $\longrightarrow$ Gaq_GDP_bg	
21	J20	J20	Ra_Gaq_GTP_bg $\longrightarrow$ Ra_Gaq_GDP_bg	
22	J21	J21	LRa_Gaq_GTP_bg $\longrightarrow$ LRa_Gaq_GDP_bg	

№	Id	Name	Reaction Equation	SBO
23	J76	J76	IP3R + Ca ⟶ IP3R_Ca	
24	J77	J77	IP3R_Ca + Ca ⟶ IP3R_2Ca	
25	J78	J78	IP3R_2Ca + Ca ⟶ IP3R_3Ca	
26	J79	J79	IP3R_3Ca + Ca ⟶ IP3R_4Ca	
27	J80	J80	IP3R + IP3 ⟶ IP3R_IP3	
28	J81	J81	IP3R_IP3 + Ca ⟶ IP3R_Open	
29	J87	J87	CaM + Ca ⟶ CaM_Ca	
30	J88	J88	CaM_Ca + Ca ⟶ CaM_2Ca	
31	J89	J89	CaM_2Ca + Ca ⟶ CaM_3Ca	
32	J90	J90	CaM_3Ca + Ca ⟶ CaM_4Ca	
33	J91	J91	CaN + Ca ⟶ CaN_Ca	
34	J92	J92	CaN_Ca + Ca ⟶ CaN_2Ca	
35	J93	J93	CaN_2Ca + Ca ⟶ CaN_3Ca	
36	J94	J94	CaN_3Ca + Ca ⟶ CaN_4Ca	
37	J95	J95	CaN_4Ca + CaM_2Ca ⟶ CaN_4Ca_CaM_2Ca	
38	J96	J96	CaN_4Ca + CaM_3Ca ⟶ CaN_4Ca_CaM_3Ca	
39	J97	J97	CaN_4Ca + CaM_4Ca ⟶ CaN_4Ca_CaM_4Ca	
40	J163	J163	PLC2_PIP2 + Ca ⟶ PLC2_Ca_PIP2	
41	J164	J164	PLC2_Gq_PIP2 + Ca ⟶ PLC2_Ca_Gq_PIP2	
42	J165	J165	PLC2_PIP2 + GaqGTP ⟶ PLC2_Gq_PIP2	
43	J166	J166	PLC2_Ca_PIP2 + GaqGTP ⟶ PLC2_Ca_Gq_PIP2	
44	J167	J167	PLC2_Ca + GaqGTP ⟶ PLC2_Ca_Gq	
45	J168	J168	PLC2_Ca_PIP2 ⟶ IP3 + DAG + PLC2_Ca	
46	J169	J169	PLC2_Ca_Gq_PIP2 ⟶ DAG + IP3 + PLC2_Ca_Gq	
47	J170	J170	PLC2_Ca + PIP2 ⟶ PLC2_Ca_PIP2	
48	J171	J171	PLC2_Ca_Gq + PIP2 ⟶ PLC2_Ca_Gq_PIP2	
49	J172	J172	PLC2_Gq_PIP2 ⟶ PLC2_PIP2 + GaqGDP	
50	J173	J173	PLC2_Ca_Gq_PIP2 ⟶ GaqGDP + PLC2_Ca_PIP2	
51	J174	J174	PLC2_Ca_Gq ⟶ GaqGDP + PLC2_Ca	

№	Id	Name	Reaction Equation	SBO
52	J175	J175	IP3K + Ca ⟶ IP3K_Ca	
53	J176	J176	IP3K_Ca + Ca ⟶ IP3K_2Ca	
54	J177	J177	IP3K_2Ca + IP3 ⟶ IP3K_2Ca_IP3	
55	J178	J178	IP3K_2Ca_IP3 ⟶ IP4 + IP3K_2Ca	
56	J179	J179	IP5P + IP3 ⟶ IP5P_IP3	
57	J180	J180	IP5P_IP3 ⟶ IP2 + IP5P	
58	J181	J181	CaER ⟶ Ca	
59	J182	J182	SERCA + Ca ⟶ SERCA_Ca	
60	J183	J183	SERCA_Ca + Ca ⟶ SERCA_2Ca	
61	J184	J184	SERCA_2Ca ⟶ CaER + SERCA_Ca	
62	J185	J185	SERCA_Ca ⟶ CaER + SERCA	
63	J186	J186	CaER ⟶ Ca	
64	J187	J187	PMCA + Ca ⟶ PMCA_Ca	
65	J188	J188	PMCA_Ca ⟶ Ca_Cleft + PMCA	
66	J189	J189	NaCa_Exch + Ca ⟶ NaCa_Exch_Ca	
67	J190	J190	NaCa_Exch_Ca + Ca ⟶ NaCa_Exch_2Ca	
68	J191	J191	NaCa_Exch_2Ca ⟶ Ca_Cleft + NaCa_Exch_Ca	
69	J192	J192	NaCa_Exch_Ca ⟶ Ca_Cleft + NaCa_Exch	
70	J193	J193	Ca_Cleft ⟶ Ca	
71	re96		iCaAMPAR + iCaNMDAR ⟶ CaPSD	
72	re97		CaPSD ⟶ Ca	

6.1 Reaction J0

This is an irreversible reaction of one reactant forming one product.

Name J0

Reaction equation

$$\mathtt{R} \longrightarrow \mathtt{Ra} \tag{1}$$

Reactant

Table 6: Properties of each reactant.

Id	Name	SBO
R	R	

Product

Table 7: Properties of each product.

Id	Name	SBO
Ra	Ra	

Kinetic Law

Derived unit contains undeclared units

$$v_1 = \mathtt{J0\_k1} \cdot [\mathtt{R}] - \mathtt{J0\_k2} \cdot [\mathtt{Ra}] \tag{2}$$

6.2 Reaction J1

This is an irreversible reaction of one reactant forming one product.

Name J1

Reaction equation

$$\mathtt{LR} \longrightarrow \mathtt{LRa} \tag{3}$$

Reactant

Table 8: Properties of each reactant.

Id	Name	SBO
LR	LR	

Product

Table 9: Properties of each product.

Id	Name	SBO
LRa	LRa	

Kinetic Law

Derived unit contains undeclared units

$$v_2 = \texttt{J1\_k1} \cdot [\texttt{LR}] - \texttt{J1\_k2} \cdot [\texttt{LRa}] \tag{4}$$

6.3 Reaction J2

This is an irreversible reaction of one reactant forming one product.

Name J2

Reaction equation

$$\texttt{R\_Gaq\_GDP\_bg} \longrightarrow \texttt{Ra\_Gaq\_GDP\_bg} \tag{5}$$

Reactant

Table 10: Properties of each reactant.

Id	Name	SBO
R_Gaq_GDP_bg	R_Gaq_GDP_bg	

Product

Table 11: Properties of each product.

Id	Name	SBO
Ra_Gaq_GDP_bg	Ra_Gaq_GDP_bg	

Kinetic Law

Derived unit contains undeclared units

$$v_3 = \texttt{J2\_k1} \cdot [\texttt{R\_Gaq\_GDP\_bg}] - \texttt{J2\_k2} \cdot [\texttt{Ra\_Gaq\_GDP\_bg}] \tag{6}$$

6.4 Reaction J3

This is an irreversible reaction of one reactant forming one product.

Name J3

Reaction equation

$$\texttt{LR\_Gaq\_GDP\_bg} \longrightarrow \texttt{LRa\_Gaq\_GDP\_bg} \tag{7}$$

Reactant

Table 12: Properties of each reactant.

Id	Name	SBO
LR_Gaq_GDP_bg	LR_Gaq_GDP_bg	

Product

Table 13: Properties of each product.

Id	Name	SBO
LRa_Gaq_GDP_bg	LRa_Gaq_GDP_bg	

Kinetic Law

Derived unit contains undeclared units

$$v_4 = \texttt{J3\_k1} \cdot [\texttt{LR\_Gaq\_GDP\_bg}] - \texttt{J3\_k2} \cdot [\texttt{LRa\_Gaq\_GDP\_bg}] \tag{8}$$

6.5 Reaction J4

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

Name J4

Reaction equation

$$\mathrm{R} + \mathrm{L} \longrightarrow \mathrm{LR} \tag{9}$$

Reactants

Table 14: Properties of each reactant.

Id	Name	SBO
R	R	
L	L	

Product

Table 15: Properties of each product.

Id	Name	SBO
LR	LR	

Kinetic Law

Derived unit contains undeclared units

$$v_5 = \mathtt{J4\_k1} \cdot [\mathrm{R}] \cdot [\mathrm{L}] - \mathtt{J4\_k2} \cdot [\mathrm{LR}] \tag{10}$$

6.6 Reaction J5

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

Name J5

Reaction equation

$$\mathrm{Ra} + \mathrm{L} \longrightarrow \mathrm{LRa} \tag{11}$$

Reactants

Table 16: Properties of each reactant.

Id	Name	SBO
Ra	Ra	
L	L	

Product

Table 17: Properties of each product.

Id	Name	SBO
LRa	LRa	

Kinetic Law

Derived unit contains undeclared units

$$v_6 = \mathtt{J5\_k1} \cdot [\mathtt{Ra}] \cdot [\mathtt{L}] - \mathtt{J5\_k2} \cdot [\mathtt{LRa}] \tag{12}$$

6.7 Reaction J6

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

Name J6

Reaction equation

$$\mathtt{R\_Gaq\_GDP\_bg} + \mathtt{L} \longrightarrow \mathtt{LR\_Gaq\_GDP\_bg} \tag{13}$$

Reactants

Table 18: Properties of each reactant.

Id	Name	SBO
R_Gaq_GDP_bg	R_Gaq_GDP_bg	
L	L	

Product

Table 19: Properties of each product.

Id	Name	SBO
LR_Gaq_GDP_bg	LR_Gaq_GDP_bg	

Kinetic Law

Derived unit contains undeclared units

$$v_7 = \texttt{J6\_k1} \cdot [\texttt{R\_Gaq\_GDP\_bg}] \cdot [\texttt{L}] - \texttt{J6\_k2} \cdot [\texttt{LR\_Gaq\_GDP\_bg}] \tag{14}$$

6.8 Reaction J7

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

Name J7

Reaction equation

$$\texttt{Ra\_Gaq\_GDP\_bg} + \texttt{L} \longrightarrow \texttt{LRa\_Gaq\_GDP\_bg} \tag{15}$$

Reactants

Table 20: Properties of each reactant.

