

SBML Model Report

Model name: “Qi2013 - IL-6 and IFN crosstalk model”



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: Vincent Knight-Schrijver¹ and Yun-Feng Qi² at August 19th 2014 at 1:45 p.m. and last time modified at October sixth 2014 at 11:46 a.m. Table 1 gives 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	4
species types	0	species	108
events	0	constraints	0
reactions	119	function definitions	11
global parameters	192	unit definitions	1
rules	2	initial assignments	0

Model Notes

Qi2013 - IL-6 and IFN crosstalk modelThis model [BIOMD0000000544]describes the crosstalk between IFN-gamma and IL-6 inducedsignalling; it aims to outline mechanisms and factors that maycontrol the interaction between both signalling pathways,discussing a role of heterodimer

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formation in signalling dysfunction.

To account for the possibility of different IFNR and gp130 binding sites for STAT1 and STAT3, model 1 [BIOMD0000000543] assumes that there is no competition between STAT1 and STAT3 for the receptor complexes (includes two extra reactions).

The reverse of this is true in model 2 [BIOMD0000000544] where it generally is assumed that there is competition between STAT1 and STAT3 for the receptor complexes.

This model is described in the article: [Elucidating the crosstalk mechanism between IFN-gamma and IL-6 via mathematical modelling](#). Qi YF, Huang YX, Wang HY, Zhang Y, Bao YL, Sun LG, Wu Y, Yu CL, Song ZB, Zheng LH, Sun Y, Wang GN, Li YX. BMC Bioinformatics 2013; 14: 41

Abstract:

BACKGROUND: Interferon-gamma (IFN-gamma) and interleukin-6 (IL-6) are multifunctional cytokines that regulate immune responses, cell proliferation, and tumour development and progression, which frequently have functionally opposing roles. The cellular responses to both cytokines are activated via the Janus kinase/signal transducer and activator of transcription (JAK/STAT) pathway. During the past 10 years, the crosstalk mechanism between the IFN-gamma and IL-6 pathways has been studied widely and several biological hypotheses have been proposed, but the kinetics and detailed crosstalk mechanism remain unclear. **RESULTS:** Using established mathematical models and new experimental observations of the crosstalk between the IFN-gamma and IL-6 pathways, we constructed a new crosstalk model that considers three possible crosstalk levels: (1) the competition between STAT1 and STAT3 for common receptor docking sites; (2) the mutual negative regulation between SOCS1 and SOCS3; and (3) the negative regulatory effects of the formation of STAT1/3 heterodimers. A number of simulations were tested to explore the consequences of cross-regulation between the two pathways. The simulation results agreed well with the experimental data, thereby demonstrating the effectiveness and correctness of the model. **CONCLUSION:** In this study, we developed a crosstalk model of the IFN-gamma and IL-6 pathways to theoretically investigate their cross-regulation mechanism. The simulation experiments showed the importance of the three crosstalk levels between the two pathways. In particular, the unbalanced competition between STAT1 and STAT3 for IFNR and gp130 led to preferential activation of IFN-gamma and IL-6, while at the same time the formation of STAT1/3 heterodimers enhanced preferential signal transduction by sequestering a fraction of the activated STATs. The model provided a good explanation of the experimental observations and provided insights that may inform further research to facilitate a better understanding of the cross-regulation mechanism between the two pathways.

This model is hosted on [BioModels Database](#) and identified by: [BIOMD0000000544](#).

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

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2 Unit Definitions

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

2.1 Unit `substance`

Name substance

Definition nmol

2.2 Unit `volume`

Notes Litre is the predefined SBML unit for volume.

Definition l

2.3 Unit `area`

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

Definition m²

2.4 Unit `length`

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

Definition m

2.5 Unit `time`

Notes Second is the predefined SBML unit for time.

Definition s

3 Compartments

This model contains four compartments.

Table 2: Properties of all compartments.

Id	Name	SBO	Spatial Dimensions	Size	Unit	Constant	Outside
default	Extracellular		3	1	litre	✓	
compartment_1	Cell		3	1	litre	✓	
c2	Nucluse1		3	1	litre	✓	
c3	Nucluse2		3	1	litre	✓	

3.1 Compartment `default`

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

Name Extracellular

3.2 Compartment `compartment_1`

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

Name Cell

3.3 Compartment `c2`

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

Name Nucluse1

3.4 Compartment `c3`

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

Name Nucluse2

4 Species

This model contains 108 species. The boundary condition of six of these species is set to `true` so that these species' amount cannot be changed by any reaction. 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	IL6	default	$\text{nmol} \cdot \text{l}^{-1}$	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
species_79	IFN	default	$\text{nmol} \cdot \text{l}^{-1}$	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
s118	(IFN-R-JAK)2*-STAT3C	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
s119	(IFN-R-JAK)2*-STAT3C*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
s120	STAT1C*-STAT3C*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
s122	STAT1N*-STAT3N*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_2	gp80	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
species_3	IL6-gp80	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_4	gp130	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
species_5	JAK(IFN)	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_6	gp130-JAK	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_7	IL6-gp80-gp130-JAK	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_8	(IL6-gp80-gp130-JAK)2	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_9	(IL6-gp80-gp130-JAK)2*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_10	(IL6-gp80-gp130-JAK)2*-STAT3C	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_11	STAT3C	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_12	STAT3C*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_13	(IL6-gp80-gp130-JAK)2*-STAT3C*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_14	(STAT3C*)2	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_15	(IL6-gp80-gp130-JAK)2*-SOCS3	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_16	(IL6-gp80-gp130-JAK)2*-SHP2	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
species_18	STAT3C-STAT3C*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_19	SOCS3	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_20	PP1	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_21	PP1-STAT3C*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_22	PP1-(STAT3C*)2	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_31	mRNA-SOCS3C	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_32	Grb2	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_33	(IL6-gp80-gp130-JAK)2*-SHP2*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_34	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_35	SOS	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_36	SHP2*-Grb2	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_37	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_38	Ras-GDP	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_39	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS-Ras-GDP	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_40	Ras-GTP	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_41	Raf	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_42	Raf-Ras-GTP	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_43	Ras-GTP*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_44	Raf*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_45	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS-Ras-GTP	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_46	SHP2*-Grb2-SOS	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_47	Grb2-SOS	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_48	SHP2*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_49	Phosp1	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
species_50	Raf*-Phosp1	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_51	MEK	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_52	MEK-Raf*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_53	MEK-P	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_54	MEK-P-Raf*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_55	MEK-PP	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_56	MEK-PP-Phosp2	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_57	Phosp2	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_58	MEK-P-Phosp2	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_59	ERK	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_60	ERK-MEK-PP	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_61	ERK-P	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_62	ERK-P-MEK-PP	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_63	ERK-PP	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_64	Phosp3	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_65	ERK-PP-Phosp3	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_66	ERK-P-Phosp3	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
s126	PP2-STAT1N*-STAT3N*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
s135	PP1-STAT1C*-STAT3C*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_74	CEBPI	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_75	CEBP	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_76	CEBPn	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_78	R-JAK	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_80	IFN-R-JAK	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_81	(IFN-R-JAK)2	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_82	(IFN-R-JAK)2*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_83	(IFN-R-JAK)2*-STAT1C	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
species_84	STAT1C	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_85	STAT1C*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_86	(IFN-R-JAK)2*-STAT1C*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_87	(STAT1C*)2	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_88	(IFN-R-JAK)2*-SHP2	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_90	PP1-STAT1C*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_91	STAT1C-STAT1C*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_98	mRNA-SOCS1C	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_99	SOCS1	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_100	(IFN-R-JAK)2*-SOCS1	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_101	PP1-(STAT1C*)2	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_104	(IFN-R-JAK)2*-STAT1C-SOCS1	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_105	(IFN-R-JAK)2*-STAT1C-SHP2-SOCS1	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_106	(IFN-R-JAK)2*-STAT1C-SHP2	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_107	R	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_108	SHP2	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
s137	STAT3*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input checked="" type="checkbox"/>
s136	STAT1*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input checked="" type="checkbox"/>
s138	(IL6-gp80-gp130-JAK)2*-STAT1	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
s139	(IL6-gp80-gp130-JAK)2*-STAT1*	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
s140	JAK(IL-6)	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_92	(STAT1N*)2	c2	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_94	PP2-STAT1N*	c2	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_95	STAT1N*	c2	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_96	STAT1N	c2	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_97	mRNA-SOCS1N	c2	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_102	PP2-(STAT1N*)2	c2	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