Id	Name	SBO
Ra_Gaq_GDP_bg	Ra_Gaq_GDP_bg	
L	L	

Product

Table 21: Properties of each product.

Id	Name	SBO
LRa_Gaq_GDP_bg	LRa_Gaq_GDP_bg	

Kinetic Law

Derived unit contains undeclared units

$$v_8 = \texttt{J7\_k1} \cdot [\texttt{Ra\_Gaq\_GDP\_bg}] \cdot [\texttt{L}] - \texttt{J7\_k2} \cdot [\texttt{LRa\_Gaq\_GDP\_bg}] \tag{16}$$

6.9 Reaction J8

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

Name J8

Reaction equation

$$\mathtt{R} + \mathtt{Gaq\_GDP\_bg} \longrightarrow \mathtt{R\_Gaq\_GDP\_bg} \tag{17}$$

Reactants

Table 22: Properties of each reactant.

Id	Name	SBO
R	R	
Gaq_GDP_bg	Gaq_GDP_bg	

Product

Table 23: Properties of each product.

Id	Name	SBO
R_Gaq_GDP_bg	R_Gaq_GDP_bg	

Kinetic Law

Derived unit contains undeclared units

$$v_9 = \mathtt{J8\_k1} \cdot [\mathtt{R}] \cdot [\mathtt{Gaq\_GDP\_bg}] - \mathtt{J8\_k2} \cdot [\mathtt{R\_Gaq\_GDP\_bg}] \tag{18}$$

6.10 Reaction J9

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

Name J9

Reaction equation

$$\mathtt{Ra} + \mathtt{Gaq\_GDP\_bg} \longrightarrow \mathtt{Ra\_Gaq\_GDP\_bg} \tag{19}$$

Reactants

Table 24: Properties of each reactant.

Id	Name	SBO
Ra	Ra	
Gaq_GDP_bg	Gaq_GDP_bg	

Product

Table 25: Properties of each product.

Id	Name	SBO
Ra_Gaq_GDP_bg	Ra_Gaq_GDP_bg	

Kinetic Law

Derived unit contains undeclared units

$$v_{10} = \mathtt{J9\_k1} \cdot [\mathtt{Ra}] \cdot [\mathtt{Gaq\_GDP\_bg}] - \mathtt{J9\_k2} \cdot [\mathtt{Ra\_Gaq\_GDP\_bg}] \tag{20}$$

6.11 Reaction J10

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

Name J10

Reaction equation

$$\mathtt{LRa} + \mathtt{Gaq\_GDP\_bg} \longrightarrow \mathtt{LRa\_Gaq\_GDP\_bg} \tag{21}$$

Reactants

Table 26: Properties of each reactant.

Id	Name	SBO
LRa	LRa	
Gaq_GDP_bg	Gaq_GDP_bg	

Product

Table 27: Properties of each product.

Id	Name	SBO
LRa_Gaq_GDP_bg	LRa_Gaq_GDP_bg	

Kinetic Law

Derived unit contains undeclared units

$$v_{11} = \texttt{J10\_k1} \cdot [\texttt{LRa}] \cdot [\texttt{Gaq\_GDP\_bg}] - \texttt{J10\_k2} \cdot [\texttt{LRa\_Gaq\_GDP\_bg}] \tag{22}$$

6.12 Reaction J11

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

Name J11

Reaction equation

$$\texttt{LR} + \texttt{Gaq\_GDP\_bg} \longrightarrow \texttt{LR\_Gaq\_GDP\_bg} \tag{23}$$

Reactants

Table 28: Properties of each reactant.

Id	Name	SBO
LR	LR	
Gaq_GDP_bg	Gaq_GDP_bg	

Product

Table 29: Properties of each product.

Id	Name	SBO
LR_Gaq_GDP_bg	LR_Gaq_GDP_bg	

Kinetic Law

Derived unit contains undeclared units

$$v_{12} = \texttt{J11\_k1} \cdot [\texttt{LR}] \cdot [\texttt{Gaq\_GDP\_bg}] - \texttt{J11\_k2} \cdot [\texttt{LR\_Gaq\_GDP\_bg}] \tag{24}$$

6.13 Reaction J12

This is an irreversible reaction of one reactant forming two products.

Name J12

Reaction equation

$$\texttt{Ra\_Gaq\_GDP\_bg} \longrightarrow \texttt{GDP} + \texttt{Ra\_Gaq0\_bg} \tag{25}$$

Reactant

Table 30: Properties of each reactant.

Id	Name	SBO
Ra_Gaq_GDP_bg	Ra_Gaq_GDP_bg	

Products

Table 31: Properties of each product.

Id	Name	SBO
GDP	GDP	
Ra_Gaq0_bg	Ra_Gaq0_bg	

Kinetic Law

Derived unit contains undeclared units

$$v_{13} = \texttt{J12\_k1} \cdot [\texttt{Ra\_Gaq\_GDP\_bg}] - \texttt{J12\_k2} \cdot [\texttt{GDP}] \cdot [\texttt{Ra\_Gaq0\_bg}] \tag{26}$$

6.14 Reaction J13

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

Name J13

Reaction equation

$$\texttt{Ra\_Gaq0\_bg} + \texttt{GTP} \longrightarrow \texttt{Ra\_Gaq\_GTP\_bg} \tag{27}$$

Reactants

Table 32: Properties of each reactant.

Id	Name	SBO
Ra_Gaq0_bg	Ra_Gaq0_bg	
GTP	GTP	

Product

Table 33: Properties of each product.

Id	Name	SBO
Ra_Gaq_GTP_bg	Ra_Gaq_GTP_bg	

Kinetic Law

Derived unit contains undeclared units

$$v_{14} = \mathtt{J13\_k1} \cdot [\mathtt{Ra\_Gaq0\_bg}] \cdot [\mathtt{GTP}] - \mathtt{J13\_k2} \cdot [\mathtt{Ra\_Gaq\_GTP\_bg}] \tag{28}$$

6.15 Reaction J14

This is an irreversible reaction of one reactant forming three products.

Name J14

Reaction equation

$$\mathtt{Ra\_Gaq\_GTP\_bg} \longrightarrow \mathtt{GaqGTP} + \mathtt{Gbg} + \mathtt{Ra} \tag{29}$$

Reactant

Table 34: Properties of each reactant.

Id	Name	SBO
Ra_Gaq_GTP_bg	Ra_Gaq_GTP_bg	

Products

Table 35: Properties of each product.

Id	Name	SBO
GaqGTP	GaqGTP	
Gbg	Gbg	
Ra	Ra	

Kinetic Law

Derived unit contains undeclared units

$$v_{15} = \texttt{J14\_k1} \cdot [\texttt{Ra\_Gaq\_GTP\_bg}] - \texttt{J14\_k2} \cdot [\texttt{GaqGTP}] \cdot [\texttt{Gbg}] \cdot [\texttt{Ra}] \tag{30}$$

6.16 Reaction J15

This is an irreversible reaction of one reactant forming two products.

Name J15

Reaction equation

$$\texttt{LRa\_Gaq\_GDP\_bg} \longrightarrow \texttt{GDP} + \texttt{LRa\_Gaq0\_bg} \tag{31}$$

Reactant

Table 36: Properties of each reactant.

Id	Name	SBO
LRa_Gaq_GDP_bg	LRa_Gaq_GDP_bg	

Products

Table 37: Properties of each product.

Id	Name	SBO
GDP	GDP	
LRa_Gaq0_bg	LRa_Gaq0_bg	

Kinetic Law

Derived unit contains undeclared units

$$v_{16} = \texttt{J15\_k1} \cdot [\texttt{LRa\_Gaq\_GDP\_bg}] - \texttt{J15\_k2} \cdot [\texttt{GDP}] \cdot [\texttt{LRa\_Gaq0\_bg}] \tag{32}$$

6.17 Reaction J16

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

Name J16

Reaction equation

$$\texttt{LRa\_Gaq0\_bg} + \texttt{GTP} \longrightarrow \texttt{LRa\_Gaq\_GTP\_bg} \tag{33}$$

Reactants

Table 38: Properties of each reactant.

Id	Name	SBO
LRa_Gaq0_bg	LRa_Gaq0_bg	
GTP	GTP	

Product

Table 39: Properties of each product.

Id	Name	SBO
LRa_Gaq_GTP_bg	LRa_Gaq_GTP_bg	

Kinetic Law

Derived unit contains undeclared units

$$v_{17} = \texttt{J16\_k1} \cdot [\texttt{LRa\_Gaq0\_bg}] \cdot [\texttt{GTP}] - \texttt{J16\_k2} \cdot [\texttt{LRa\_Gaq\_GTP\_bg}] \tag{34}$$

6.18 Reaction J17

This is an irreversible reaction of one reactant forming three products.

Name J17

Reaction equation

$$\texttt{LRa\_Gaq\_GTP\_bg} \longrightarrow \texttt{GaqGTP} + \texttt{Gbg} + \texttt{LRa} \tag{35}$$

Reactant

Table 40: Properties of each reactant.

Id	Name	SBO
LRa_Gaq_GTP_bg	LRa_Gaq_GTP_bg	

Products

Table 41: Properties of each product.

Id	Name	SBO
GaqGTP	GaqGTP	
Gbg	Gbg	
LRa	LRa	

Kinetic Law

Derived unit contains undeclared units

$$v_{18} = \texttt{J17\_k1} \cdot [\texttt{LRa\_Gaq\_GTP\_bg}] - \texttt{J17\_k2} \cdot [\texttt{GaqGTP}] \cdot [\texttt{Gbg}] \cdot [\texttt{LRa}] \tag{36}$$

6.19 Reaction J18

This is an irreversible reaction of one reactant forming one product.

Name J18

Reaction equation

$$\texttt{GaqGTP} \longrightarrow \texttt{GaqGDP} \tag{37}$$

Reactant

Table 42: Properties of each reactant.

Id	Name	SBO
GaqGTP	GaqGTP	

Product

Table 43: Properties of each product.

Id	Name	SBO
GaqGDP	GaqGDP	

Kinetic Law

Derived unit contains undeclared units

$$v_{19} = \texttt{J18\_k1} \cdot [\texttt{GaqGTP}] - \texttt{J18\_k2} \cdot [\texttt{GaqGDP}] \tag{38}$$

6.20 Reaction J19

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

Name J19

Reaction equation

$$\texttt{GaqGDP} + \texttt{Gbg} \longrightarrow \texttt{Gaq\_GDP\_bg} \tag{39}$$

Reactants

Table 44: Properties of each reactant.

Id	Name	SBO
GaqGDP	GaqGDP	
Gbg	Gbg	

Product

Table 45: Properties of each product.

Id	Name	SBO
Gaq_GDP_bg	Gaq_GDP_bg	

Kinetic Law

Derived unit contains undeclared units

$$v_{20} = \texttt{J19\_k1} \cdot [\texttt{GaqGDP}] \cdot [\texttt{Gbg}] - \texttt{J19\_k2} \cdot [\texttt{Gaq\_GDP\_bg}] \tag{40}$$

6.21 Reaction J20

This is an irreversible reaction of one reactant forming one product.

Name J20

Reaction equation

$$\texttt{Ra\_Gaq\_GTP\_bg} \longrightarrow \texttt{Ra\_Gaq\_GDP\_bg} \tag{41}$$

Reactant

Table 46: Properties of each reactant.

Id	Name	SBO
Ra_Gaq_GTP_bg	Ra_Gaq_GTP_bg	

Product

Table 47: Properties of each product.

Id	Name	SBO
Ra_Gaq_GDP_bg	Ra_Gaq_GDP_bg	

Kinetic Law

Derived unit contains undeclared units

$$v_{21} = \frac{\texttt{J20\_Vmax} \cdot [\texttt{Ra\_Gaq\_GTP\_bg}] \cdot [\texttt{RGS}]}{\texttt{J20\_Km1} + [\texttt{RGS}]} \tag{42}$$

6.22 Reaction J21

This is an irreversible reaction of one reactant forming one product.

Name J21

Reaction equation

$$\texttt{LRa\_Gaq\_GTP\_bg} \longrightarrow \texttt{LRa\_Gaq\_GDP\_bg} \tag{43}$$

Reactant

Table 48: Properties of each reactant.

Id	Name	SBO
LRa_Gaq_GTP_bg	LRa_Gaq_GTP_bg	

Product

Table 49: Properties of each product.

Id	Name	SBO
LRa_Gaq_GDP_bg	LRa_Gaq_GDP_bg	

Kinetic Law

Derived unit contains undeclared units

$$v_{22} = \frac{\texttt{J21\_Vmax} \cdot [\texttt{LRa\_Gaq\_GTP\_bg}] \cdot [\texttt{RGS}]}{\texttt{J21\_Km1} + [\texttt{RGS}]} \tag{44}$$

6.23 Reaction J76

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

Name J76

Reaction equation

$$\texttt{IP3R} + \texttt{Ca} \longrightarrow \texttt{IP3R\_Ca} \tag{45}$$

Reactants

Table 50: Properties of each reactant.

Id	Name	SBO
IP3R	IP3R	
Ca	Ca	

Product

Table 51: Properties of each product.

Id	Name	SBO
IP3R_Ca	IP3R_Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{23} = \texttt{J76\_k1} \cdot [\texttt{IP3R}] \cdot [\texttt{Ca}] - \texttt{J76\_k2} \cdot [\texttt{IP3R\_Ca}] \tag{46}$$

6.24 Reaction J77

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

Name J77

Reaction equation

$$\texttt{IP3R\_Ca} + \texttt{Ca} \longrightarrow \texttt{IP3R\_2Ca} \tag{47}$$

Reactants

Table 52: Properties of each reactant.

Id	Name	SBO
IP3R_Ca	IP3R_Ca	
Ca	Ca	

Product

Table 53: Properties of each product.

Id	Name	SBO
IP3R_2Ca	IP3R_2Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{24} = \mathtt{J77\_k1} \cdot [\mathtt{IP3R\_Ca}] \cdot [\mathtt{Ca}] - \mathtt{J77\_k2} \cdot [\mathtt{IP3R\_2Ca}] \tag{48}$$

6.25 Reaction J78

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

Name J78

Reaction equation

$$\mathtt{IP3R\_2Ca} + \mathtt{Ca} \longrightarrow \mathtt{IP3R\_3Ca} \tag{49}$$

Reactants

Table 54: Properties of each reactant.

Id	Name	SBO
IP3R_2Ca	IP3R_2Ca	
Ca	Ca	

Product

Table 55: Properties of each product.

Id	Name	SBO
IP3R_3Ca	IP3R_3Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{25} = \mathtt{J78\_k1} \cdot [\mathtt{IP3R\_2Ca}] \cdot [\mathtt{Ca}] - \mathtt{J78\_k2} \cdot [\mathtt{IP3R\_3Ca}] \tag{50}$$

6.26 Reaction J79

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

Name J79

Reaction equation

$$\texttt{IP3R\_3Ca} + \texttt{Ca} \longrightarrow \texttt{IP3R\_4Ca} \tag{51}$$

Reactants

Table 56: Properties of each reactant.

Id	Name	SBO
IP3R_3Ca	IP3R_3Ca	
Ca	Ca	

Product

Table 57: Properties of each product.

Id	Name	SBO
IP3R_4Ca	IP3R_4Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{26} = \texttt{J79\_k1} \cdot [\texttt{IP3R\_3Ca}] \cdot [\texttt{Ca}] - \texttt{J79\_k2} \cdot [\texttt{IP3R\_4Ca}] \tag{52}$$

6.27 Reaction J80

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

Name J80

Reaction equation

$$\texttt{IP3R} + \texttt{IP3} \longrightarrow \texttt{IP3R\_IP3} \tag{53}$$

Reactants

Table 58: Properties of each reactant.

Id	Name	SBO
IP3R	IP3R	
IP3	IP3	

Product

Table 59: Properties of each product.

Id	Name	SBO
IP3R_IP3	IP3R_IP3	

Kinetic Law

Derived unit contains undeclared units

$$v_{27} = \mathtt{J80\_k1} \cdot [\mathtt{IP3R}] \cdot [\mathtt{IP3}] - \mathtt{J80\_k2} \cdot [\mathtt{IP3R\_IP3}] \tag{54}$$

6.28 Reaction J81

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

Name J81

Reaction equation

$$\mathtt{IP3R\_IP3} + \mathtt{Ca} \longrightarrow \mathtt{IP3R\_Open} \tag{55}$$

Reactants

Table 60: Properties of each reactant.

Id	Name	SBO
IP3R_IP3	IP3R_IP3	
Ca	Ca	

Product

Table 61: Properties of each product.

Id	Name	SBO
IP3R_Open	IP3R_Open	

Kinetic Law

Derived unit contains undeclared units

$$v_{28} = \mathtt{J81\_k1} \cdot [\mathtt{IP3R\_IP3}] \cdot [\mathtt{Ca}] - \mathtt{J81\_k2} \cdot [\mathtt{IP3R\_Open}] \tag{56}$$

6.29 Reaction J87

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

Name J87

Reaction equation

$$\mathtt{CaM} + \mathtt{Ca} \longrightarrow \mathtt{CaM\_Ca} \tag{57}$$

Reactants

Table 62: Properties of each reactant.

Id	Name	SBO
CaM	CaM	
Ca	Ca	

Product

Table 63: Properties of each product.

Id	Name	SBO
CaM_Ca	CaM_Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{29} = \mathtt{J87\_k1} \cdot [\mathtt{CaM}] \cdot [\mathtt{Ca}] - \mathtt{J87\_k2} \cdot [\mathtt{CaM\_Ca}] \tag{58}$$

6.30 Reaction J88

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

Name J88

Reaction equation

$$\texttt{CaM\_Ca} + \texttt{Ca} \longrightarrow \texttt{CaM\_2Ca} \tag{59}$$

Reactants

Table 64: Properties of each reactant.

Id	Name	SBO
CaM_Ca	CaM_Ca	
Ca	Ca	

Product

Table 65: Properties of each product.

Id	Name	SBO
CaM_2Ca	CaM_2Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{30} = \texttt{J88\_k1} \cdot [\texttt{CaM\_Ca}] \cdot [\texttt{Ca}] - \texttt{J88\_k2} \cdot [\texttt{CaM\_2Ca}] \tag{60}$$

6.31 Reaction J89

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

Name J89

Reaction equation

$$\texttt{CaM\_2Ca} + \texttt{Ca} \longrightarrow \texttt{CaM\_3Ca} \tag{61}$$

Reactants

Table 66: Properties of each reactant.

Id	Name	SBO
CaM_2Ca	CaM_2Ca	
Ca	Ca	

Product

Table 67: Properties of each product.

Id	Name	SBO
CaM_3Ca	CaM_3Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{31} = \texttt{J89\_k1} \cdot [\texttt{CaM\_2Ca}] \cdot [\texttt{Ca}] - \texttt{J89\_k2} \cdot [\texttt{CaM\_3Ca}] \tag{62}$$

6.32 Reaction J90

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

Name J90

Reaction equation

$$\texttt{CaM\_3Ca} + \texttt{Ca} \longrightarrow \texttt{CaM\_4Ca} \tag{63}$$

Reactants

Table 68: Properties of each reactant.

Id	Name	SBO
CaM_3Ca	CaM_3Ca	
Ca	Ca	

Product

Table 69: Properties of each product.

Id	Name	SBO
CaM_4Ca	CaM_4Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{32} = \texttt{J90\_k1} \cdot [\texttt{CaM\_3Ca}] \cdot [\texttt{Ca}] - \texttt{J90\_k2} \cdot [\texttt{CaM\_4Ca}] \tag{64}$$

6.33 Reaction J91

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

Name J91

Reaction equation

$$\texttt{CaN} + \texttt{Ca} \longrightarrow \texttt{CaN\_Ca} \tag{65}$$

Reactants

Table 70: Properties of each reactant.

Id	Name	SBO
CaN	CaN	
Ca	Ca	

Product

Table 71: Properties of each product.