Id	Name	Compartment	Derived Unit	Constant	Boundary Condi- tion
species_103	STAT1N-STAT1N*	c2	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_23	(STAT3N*)2	c3	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_24	PP2	c3	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_25	PP2-(STAT3N*)2	c3	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_26	STAT3N*	c3	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_27	PP2-STAT3N*	c3	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_28	STAT3N	c3	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_29	STAT3N-STAT3N*	c3	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
species_30	mRNA-SOCS3N	c3	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

5 Parameters

This model contains 192 global parameters.

Table 4: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
parameter_1	k1f		0.100		✓
parameter_2	k1r		0.050		✓
parameter_3	k2f		0.100		✓
parameter_4	k2r		0.050		✓
parameter_5	k3f		0.020		✓
parameter_6	k3r		0.020		✓
parameter_11	k6f		0.040		✓
parameter_12	k6r		0.200		✓
parameter_13	k7		0.005		✓
parameter_14	k8f		0.008		✓
parameter_15	k8r		0.800		✓
parameter_16	k9		0.400		✓
parameter_17	k10f		0.005		✓
parameter_18	k10r		0.500		✓
parameter_27	k16f		0.020		✓
parameter_28	k16r		0.100		✓
parameter_29	k17f		0.001		✓
parameter_30	k17r		0.200		✓
parameter_31	k18		0.003		✓
parameter_32	k19f		0.001		✓
parameter_33	k19r		0.200		✓
parameter_34	k20		0.003		✓
parameter_35	k21f		0.001		✓
parameter_36	k21r		0.200		✓
parameter_37	k22		0.003		✓
parameter_38	k23f		$2 \cdot 10^{-7}$		✓
parameter_39	k23r		0.200		✓
parameter_40	k24		0.005		✓
parameter_41	k25f		0.100		✓
parameter_42	k25r		0.020		✓
parameter_43	k26f		0.001		✓
parameter_44	k26r		0.200		✓
parameter_45	k27		0.005		✓
parameter_46	k28f		0.001		✓
parameter_47	k28r		0.200		✓
parameter_48	k29		0.005		✓
parameter_49	k30f		0.200		✓