Id	Name	SBO
CaN_Ca	CaN_Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{33} = \texttt{J91\_k1} \cdot [\texttt{CaN}] \cdot [\texttt{Ca}] - \texttt{J91\_k2} \cdot [\texttt{CaN\_Ca}] \tag{66}$$

6.34 Reaction J92

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

Name J92

Reaction equation

$$\texttt{CaN\_Ca} + \texttt{Ca} \longrightarrow \texttt{CaN\_2Ca} \tag{67}$$

Reactants

Table 72: Properties of each reactant.

Id	Name	SBO
CaN_Ca	CaN_Ca	
Ca	Ca	

Product

Table 73: Properties of each product.

Id	Name	SBO
CaN_2Ca	CaN_2Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{34} = \texttt{J92\_k1} \cdot [\texttt{CaN\_Ca}] \cdot [\texttt{Ca}] - \texttt{J92\_k2} \cdot [\texttt{CaN\_2Ca}] \tag{68}$$

6.35 Reaction J93

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

Name J93

Reaction equation

$$\texttt{CaN\_2Ca} + \texttt{Ca} \longrightarrow \texttt{CaN\_3Ca} \tag{69}$$

Reactants

Table 74: Properties of each reactant.

Id	Name	SBO
CaN_2Ca	CaN_2Ca	
Ca	Ca	

Product

Table 75: Properties of each product.

Id	Name	SBO
CaN_3Ca	CaN_3Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{35} = \texttt{J93\_k1} \cdot [\texttt{CaN\_2Ca}] \cdot [\texttt{Ca}] - \texttt{J93\_k2} \cdot [\texttt{CaN\_3Ca}] \tag{70}$$

6.36 Reaction J94

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

Name J94

Reaction equation

$$\texttt{CaN\_3Ca} + \texttt{Ca} \longrightarrow \texttt{CaN\_4Ca} \tag{71}$$

Reactants

Table 76: Properties of each reactant.

Id	Name	SBO
CaN_3Ca	CaN_3Ca	
Ca	Ca	

Product

Table 77: Properties of each product.

Id	Name	SBO
CaN_4Ca	CaN_4Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{36} = \texttt{J94\_k1} \cdot [\texttt{CaN\_3Ca}] \cdot [\texttt{Ca}] - \texttt{J94\_k2} \cdot [\texttt{CaN\_4Ca}] \tag{72}$$

6.37 Reaction J95

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

Name J95

Reaction equation

$$\texttt{CaN\_4Ca} + \texttt{CaM\_2Ca} \longrightarrow \texttt{CaN\_4Ca\_CaM\_2Ca} \tag{73}$$

Reactants

Table 78: Properties of each reactant.

Id	Name	SBO
CaN_4Ca	CaN_4Ca	
CaM_2Ca	CaM_2Ca	

Product

Table 79: Properties of each product.

Id	Name	SBO
CaN_4Ca_CaM_2Ca	CaN_4Ca_CaM_2Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{37} = \texttt{J95\_k1} \cdot [\texttt{CaN\_4Ca}] \cdot [\texttt{CaM\_2Ca}] - \texttt{J95\_k2} \cdot [\texttt{CaN\_4Ca\_CaM\_2Ca}] \tag{74}$$

6.38 Reaction J96

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

Name J96

Reaction equation

$$\texttt{CaN\_4Ca} + \texttt{CaM\_3Ca} \longrightarrow \texttt{CaN\_4Ca\_CaM\_3Ca} \tag{75}$$

Reactants

Table 80: Properties of each reactant.

Id	Name	SBO
CaN_4Ca	CaN_4Ca	
CaM_3Ca	CaM_3Ca	

Product

Table 81: Properties of each product.

Id	Name	SBO
CaN_4Ca_CaM_3Ca	CaN_4Ca_CaM_3Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{38} = \texttt{J96\_k1} \cdot [\texttt{CaN\_4Ca}] \cdot [\texttt{CaM\_3Ca}] - \texttt{J96\_k2} \cdot [\texttt{CaN\_4Ca\_CaM\_3Ca}] \tag{76}$$

6.39 Reaction J97

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

Name J97

Reaction equation

$$\texttt{CaN\_4Ca} + \texttt{CaM\_4Ca} \longrightarrow \texttt{CaN\_4Ca\_CaM\_4Ca} \tag{77}$$

Reactants

Table 82: Properties of each reactant.

Id	Name	SBO
CaN_4Ca	CaN_4Ca	
CaM_4Ca	CaM_4Ca	

Product

Table 83: Properties of each product.

Id	Name	SBO
CaN_4Ca_CaM_4Ca	CaN_4Ca_CaM_4Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{39} = \texttt{J97\_k1} \cdot [\texttt{CaN\_4Ca}] \cdot [\texttt{CaM\_4Ca}] - \texttt{J97\_k2} \cdot [\texttt{CaN\_4Ca\_CaM\_4Ca}] \tag{78}$$

6.40 Reaction J163

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

Name J163

Reaction equation

$$\texttt{PLC2\_PIP2} + \texttt{Ca} \longrightarrow \texttt{PLC2\_Ca\_PIP2} \tag{79}$$

Reactants

Table 84: Properties of each reactant.

Id	Name	SBO
PLC2_PIP2	PLC2_PIP2	
Ca	Ca	

Product

Table 85: Properties of each product.

Id	Name	SBO
PLC2_Ca_PIP2	PLC2_Ca_PIP2	

Kinetic Law

Derived unit contains undeclared units

$$v_{40} = \texttt{J163\_k1} \cdot [\texttt{PLC2\_PIP2}] \cdot [\texttt{Ca}] - \texttt{J163\_k2} \cdot [\texttt{PLC2\_Ca\_PIP2}] \tag{80}$$

6.41 Reaction J164

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

Name J164

Reaction equation

$$\texttt{PLC2\_Gq\_PIP2} + \texttt{Ca} \longrightarrow \texttt{PLC2\_Ca\_Gq\_PIP2} \tag{81}$$

Reactants

Table 86: Properties of each reactant.

Id	Name	SBO
PLC2_Gq_PIP2	PLC2_Gq_PIP2	
Ca	Ca	

Product

Table 87: Properties of each product.

Id	Name	SBO
PLC2_Ca_Gq_PIP2	PLC2_Ca_Gq_PIP2	

Kinetic Law

Derived unit contains undeclared units

$$v_{41} = \texttt{J164\_k1} \cdot [\texttt{PLC2\_Gq\_PIP2}] \cdot [\texttt{Ca}] - \texttt{J164\_k2} \cdot [\texttt{PLC2\_Ca\_Gq\_PIP2}] \tag{82}$$

6.42 Reaction J165

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

Name J165

Reaction equation

$$\mathtt{PLC2\_PIP2} + \mathtt{GaqGTP} \longrightarrow \mathtt{PLC2\_Gq\_PIP2} \tag{83}$$

Reactants

Table 88: Properties of each reactant.

Id	Name	SBO
PLC2_PIP2	PLC2_PIP2	
GaqGTP	GaqGTP	

Product

Table 89: Properties of each product.

Id	Name	SBO
PLC2_Gq_PIP2	PLC2_Gq_PIP2	

Kinetic Law

Derived unit contains undeclared units

$$v_{42} = \mathtt{J165\_k1} \cdot [\mathtt{PLC2\_PIP2}] \cdot [\mathtt{GaqGTP}] - \mathtt{J165\_k2} \cdot [\mathtt{PLC2\_Gq\_PIP2}] \tag{84}$$

6.43 Reaction J166

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

Name J166

Reaction equation

$$\mathtt{PLC2\_Ca\_PIP2} + \mathtt{GaqGTP} \longrightarrow \mathtt{PLC2\_Ca\_Gq\_PIP2} \tag{85}$$

Reactants

Table 90: Properties of each reactant.

Id	Name	SBO
PLC2_Ca_PIP2	PLC2_Ca_PIP2	
GaqGTP	GaqGTP	

Product

Table 91: Properties of each product.

Id	Name	SBO
PLC2_Ca_Gq_PIP2	PLC2_Ca_Gq_PIP2	

Kinetic Law

Derived unit contains undeclared units

$$v_{43} = \mathtt{J166\_k1} \cdot [\mathtt{PLC2\_Ca\_PIP2}] \cdot [\mathtt{GaqGTP}] - \mathtt{J166\_k2} \cdot [\mathtt{PLC2\_Ca\_Gq\_PIP2}] \quad (86)$$

6.44 Reaction J167

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

Name J167

Reaction equation

$$\mathtt{PLC2\_Ca} + \mathtt{GaqGTP} \longrightarrow \mathtt{PLC2\_Ca\_Gq} \quad (87)$$

Reactants

Table 92: Properties of each reactant.

Id	Name	SBO
PLC2_Ca	PLC2_Ca	
GaqGTP	GaqGTP	

Product

Table 93: Properties of each product.

Id	Name	SBO
PLC2_Ca_Gq	PLC2_Ca_Gq	

Kinetic Law

Derived unit contains undeclared units

$$v_{44} = \mathtt{J167\_k1} \cdot [\mathtt{PLC2\_Ca}] \cdot [\mathtt{GaqGTP}] - \mathtt{J167\_k2} \cdot [\mathtt{PLC2\_Ca\_Gq}] \tag{88}$$

6.45 Reaction J168

This is an irreversible reaction of one reactant forming three products.

Name J168

Reaction equation

$$\mathtt{PLC2\_Ca\_PIP2} \longrightarrow \mathtt{IP3} + \mathtt{DAG} + \mathtt{PLC2\_Ca} \tag{89}$$

Reactant

Table 94: Properties of each reactant.

Id	Name	SBO
PLC2_Ca_PIP2	PLC2_Ca_PIP2	

Products

Table 95: Properties of each product.

Id	Name	SBO
IP3	IP3	
DAG	DAG	
PLC2_Ca	PLC2_Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{45} = \texttt{J168\_k1} \cdot [\texttt{PLC2\_Ca\_PIP2}] - \texttt{J168\_k2} \cdot [\texttt{IP3}] \cdot [\texttt{DAG}] \cdot [\texttt{PLC2\_Ca}] \quad (90)$$

6.46 Reaction J169

This is an irreversible reaction of one reactant forming three products.

Name J169

Reaction equation

$$\texttt{PLC2\_Ca\_Gq\_PIP2} \longrightarrow \texttt{DAG} + \texttt{IP3} + \texttt{PLC2\_Ca\_Gq} \quad (91)$$

Reactant

Table 96: Properties of each reactant.

Id	Name	SBO
PLC2_Ca_Gq_PIP2	PLC2_Ca_Gq_PIP2	

Products

Table 97: Properties of each product.

Id	Name	SBO
DAG	DAG	
IP3	IP3	
PLC2_Ca_Gq	PLC2_Ca_Gq	

Kinetic Law

Derived unit contains undeclared units

$$v_{46} = \texttt{J169\_k1} \cdot [\texttt{PLC2\_Ca\_Gq\_PIP2}] - \texttt{J169\_k2} \cdot [\texttt{DAG}] \cdot [\texttt{IP3}] \cdot [\texttt{PLC2\_Ca\_Gq}] \quad (92)$$

6.47 Reaction J170

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

Name J170

Reaction equation

$$\texttt{PLC2\_Ca} + \texttt{PIP2} \longrightarrow \texttt{PLC2\_Ca\_PIP2} \quad (93)$$

Reactants

Table 98: Properties of each reactant.

Id	Name	SBO
PLC2_Ca	PLC2_Ca	
PIP2	PIP2	

Product

Table 99: Properties of each product.

Id	Name	SBO
PLC2_Ca_PIP2	PLC2_Ca_PIP2	

Kinetic Law

Derived unit contains undeclared units

$$v_{47} = \texttt{J170\_k1} \cdot [\texttt{PLC2\_Ca}] \cdot [\texttt{PIP2}] - \texttt{J170\_k2} \cdot [\texttt{PLC2\_Ca\_PIP2}] \tag{94}$$

6.48 Reaction J171

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

Name J171

Reaction equation

$$\texttt{PLC2\_Ca\_Gq} + \texttt{PIP2} \longrightarrow \texttt{PLC2\_Ca\_Gq\_PIP2} \tag{95}$$

Reactants

Table 100: Properties of each reactant.

Id	Name	SBO
PLC2_Ca_Gq	PLC2_Ca_Gq	
PIP2	PIP2	

Product

Table 101: Properties of each product.

Id	Name	SBO
PLC2_Ca_Gq_PIP2	PLC2_Ca_Gq_PIP2	

Kinetic Law

Derived unit contains undeclared units

$$v_{48} = \texttt{J171\_k1} \cdot [\texttt{PLC2\_Ca\_Gq}] \cdot [\texttt{PIP2}] - \texttt{J171\_k2} \cdot [\texttt{PLC2\_Ca\_Gq\_PIP2}] \tag{96}$$

6.49 Reaction J172

This is an irreversible reaction of one reactant forming two products.

Name J172

Reaction equation

$$\texttt{PLC2\_Gq\_PIP2} \longrightarrow \texttt{PLC2\_PIP2} + \texttt{GaqGDP} \tag{97}$$

Reactant

Table 102: Properties of each reactant.

Id	Name	SBO
PLC2_Gq_PIP2	PLC2_Gq_PIP2	

Products

Table 103: Properties of each product.

Id	Name	SBO
PLC2_PIP2	PLC2_PIP2	
GaqGDP	GaqGDP	

Kinetic Law

Derived unit contains undeclared units

$$v_{49} = \texttt{J172\_k1} \cdot [\texttt{PLC2\_Gq\_PIP2}] - \texttt{J172\_k2} \cdot [\texttt{PLC2\_PIP2}] \cdot [\texttt{GaqGDP}] \tag{98}$$

6.50 Reaction J173

This is an irreversible reaction of one reactant forming two products.

Name J173

Reaction equation

$$\texttt{PLC2\_Ca\_Gq\_PIP2} \longrightarrow \texttt{GaqGDP} + \texttt{PLC2\_Ca\_PIP2} \tag{99}$$

Reactant

Table 104: Properties of each reactant.

Id	Name	SBO
PLC2_Ca_Gq_PIP2	PLC2_Ca_Gq_PIP2	

Products

Table 105: Properties of each product.

Id	Name	SBO
GaqGDP	GaqGDP	
PLC2_Ca_PIP2	PLC2_Ca_PIP2	

Kinetic Law

Derived unit contains undeclared units

$$v_{50} = \texttt{J173\_k1} \cdot [\texttt{PLC2\_Ca\_Gq\_PIP2}] - \texttt{J173\_k2} \cdot [\texttt{GaqGDP}] \cdot [\texttt{PLC2\_Ca\_PIP2}] \tag{100}$$

6.51 Reaction J174

This is an irreversible reaction of one reactant forming two products.

Name J174

Reaction equation

$$\texttt{PLC2\_Ca\_Gq} \longrightarrow \texttt{GaqGDP} + \texttt{PLC2\_Ca} \tag{101}$$

Reactant

Table 106: Properties of each reactant.

Id	Name	SBO
PLC2_Ca_Gq	PLC2_Ca_Gq	

Products

Table 107: Properties of each product.

Id	Name	SBO
GaqGDP	GaqGDP	
PLC2_Ca	PLC2_Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{51} = \texttt{J174\_k1} \cdot [\texttt{PLC2\_Ca\_Gq}] - \texttt{J174\_k2} \cdot [\texttt{GaqGDP}] \cdot [\texttt{PLC2\_Ca}] \tag{102}$$

6.52 Reaction J175

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

Name J175

Reaction equation

$$\texttt{IP3K} + \texttt{Ca} \longrightarrow \texttt{IP3K\_Ca} \tag{103}$$

Reactants

Table 108: Properties of each reactant.

Id	Name	SBO
IP3K	IP3K	
Ca	Ca	

Product

Table 109: Properties of each product.

Id	Name	SBO
IP3K_Ca	IP3K_Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{52} = \texttt{J175\_k1} \cdot [\texttt{IP3K}] \cdot [\texttt{Ca}] - \texttt{J175\_k2} \cdot [\texttt{IP3K\_Ca}] \tag{104}$$

6.53 Reaction J176

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

Name J176

Reaction equation

$$\texttt{IP3K\_Ca} + \texttt{Ca} \longrightarrow \texttt{IP3K\_2Ca} \tag{105}$$

Reactants

Table 110: Properties of each reactant.

Id	Name	SBO
IP3K_Ca	IP3K_Ca	
Ca	Ca	

Product

Table 111: Properties of each product.

Id	Name	SBO
IP3K_2Ca	IP3K_2Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{53} = \mathtt{J176\_k1} \cdot [\mathtt{IP3K\_Ca}] \cdot [\mathtt{Ca}] - \mathtt{J176\_k2} \cdot [\mathtt{IP3K\_2Ca}] \tag{106}$$

6.54 Reaction J177

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

Name J177

Reaction equation

$$\mathtt{IP3K\_2Ca} + \mathtt{IP3} \longrightarrow \mathtt{IP3K\_2Ca\_IP3} \tag{107}$$

Reactants

Table 112: Properties of each reactant.

Id	Name	SBO
IP3K_2Ca	IP3K_2Ca	
IP3	IP3	

Product

Table 113: Properties of each product.

Id	Name	SBO
IP3K_2Ca_IP3	IP3K_2Ca_IP3	

Kinetic Law

Derived unit contains undeclared units

$$v_{54} = \mathtt{J177\_k1} \cdot [\mathtt{IP3K\_2Ca}] \cdot [\mathtt{IP3}] - \mathtt{J177\_k2} \cdot [\mathtt{IP3K\_2Ca\_IP3}] \tag{108}$$

6.55 Reaction J178

This is an irreversible reaction of one reactant forming two products.

Name J178

Reaction equation

$$\texttt{IP3K\_2Ca\_IP3} \longrightarrow \texttt{IP4} + \texttt{IP3K\_2Ca} \tag{109}$$

Reactant

Table 114: Properties of each reactant.

Id	Name	SBO
IP3K_2Ca_IP3	IP3K_2Ca_IP3	

Products

Table 115: Properties of each product.

Id	Name	SBO
IP4	IP4	
IP3K_2Ca	IP3K_2Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{55} = \texttt{J178\_k1} \cdot [\texttt{IP3K\_2Ca\_IP3}] - \texttt{J178\_k2} \cdot [\texttt{IP4}] \cdot [\texttt{IP3K\_2Ca}] \tag{110}$$

6.56 Reaction J179

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

Name J179

Reaction equation

$$\texttt{IP5P} + \texttt{IP3} \longrightarrow \texttt{IP5P\_IP3} \tag{111}$$

Reactants

Table 116: Properties of each reactant.

Id	Name	SBO
IP5P	IP5P	
IP3	IP3	

Product

Table 117: Properties of each product.

Id	Name	SBO
IP5P_IP3	IP5P_IP3	

Kinetic Law

Derived unit contains undeclared units

$$v_{56} = \texttt{J179\_k1} \cdot [\texttt{IP5P}] \cdot [\texttt{IP3}] - \texttt{J179\_k2} \cdot [\texttt{IP5P\_IP3}] \tag{112}$$

6.57 Reaction J180

This is an irreversible reaction of one reactant forming two products.

Name J180

Reaction equation

$$\texttt{IP5P\_IP3} \longrightarrow \texttt{IP2} + \texttt{IP5P} \tag{113}$$

Reactant

Table 118: Properties of each reactant.

Id	Name	SBO
IP5P_IP3	IP5P_IP3	

Products

Table 119: Properties of each product.

Id	Name	SBO
IP2	IP2	
IP5P	IP5P	

Kinetic Law

Derived unit contains undeclared units

$$v_{57} = \texttt{J180\_k1} \cdot [\texttt{IP5P\_IP3}] - \texttt{J180\_k2} \cdot [\texttt{IP2}] \cdot [\texttt{IP5P}] \tag{114}$$

6.58 Reaction J181

This is an irreversible reaction of one reactant forming one product.

Name J181

Reaction equation

$$\texttt{CaER} \longrightarrow \texttt{Ca} \tag{115}$$

Reactant

Table 120: Properties of each reactant.

Id	Name	SBO
CaER	CaER	

Product

Table 121: Properties of each product.