Id	Name	SBO	Value	Unit	Constant
parameter_50	k30r		$2 \cdot 10^{-7}$		<input checked="" type="checkbox"/>
parameter_51	k31		0.050		<input checked="" type="checkbox"/>
parameter_52	k32f		0.010		<input checked="" type="checkbox"/>
parameter_53	k32r		400.000		<input checked="" type="checkbox"/>
parameter_54	k33		0.001		<input checked="" type="checkbox"/>
parameter_55	k34		0.010		<input checked="" type="checkbox"/>
parameter_56	k35f		5.000		<input checked="" type="checkbox"/>
parameter_57	k35r		0.100		<input checked="" type="checkbox"/>
parameter_58	k36		$5 \cdot 10^{-4}$		<input checked="" type="checkbox"/>
parameter_59	k37		$6 \cdot 10^{-4}$		<input checked="" type="checkbox"/>
parameter_60	k38		0.003		<input checked="" type="checkbox"/>
parameter_61	k39f		6.000		<input checked="" type="checkbox"/>
parameter_62	k39r		0.060		<input checked="" type="checkbox"/>
parameter_63	k40f		0.010		<input checked="" type="checkbox"/>
parameter_64	k40r		0.550		<input checked="" type="checkbox"/>
parameter_65	k41f		0.010		<input checked="" type="checkbox"/>
parameter_66	k41r		0.021		<input checked="" type="checkbox"/>
parameter_67	k42f		0.015		<input checked="" type="checkbox"/>
parameter_68	k42r		1.300		<input checked="" type="checkbox"/>
parameter_69	k43f		0.500		<input checked="" type="checkbox"/>
parameter_70	k43r		10^{-4}		<input checked="" type="checkbox"/>
parameter_71	k44f		0.001		<input checked="" type="checkbox"/>
parameter_72	k44r		0.005		<input checked="" type="checkbox"/>
parameter_73	k45f		1.000		<input checked="" type="checkbox"/>
parameter_74	k45r		$7 \cdot 10^{-4}$		<input checked="" type="checkbox"/>
parameter_75	k46f		0.008		<input checked="" type="checkbox"/>
parameter_76	k46r		0.400		<input checked="" type="checkbox"/>
parameter_77	k47f		0.023		<input checked="" type="checkbox"/>
parameter_78	k47r		$2.2 \cdot 10^{-4}$		<input checked="" type="checkbox"/>
parameter_79	k48f		0.470		<input checked="" type="checkbox"/>
parameter_80	k48r		$2.45 \cdot 10^{-4}$		<input checked="" type="checkbox"/>
parameter_81	k49f		0.300		<input checked="" type="checkbox"/>
parameter_82	k49r		0.021		<input checked="" type="checkbox"/>
parameter_83	k50f		0.002		<input checked="" type="checkbox"/>
parameter_84	k50r		0.005		<input checked="" type="checkbox"/>
parameter_85	k51f		1.700		<input checked="" type="checkbox"/>
parameter_86	k51r		340.000		<input checked="" type="checkbox"/>
parameter_87	k52f		0.300		<input checked="" type="checkbox"/>
parameter_88	k52r		$9 \cdot 10^{-4}$		<input checked="" type="checkbox"/>
parameter_89	k53f		0.010		<input checked="" type="checkbox"/>
parameter_90	k53r		0.550		<input checked="" type="checkbox"/>
parameter_91	k54f		0.300		<input checked="" type="checkbox"/>

Id	Name	SBO	Value	Unit	Constant
parameter_92	k54r		$9 \cdot 10^{-4}$		✓
parameter_93	k55f		0.030		✓
parameter_94	k55r		0.064		✓
parameter_95	k56f		0.030		✓
parameter_96	k56r		0.043		✓
parameter_97	k57f		0.072		✓
parameter_98	k57r		0.200		✓
parameter_99	k58		1.000		✓
parameter- _100	k59f		0.011		✓
parameter- _101	k59r		0.002		✓
parameter- _102	k60		3.500		✓
parameter- _103	k61f		0.011		✓
parameter- _104	k61r		0.002		✓
parameter- _105	k62		2.900		✓
parameter- _106	k63f		0.014		✓
parameter- _107	k63r		0.800		✓
parameter- _108	k64		0.058		✓
parameter- _109	k65f		$2.5 \cdot 10^{-4}$		✓
parameter- _110	k65r		0.500		✓
parameter- _111	k66		0.058		✓
parameter- _112	k67f		$1.1 \cdot 10^{-4}$		✓
parameter- _113	k67r		0.033		✓
parameter- _114	k68		16.000		✓
parameter- _115	k69f		$1.1 \cdot 10^{-4}$		✓
parameter- _116	k69r		0.033		✓