Id	Name	SBO
Ca	Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{58} = \texttt{J181\_k1} \cdot [\texttt{CaER}] \cdot [\texttt{IP3R\_Open}] - \texttt{J181\_k2} \cdot [\texttt{Ca}] \tag{116}$$

6.59 Reaction J182

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

Name J182

Reaction equation

$$\texttt{SERCA} + \texttt{Ca} \longrightarrow \texttt{SERCA\_Ca} \tag{117}$$

Reactants

Table 122: Properties of each reactant.

Id	Name	SBO
SERCA	SERCA	
Ca	Ca	

Product

Table 123: Properties of each product.

Id	Name	SBO
SERCA_Ca	SERCA_Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{59} = \texttt{J182\_k1} \cdot [\texttt{SERCA}] \cdot [\texttt{Ca}] - \texttt{J182\_k2} \cdot [\texttt{SERCA\_Ca}] \tag{118}$$

6.60 Reaction J183

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

Name J183

Reaction equation

$$\texttt{SERCA\_Ca} + \texttt{Ca} \longrightarrow \texttt{SERCA\_2Ca} \tag{119}$$

Reactants

Table 124: Properties of each reactant.

Id	Name	SBO
SERCA_Ca	SERCA_Ca	
Ca	Ca	

Product

Table 125: Properties of each product.

Id	Name	SBO
SERCA_2Ca	SERCA_2Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{60} = \mathtt{J183\_k1} \cdot [\mathtt{SERCA\_Ca}] \cdot [\mathtt{Ca}] - \mathtt{J183\_k2} \cdot [\mathtt{SERCA\_2Ca}] \tag{120}$$

6.61 Reaction J184

This is an irreversible reaction of one reactant forming two products.

Name J184

Reaction equation

$$\mathtt{SERCA\_2Ca} \longrightarrow \mathtt{CaER} + \mathtt{SERCA\_Ca} \tag{121}$$

Reactant

Table 126: Properties of each reactant.

Id	Name	SBO
SERCA_2Ca	SERCA_2Ca	

Products

Table 127: Properties of each product.

Id	Name	SBO
CaER	CaER	
SERCA_Ca	SERCA_Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{61} = \texttt{J184\_k1} \cdot [\texttt{SERCA\_2Ca}] - \texttt{J184\_k2} \cdot [\texttt{CaER}] \cdot [\texttt{SERCA\_Ca}] \tag{122}$$

6.62 Reaction J185

This is an irreversible reaction of one reactant forming two products.

Name J185

Reaction equation

$$\texttt{SERCA\_Ca} \longrightarrow \texttt{CaER} + \texttt{SERCA} \tag{123}$$

Reactant

Table 128: Properties of each reactant.

Id	Name	SBO
SERCA_Ca	SERCA_Ca	

Products

Table 129: Properties of each product.

Id	Name	SBO
CaER	CaER	
SERCA	SERCA	

Kinetic Law

Derived unit contains undeclared units

$$v_{62} = \mathtt{J185\_k1} \cdot [\mathtt{SERCA\_Ca}] - \mathtt{J185\_k2} \cdot [\mathtt{CaER}] \cdot [\mathtt{SERCA}] \tag{124}$$

6.63 Reaction J186

This is an irreversible reaction of one reactant forming one product.

Name J186

Reaction equation

$$\mathtt{CaER} \longrightarrow \mathtt{Ca} \tag{125}$$

Reactant

Table 130: Properties of each reactant.

Id	Name	SBO
CaER	CaER	

Product

Table 131: Properties of each product.

Id	Name	SBO
Ca	Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{63} = \mathtt{J186\_k1} \cdot [\mathtt{CaER}] - \mathtt{J186\_k2} \cdot [\mathtt{Ca}] \tag{126}$$

6.64 Reaction J187

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

Name J187

Reaction equation

$$\mathtt{PMCA} + \mathtt{Ca} \longrightarrow \mathtt{PMCA\_Ca} \tag{127}$$

Reactants

Table 132: Properties of each reactant.

Id	Name	SBO
PMCA	PMCA	
Ca	Ca	

Product

Table 133: Properties of each product.

Id	Name	SBO
PMCA_Ca	PMCA_Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{64} = \texttt{J187\_k1} \cdot [\texttt{PMCA}] \cdot [\texttt{Ca}] - \texttt{J187\_k2} \cdot [\texttt{PMCA\_Ca}] \tag{128}$$

6.65 Reaction J188

This is an irreversible reaction of one reactant forming two products.

Name J188

Reaction equation

$$\texttt{PMCA\_Ca} \longrightarrow \texttt{Ca\_Cleft} + \texttt{PMCA} \tag{129}$$

Reactant

Table 134: Properties of each reactant.

Id	Name	SBO
PMCA_Ca	PMCA_Ca	

Products

Table 135: Properties of each product.

Id	Name	SBO
Ca_Cleft	Ca_Cleft	
PMCA	PMCA	

Kinetic Law

Derived unit contains undeclared units

$$v_{65} = \texttt{J188\_k1} \cdot [\texttt{PMCA\_Ca}] - \texttt{J188\_k2} \cdot [\texttt{Ca\_Cleft}] \cdot [\texttt{PMCA}] \tag{130}$$

6.66 Reaction J189

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

Name J189

Reaction equation

$$\texttt{NaCa\_Exch} + \texttt{Ca} \longrightarrow \texttt{NaCa\_Exch\_Ca} \tag{131}$$

Reactants

Table 136: Properties of each reactant.

Id	Name	SBO
NaCa_Exch	NaCa_Exch	
Ca	Ca	

Product

Table 137: Properties of each product.

Id	Name	SBO
NaCa_Exch_Ca	NaCa_Exch_Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{66} = \texttt{J189\_k1} \cdot [\texttt{NaCa\_Exch}] \cdot [\texttt{Ca}] - \texttt{J189\_k2} \cdot [\texttt{NaCa\_Exch\_Ca}] \tag{132}$$

6.67 Reaction J190

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

Name J190

Reaction equation

$$\texttt{NaCa\_Exch\_Ca} + \texttt{Ca} \longrightarrow \texttt{NaCa\_Exch\_2Ca} \tag{133}$$

Reactants

Table 138: Properties of each reactant.

Id	Name	SBO
NaCa_Exch_Ca	NaCa_Exch_Ca	
Ca	Ca	

Product

Table 139: Properties of each product.

Id	Name	SBO
NaCa_Exch_2Ca	NaCa_Exch_2Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{67} = \texttt{J190\_k1} \cdot [\texttt{NaCa\_Exch\_Ca}] \cdot [\texttt{Ca}] - \texttt{J190\_k2} \cdot [\texttt{NaCa\_Exch\_2Ca}] \tag{134}$$

6.68 Reaction J191

This is an irreversible reaction of one reactant forming two products.

Name J191

Reaction equation

$$\texttt{NaCa\_Exch\_2Ca} \longrightarrow \texttt{Ca\_Cleft} + \texttt{NaCa\_Exch\_Ca} \tag{135}$$

Reactant

Table 140: Properties of each reactant.

Id	Name	SBO
NaCa_Exch_2Ca	NaCa_Exch_2Ca	

Products

Table 141: Properties of each product.

Id	Name	SBO
Ca_Cleft	Ca_Cleft	
NaCa_Exch_Ca	NaCa_Exch_Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{68} = \mathtt{J191\_k1} \cdot [\mathtt{NaCa\_Exch\_2Ca}] - \mathtt{J191\_k2} \cdot [\mathtt{Ca\_Cleft}] \cdot [\mathtt{NaCa\_Exch\_Ca}] \quad (136)$$

6.69 Reaction J192

This is an irreversible reaction of one reactant forming two products.

Name J192

Reaction equation

$$\mathtt{NaCa\_Exch\_Ca} \longrightarrow \mathtt{Ca\_Cleft} + \mathtt{NaCa\_Exch} \quad (137)$$

Reactant

Table 142: Properties of each reactant.

Id	Name	SBO
NaCa_Exch_Ca	NaCa_Exch_Ca	

Products

Table 143: Properties of each product.

Id	Name	SBO
Ca_Cleft	Ca_Cleft	
NaCa_Exch	NaCa_Exch	

Kinetic Law

Derived unit contains undeclared units

$$v_{69} = \texttt{J192\_k1} \cdot [\texttt{NaCa\_Exch\_Ca}] - \texttt{J192\_k2} \cdot [\texttt{Ca\_Cleft}] \cdot [\texttt{NaCa\_Exch}] \quad (138)$$

6.70 Reaction J193

This is an irreversible reaction of one reactant forming one product.

Name J193

Reaction equation

$$\texttt{Ca\_Cleft} \longrightarrow \texttt{Ca} \quad (139)$$

Reactant

Table 144: Properties of each reactant.

Id	Name	SBO
Ca_Cleft	Ca_Cleft	

Product

Table 145: Properties of each product.

Id	Name	SBO
Ca	Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{70} = \texttt{J193\_k1} \cdot [\texttt{Ca\_Cleft}] - \texttt{J193\_k2} \cdot [\texttt{Ca}] \quad (140)$$

6.71 Reaction re96

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

Reaction equation

$$\texttt{iCaAMPAR} + \texttt{iCaNMDAR} \longrightarrow \texttt{CaPSD} \tag{141}$$

Reactants

Table 146: Properties of each reactant.

Id	Name	SBO
iCaAMPAR	iCaAMPAR	
iCaNMDAR	iCaNMDAR	

Product

Table 147: Properties of each product.

Id	Name	SBO
CaPSD	CaPSD	

Kinetic Law

Derived unit contains undeclared units

$$v_{71} = \frac{-1 \cdot (\texttt{iCaAMPAR} + \texttt{iCaNMDAR})}{2 \cdot 9.64867 \cdot 10^4 \cdot 0.002} \tag{142}$$

6.72 Reaction re97

This is an irreversible reaction of one reactant forming one product.

Reaction equation

$$\texttt{CaPSD} \longrightarrow \texttt{Ca} \tag{143}$$

Reactant

Table 148: Properties of each reactant.

Id	Name	SBO
CaPSD	CaPSD	

Product

Table 149: Properties of each product.

Id	Name	SBO
Ca	Ca	

Kinetic Law

Derived unit contains undeclared units

$$v_{72} = 0.05 \cdot [\mathtt{CaPSD}] \cdot \mathrm{vol}(\mathtt{compartment}) \tag{144}$$

7 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 a unit definition are involved or
- volume correction is necessary because the `hasOnlySubstanceUnits` flag may be set to `false` and `spacialDimensions`> 0 for certain species.

7.1 Species R

Name R

Initial concentration $3.89266904847504 \cdot 10^{-4}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in three reactions (as a reactant in J0, J4, J8).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{R} = -v_1 - v_5 - v_9 \tag{145}$$

7.2 Species Ra

Name Ra

Initial concentration $3.89319081649848 \cdot 10^{-7}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in J5, J9 and as a product in J0, J14).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Ra} = v_1 + v_{15} - v_6 - v_{10} \tag{146}$$

7.3 Species LR

Name LR

Initial concentration $1.5836159708699 \cdot 10^{-33}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in three reactions (as a reactant in J1, J11 and as a product in J4).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{LR} = v_5 - v_2 - v_{12} \tag{147}$$

7.4 Species LRa

Name LRa

Initial concentration $-6.09975847613016 \cdot 10^{-32}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in J10 and as a product in J1, J5, J17).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{LRa} = v_2 + v_6 + v_{18} - v_{11} \tag{148}$$

7.5 Species R_Gaq_GDP_bg

Name R_Gaq_GDP_bg

Initial concentration $0.00406139263968745\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in three reactions (as a reactant in J2, J6 and as a product in J8).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{R\_Gaq\_GDP\_bg} = v_9 - v_3 - v_7 \tag{149}$$

7.6 Species Ra_Gaq_GDP_bg

Name Ra_Gaq_GDP_bg

Initial concentration $4.0609927129471 \cdot 10^{-6}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in five reactions (as a reactant in J7, J12 and as a product in J2, J9, J20).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Ra\_Gaq\_GDP\_bg} = v_3 + v_{10} + v_{21} - v_8 - v_{13} \tag{150}$$

7.7 Species LR_Gaq_GDP_bg

Name LR_Gaq_GDP_bg

Initial concentration $6.75598591019411 \cdot 10^{-37}$ kmol$\cdot$l^{-1}

This species takes part in three reactions (as a reactant in J3 and as a product in J6, J11).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{LR\_Gaq\_GDP\_bg} = v_7 + v_{12} - v_4 \tag{151}$$

7.8 Species LRa_Gaq_GDP_bg

Name LRa_Gaq_GDP_bg

Initial concentration $2.42654539845649 \cdot 10^{-36}$ kmol$\cdot$l^{-1}

This species takes part in five reactions (as a reactant in J15 and as a product in J3, J7, J10, J21).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{LRa\_Gaq\_GDP\_bg} = v_4 + v_8 + v_{11} + v_{22} - v_{16} \tag{152}$$

7.9 Species Gaq_GDP_bg

Name Gaq_GDP_bg

Initial concentration 0.0173894166168917 kmol$\cdot$l^{-1}

This species takes part in five reactions (as a reactant in J8, J9, J10, J11 and as a product in J19).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{Gaq\_GDP\_bg} = v_{20} - v_9 - v_{10} - v_{11} - v_{12} \tag{153}$$

7.10 Species Ra_Gaq0_bg

Name Ra_Gaq0_bg

Initial concentration $3.02095086399659 \cdot 10^{-9}$ kmol$\cdot$l^{-1}

This species takes part in two reactions (as a reactant in J13 and as a product in J12).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{Ra\_Gaq0\_bg} = v_{13} - v_{14} \tag{154}$$

7.11 Species LRa_Gaq0_bg

Name LRa_Gaq0_bg

Initial concentration $7.34343136413473 \cdot 10^{-39}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J16 and as a product in J15).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{LRa\_Gaq0\_bg} = v_{16} - v_{17} \tag{155}$$

7.12 Species Ra_Gaq_GTP_bg

Name Ra_Gaq_GTP_bg

Initial concentration $0.00354488711914096\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in three reactions (as a reactant in J14, J20 and as a product in J13).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{Ra\_Gaq\_GTP\_bg} = v_{14} - v_{15} - v_{21} \tag{156}$$

7.13 Species LRa_Gaq_GTP_bg

Name LRa_Gaq_GTP_bg

Initial concentration $-1.93232758048374 \cdot 10^{-32}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in three reactions (as a reactant in J17, J21 and as a product in J16).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{LRa\_Gaq\_GTP\_bg} = v_{17} - v_{18} - v_{22} \tag{157}$$

7.14 Species GaqGTP

Name GaqGTP

Initial concentration $1.23461735927345 \cdot 10^{-12}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in J18, J165, J166, J167 and as a product in J14, J17).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{GaqGTP} = v_{15} + v_{18} - v_{19} - v_{42} - v_{43} - v_{44} \tag{158}$$

7.15 Species Gbg

Name Gbg

Initial concentration $2.39599480303788 \cdot 10^{-7}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in three reactions (as a reactant in J19 and as a product in J14, J17).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{Gbg} = v_{15} + v_{18} - v_{20} \tag{159}$$

7.16 Species GaqGDP

Name GaqGDP

Initial concentration $2.21874391407848 \cdot 10^{-7}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in five reactions (as a reactant in J19 and as a product in J18, J172, J173, J174).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{GaqGDP} = v_{19} + v_{49} + v_{50} + v_{51} - v_{20} \tag{160}$$

7.17 Species IP3

Name IP3

Initial concentration $1.07531278043228 \cdot 10^{-4}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in five reactions (as a reactant in J80, J177, J179 and as a product in J168, J169).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{IP3} = v_{45} + v_{46} - v_{27} - v_{54} - v_{56} \tag{161}$$

7.18 Species DAG

Name DAG

Initial concentration $0.201350856777011\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a product in J168, J169).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{DAG} = v_{45} + v_{46} \tag{162}$$

7.19 Species Ca

Name Ca

Initial concentration $4.90691666502258 \cdot 10^{-5}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

Charge 0

This species takes part in 26 reactions (as a reactant in J76, J77, J78, J79, J81, J87, J88, J89, J90, J91, J92, J93, J94, J163, J164, J175, J176, J182, J183, J187, J189, J190 and as a product in J181, J186, J193, re97).

$$\begin{aligned}\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{Ca} = {} & v_{58} + v_{63} + v_{70} + v_{72} - v_{23} - v_{24} - v_{25} - v_{26} - v_{28} - v_{29} - v_{30} - v_{31} - v_{32} \\ & - v_{33} - v_{34} - v_{35} - v_{36} - v_{40} - v_{41} - v_{52} - v_{53} - v_{59} - v_{60} - v_{64} - v_{66} - v_{67}\end{aligned} \tag{163}$$

7.20 Species IP3R

Name IP3R

Initial concentration $8.65143190764843 \cdot 10^{-4}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J76, J80).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{IP3R} = -v_{23} - v_{27} \tag{164}$$

7.21 Species IP3R_Ca

Name IP3R_Ca

Initial concentration $7.6328454580141 \cdot 10^{-5}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J77 and as a product in J76).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{IP3R\_Ca} = v_{23} - v_{24} \tag{165}$$

7.22 Species IP3R_2Ca

Name IP3R_2Ca

Initial concentration $7.49074795061143 \cdot 10^{-6}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J78 and as a product in J77).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{IP3R\_2Ca} = v_{24} - v_{25} \tag{166}$$

7.23 Species IP3R_3Ca

Name IP3R_3Ca

Initial concentration $9.80172721883503 \cdot 10^{-7}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J79 and as a product in J78).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{IP3R\_3Ca} = v_{25} - v_{26} \tag{167}$$

7.24 Species IP3R_4Ca

Name IP3R_4Ca

Initial concentration $1.44288776605156 \cdot 10^{-7}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in one reaction (as a product in J79).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{IP3R\_4Ca} = v_{26} \tag{168}$$

7.25 Species IP3R_IP3

Name IP3R_IP3

Initial concentration $4.46543773819571 \cdot 10^{-5}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J81 and as a product in J80).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{IP3R\_IP3} = v_{27} - v_{28} \tag{169}$$

7.26 Species IP3R_Open

Name IP3R_Open

Initial concentration $5.25876737578409 \cdot 10^{-6}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in one reaction (as a product in J81).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{IP3R\_Open} = v_{28} \tag{170}$$

7.27 Species CaM

Name CaM

Initial concentration $9.98061332488321 \cdot 10^{-4}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in one reaction (as a reactant in J87).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{CaM} = -v_{29} \tag{171}$$

7.28 Species CaM_Ca

Name CaM_Ca

Initial concentration $1.93477680233643 \cdot 10^{-6}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J88 and as a product in J87).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{CaM\_Ca} = v_{29} - v_{30} \tag{172}$$

7.29 Species CaM_2Ca

Name CaM_2Ca

Initial concentration $3.75063250064924 \cdot 10^{-9}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in three reactions (as a reactant in J89, J95 and as a product in J88).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{CaM\_2Ca} = v_{30} - v_{31} - v_{37} \tag{173}$$

7.30 Species CaM_3Ca

Name CaM_3Ca

Initial concentration $1.15025191744954 \cdot 10^{-10}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in three reactions (as a reactant in J90, J96 and as a product in J89).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{CaM\_3Ca} = v_{31} - v_{32} - v_{38} \tag{174}$$

7.31 Species CaM_4Ca

Name CaM_4Ca

Initial concentration $3.52760467136455 \cdot 10^{-12}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J97 and as a product in J90).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{CaM\_4Ca} = v_{32} - v_{39} \tag{175}$$

7.32 Species CaN

Name CaN

Initial concentration $3.08307084668497 \cdot 10^{-5}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in one reaction (as a reactant in J91).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{CaN} = -v_{33} \tag{176}$$

7.33 Species CaN_Ca

Name CaN_Ca

Initial concentration $1.51283697228116 \cdot 10^{-4}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J92 and as a product in J91).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{CaN\_Ca} = v_{33} - v_{34} \tag{177}$$

7.34 Species CaN_2Ca

Name CaN_2Ca

Initial concentration $7.42336429635558 \cdot 10^{-4}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J93 and as a product in J92).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{CaN\_2Ca} = v_{34} - v_{35} \tag{178}$$

7.35 Species CaN_3Ca

Name CaN_3Ca

Initial concentration $6.91143378885222 \cdot 10^{-5}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J94 and as a product in J93).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{CaN\_3Ca} = v_{35} - v_{36} \tag{179}$$