Id	Name	SBO	Value	Unit	Constant
parameter-_117	k70		6.700		✓
parameter-_118	k71f		0.014		✓
parameter-_119	k71r		0.600		✓
parameter-_120	k72		0.270		✓
parameter-_121	k73f		0.005		✓
parameter-_122	k73r		0.500		✓
parameter-_123	k74		0.300		✓
parameter-_124	k75f		0.234		✓
parameter-_125	k75r		20000.000		✓
parameter-_126	k76		0.039		✓
parameter-_127	k77f		0.985		✓
parameter-_128	k77r		$9 \cdot 10^{-4}$		✓
parameter-_129	kf1		0.100		✓
parameter-_130	kb1		0.050		✓
parameter-_131	kf2		0.020		✓
parameter-_132	kb2		0.020		✓
parameter-_133	kf3		0.040		✓
parameter-_134	kb3		0.200		✓
parameter-_135	kf4		0.005		✓
parameter-_136	kf5		0.008		✓
parameter-_137	kb5		0.800		✓

Id	Name	SBO	Value	Unit	Constant
parameter- _138	kf6		0.400		✓
parameter- _139	kf7		0.005		✓
parameter- _140	kb7		0.500		✓
parameter- _141	kf8		0.020		✓
parameter- _142	kb8		0.100		✓
parameter- _143	kf9		0.001		✓
parameter- _144	kb9		0.200		✓
parameter- _145	kf10		0.003		✓
parameter- _146	kf11		0.001		✓
parameter- _147	kb11		0.200		✓
parameter- _148	kf12		0.003		✓
parameter- _149	kf13		$2 \cdot 10^{-7}$		✓
parameter- _150	kb13		0.200		✓
parameter- _151	kf14		0.005		✓
parameter- _152	kf15		0.001		✓
parameter- _153	kb15		0.200		✓
parameter- _154	kf17		0.050		✓
parameter- _155	kf16		0.005		✓
parameter- _156	k18a		0.010		✓
parameter- _157	k18b		400.000		✓
parameter- _158	kf19		0.001		✓

Id	Name	SBO	Value	Unit	Constant
parameter- _159	kf20		0.010		✓
parameter- _160	kf21		0.020		✓
parameter- _161	kb21		0.100		✓
parameter- _162	kf22		$5 \cdot 10^{-4}$		✓
parameter- _163	kf23		$5 \cdot 10^{-4}$		✓
parameter- _164	kf24		0.001		✓
parameter- _165	kb24		0.200		✓
parameter- _166	kf25		0.003		✓
parameter- _167	kf26		0.005		✓
parameter- _168	kb26		0.500		✓
parameter- _169	kf27		0.001		✓
parameter- _170	kb27		0.200		✓
parameter- _171	kf28		0.005		✓
parameter- _172	kf29		$2 \cdot 10^{-7}$		✓
parameter- _173	kb29		0.200		✓
parameter- _174	kf30		0.008		✓
parameter- _175	kb30		0.800		✓
parameter- _176	kf31		0.001		✓
parameter- _177	kb31		0.200		✓
parameter- _178	kf32		0.003		✓
parameter- _179	kf33		$5 \cdot 10^{-4}$		✓

Id	Name	SBO	Value	Unit	Constant
parameter- _221	n_kf1		0.001		✓
parameter- _222	n_kr1		7.999		✓
parameter- _223	n_k2		4.000		✓
parameter- _224	n_kf3		$5.09534 \cdot 10^{-4}$		✓
parameter- _225	n_kr3		4.983		✓
parameter- _226	n_kf4		0.002		✓
parameter- _227	n_kr4		7.995		✓
parameter- _228	n_k5		4.000		✓
parameter- _229	n_kf6		$5.01092 \cdot 10^{-4}$		✓
parameter- _230	n_kr6		4.992		✓
parameter- _231	n_kf7		0.001		✓
parameter- _232	n_kr7		400.000		✓
parameter- _233	n_kf8		0.020		✓
parameter- _234	n_kr8		0.100		✓
parameter- _235	n_kf9		0.020		✓
parameter- _236	n_kr9		0.100		✓
parameter- _237	n_k10		0.005		✓
parameter- _238	n_kf11		0.001		✓
parameter- _239	n_kr11		0.200		✓
parameter- _240	n_kf12		0.001		✓
parameter- _241	n_kr12		0.200		✓

Id	Name	SBO	Value	Unit	Constant
parameter- _242	n.k13		0.002		✓
parameter- _243	n.k14		0.002		✓
parameter- _244	n.k15		0.003		✓
parameter- _245	n.k16		0.003		✓

6 Function definitions

This is an overview of eleven function definitions.