7.36 Species CaN_4Ca

Name CaN_4Ca

Initial concentration $6.43480526513203 \cdot 10^{-6}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in J95, J96, J97 and as a product in J94).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{CaN\_4Ca} = v_{36} - v_{37} - v_{38} - v_{39} \tag{180}$$

7.37 Species CaN_4Ca_CaM_2Ca

Name CaN_4Ca_CaM_2Ca

Initial concentration $5.79229321482362 \cdot 10^{-12}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in one reaction (as a product in J95).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{CaN\_4Ca\_CaM\_2Ca} = v_{37} \tag{181}$$

7.38 Species CaN_4Ca_CaM_3Ca

Name CaN_4Ca_CaM_3Ca

Initial concentration $1.65648565926826 \cdot 10^{-12}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in one reaction (as a product in J96).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{CaN\_4Ca\_CaM\_3Ca} = v_{38} \tag{182}$$

7.39 Species CaN_4Ca_CaM_4Ca

Name CaN_4Ca_CaM_4Ca

Initial concentration $1.36196401667878 \cdot 10^{-11}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in one reaction (as a product in J97).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{CaN\_4Ca\_CaM\_4Ca} = v_{39} \tag{183}$$

7.40 Species PLC2_PIP2

Name PLC2_PIP2

Initial concentration $0.0365906334982299\ \mathrm{kmol}\cdot\mathrm{l}^{-1}$

This species takes part in three reactions (as a reactant in J163, J165 and as a product in J172).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{PLC2\_PIP2} = v_{49} - v_{40} - v_{42} \tag{184}$$

7.41 Species PLC2_Ca_PIP2

Name PLC2_Ca_PIP2

Initial concentration $0.00538641608061752\ \mathrm{kmol}\cdot\mathrm{l}^{-1}$

This species takes part in five reactions (as a reactant in J166, J168 and as a product in J163, J170, J173).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{PLC2\_Ca\_PIP2} = v_{40} + v_{47} + v_{50} - v_{43} - v_{45} \tag{185}$$

7.42 Species PLC2_Ca

Name PLC2_Ca

Initial concentration $2.29326787106452\cdot 10^{-5}\ \mathrm{kmol}\cdot\mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in J167, J170 and as a product in J168, J174).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{PLC2\_Ca} = v_{45} + v_{51} - v_{44} - v_{47} \tag{186}$$

7.43 Species PLC2_Gq_PIP2

Name PLC2_Gq_PIP2

Initial concentration $1.12386350156032\cdot 10^{-9}\ \mathrm{kmol}\cdot\mathrm{l}^{-1}$

This species takes part in three reactions (as a reactant in J164, J172 and as a product in J165).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{PLC2\_Gq\_PIP2} = v_{42} - v_{41} - v_{49} \tag{187}$$

7.44 Species PLC2_Ca_Gq_PIP2

Name PLC2_Ca_Gq_PIP2

Initial concentration $2.60976147069917 \cdot 10^{-10}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in five reactions (as a reactant in J169, J173 and as a product in J164, J166, J171).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{PLC2\_Ca\_Gq\_PIP2} = v_{41} + v_{43} + v_{48} - v_{46} - v_{50} \tag{188}$$

7.45 Species PLC2_Ca_Gq

Name PLC2_Ca_Gq

Initial concentration $1.63390146299747 \cdot 10^{-8}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in J171, J174 and as a product in J167, J169).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{PLC2\_Ca\_Gq} = v_{44} + v_{46} - v_{48} - v_{51} \tag{189}$$

7.46 Species IP3K

Name IP3K

Initial concentration $2.51427923206463 \cdot 10^{-4}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in one reaction (as a reactant in J175).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{IP3K} = -v_{52} \tag{190}$$

7.47 Species IP3K_Ca

Name IP3K_Ca

Initial concentration $4.11228805229033 \cdot 10^{-5}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J176 and as a product in J175).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{IP3K\_Ca} = v_{52} - v_{53} \tag{191}$$

7.48 Species IP3K_2Ca

Name IP3K_2Ca

Initial concentration $6.72594670251113 \cdot 10^{-6}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in three reactions (as a reactant in J177 and as a product in J176, J178).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{IP3K\_2Ca} = v_{53} + v_{55} - v_{54} \tag{192}$$

7.49 Species IP3K_2Ca_IP3

Name IP3K_2Ca_IP3

Initial concentration $7.23249431820098 \cdot 10^{-7}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J178 and as a product in J177).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{IP3K\_2Ca\_IP3} = v_{54} - v_{55} \tag{193}$$

7.50 Species IP4

Name IP4

Initial concentration $0.0134944771563497\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in one reaction (as a product in J178).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{IP4} = v_{55} \tag{194}$$

7.51 Species IP5P

Name IP5P

Initial concentration $9.88193150800043 \cdot 10^{-4}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J179 and as a product in J180).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{IP5P} = v_{57} - v_{56} \tag{195}$$

7.52 Species IP5P_IP3

Name IP5P_IP3

Initial concentration $1.18068487472253 \cdot 10^{-5}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J180 and as a product in J179).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{IP5P\_IP3} = v_{56} - v_{57} \tag{196}$$

7.53 Species IP2

Name IP2

Initial concentration $0.197471161846005\ \mathrm{kmol}\cdot\mathrm{l}^{-1}$

This species takes part in one reaction (as a product in J180).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{IP2} = v_{57} \tag{197}$$

7.54 Species CaER

Name CaER

Initial concentration $0.125246230104744\ \mathrm{kmol}\cdot\mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in J181, J186 and as a product in J184, J185).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{CaER} = v_{61} + v_{62} - v_{58} - v_{63} \tag{198}$$

7.55 Species Ca_Cleft

Name Ca_Cleft

Initial concentration $2.06702116280734\ \mathrm{kmol}\cdot\mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in J193 and as a product in J188, J191, J192).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{Ca\_Cleft} = v_{65} + v_{68} + v_{69} - v_{70} \tag{199}$$

7.56 Species SERCA

Name SERCA

Initial concentration $0.0198971929761697\ \mathrm{kmol}\cdot\mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J182 and as a product in J185).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{SERCA} = v_{62} - v_{59} \tag{200}$$

7.57 Species SERCA_Ca

Name SERCA_Ca

Initial concentration $1.02281239880892 \cdot 10^{-4}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in J183, J185 and as a product in J182, J184).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{SERCA\_Ca} = v_{59} + v_{61} - v_{60} - v_{62} \tag{201}$$

7.58 Species SERCA_2Ca

Name SERCA_2Ca

Initial concentration $5.2577527097615 \cdot 10^{-7}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J184 and as a product in J183).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{SERCA\_2Ca} = v_{60} - v_{61} \tag{202}$$

7.59 Species PMCA

Name PMCA

Initial concentration $8.04995443752187 \cdot 10^{-5}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J187 and as a product in J188).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{PMCA} = v_{65} - v_{64} \tag{203}$$

7.60 Species PMCA_Ca

Name PMCA_Ca

Initial concentration $3.95004555784861 \cdot 10^{-5}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J188 and as a product in J187).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{PMCA\_Ca} = v_{64} - v_{65} \tag{204}$$

7.61 Species NaCa_Exch

Name NaCa_Exch

Initial concentration $9.99079197786183 \cdot 10^{-4}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J189 and as a product in J192).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{NaCa\_Exch} = v_{69} - v_{66} \tag{205}$$

7.62 Species NaCa_Exch_Ca

Name NaCa_Exch_Ca

Initial concentration $9.19954662777323 \cdot 10^{-7}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in J190, J192 and as a product in J189, J191).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{NaCa\_Exch\_Ca} = v_{66} + v_{68} - v_{67} - v_{69} \tag{206}$$

7.63 Species NaCa_Exch_2Ca

Name NaCa_Exch_2Ca

Initial concentration $8.47096589922676 \cdot 10^{-10}\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J191 and as a product in J190).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{NaCa\_Exch\_2Ca} = v_{67} - v_{68} \tag{207}$$

7.64 Species GDP

Name GDP

Initial concentration $0.13\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a product in J12, J15), which do not influence its rate of change because this species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{GDP} = 0 \tag{208}$$

7.65 Species GTP

Name GTP

Initial concentration $0.2\ \mathrm{kmol} \cdot \mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J13, J16), which do not influence its rate of change because this species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{GTP} = 0 \tag{209}$$

7.66 Species L

Name L

Initial concentration $0\,\mathrm{kmol}\cdot\mathrm{l}^{-1}$

This species takes part in four reactions (as a reactant in J4, J5, J6, J7), which do not influence its rate of change because this species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{L} = 0 \tag{210}$$

7.67 Species RGS

Name RGS

Initial concentration $0\,\mathrm{kmol}\cdot\mathrm{l}^{-1}$

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{RGS} = 0 \tag{211}$$

7.68 Species PIP2

Name PIP2

Initial concentration $4\,\mathrm{kmol}\cdot\mathrm{l}^{-1}$

This species takes part in two reactions (as a reactant in J170, J171), which do not influence its rate of change because this species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{PIP2} = 0 \tag{212}$$

7.69 Species iCaAMPAR

Name iCaAMPAR

Initial amount $0\,\mathrm{mol}$

Charge 0

This species takes part in one reaction (as a reactant in re96), which does not influence its rate of change because this species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{iCaAMPAR} = 0 \tag{213}$$

7.70 Species iCaNMDAR

Name iCaNMDAR

Initial amount 0 mol

Charge 0

This species takes part in one reaction (as a reactant in re96), which does not influence its rate of change because this species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{iCaNMDAR} = 0 \tag{214}$$

7.71 Species CaPSD

Name CaPSD

Initial amount 0 mol

Charge 0

This species takes part in two reactions (as a reactant in re97 and as a product in re96).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathtt{CaPSD} = v_{71} - v_{72} \tag{215}$$

References

Dräger, A., Planatscher, H., Wouamba, D. M., Schröder, A., Hucka, M., Endler, L., Golebiewski, M., Müller, W., and Zell, A. (2009). SBML2LaTeX: Conversion of SBML files into human-readable reports. Bioinformatics, **25**(11), 1455–1456. 10.1093/bioinformatics/btp170.