6.1 Function definition [function_3](#)

Name Henri-Michaelis-Menten (irreversible)

Arguments substrate, Km, V

Mathematical Expression

$$\frac{V \cdot \text{substrate}}{Km + \text{substrate}} \quad (1)$$

6.2 Function definition [function_2](#)

Name function_4_reaction-34

Arguments parameter_55, [species_31]

Mathematical Expression

$$\text{parameter_55} \cdot [\text{species_31}] \quad (2)$$

6.3 Function definition [function_1](#)

Name function_4_reaction-32

Arguments parameter_52, parameter_53, [species_23]

Mathematical Expression

$$\frac{\text{parameter_52} \cdot [\text{species_23}]}{\text{parameter_53} + [\text{species_23}]} \quad (3)$$

6.4 Function definition [function_4](#)

Name function_4_reaction-v15

Arguments $\text{vol}(c2)$, parameter_152, parameter_153, [species_24], [species_94], [species_95]

Mathematical Expression

$$\text{vol}(c2) \cdot (\text{parameter_152} \cdot [\text{species_24}] \cdot [\text{species_95}] - \text{parameter_153} \cdot [\text{species_94}]) \quad (4)$$

6.5 Function definition [function_5](#)

Name function_4_reaction-v16

Arguments $\text{vol}(c2)$, parameter_155, [species_94]

Mathematical Expression

$$\text{vol}(c2) \cdot \text{parameter_155} \cdot [\text{species_94}] \quad (5)$$

6.6 Function definition [function_6](#)

Name function_4_reaction-v18

Arguments parameter_156, parameter_157, [species_92]

Mathematical Expression

$$\frac{\text{parameter_156} \cdot [\text{species_92}]}{\text{parameter_157} + [\text{species_92}]} \quad (6)$$

6.7 Function definition [function_7](#)

Name function_4_reaction-v20

Arguments parameter_159, [species_98]

Mathematical Expression

$$\text{parameter_159} \cdot [\text{species_98}] \quad (7)$$

6.8 Function definition [function_8](#)

Name function_4_reaction-v27

Arguments $\text{vol}(c2)$, parameter_169, parameter_170, [species_102], [species_24], [species_92]

Mathematical Expression

$$\text{vol}(c2) \cdot (\text{parameter_169} \cdot [\text{species_24}] \cdot [\text{species_92}] - \text{parameter_170} \cdot [\text{species_102}]) \quad (8)$$

6.9 Function definition `function_9`

Name `function_4_reaction-v28`

Arguments `vol(c2)`, `parameter_171`, `[species_102]`

Mathematical Expression

$$\text{vol}(c2) \cdot \text{parameter_171} \cdot [\text{species_102}] \quad (9)$$

6.10 Function definition `function_4_reaction_n7_1`

Name `function_4_reaction_n7_1`

Arguments `parameter_231`, `parameter_232`, `[species_92]`

Mathematical Expression

$$\frac{\text{parameter_231} \cdot [\text{species_92}]}{\text{parameter_232} + [\text{species_92}]} \quad (10)$$

6.11 Function definition `function_activation`

Name `function_activation`

Arguments `v`, `a`, `b`, `k`

Mathematical Expression

$$\frac{v \cdot a \cdot b}{b + k} \quad (11)$$

7 Rules

This is an overview of two rules.

7.1 Rule `s137`

Rule `s137` is an assignment rule for species `s137`:

$$\begin{aligned} s137 = & [\text{s119}] + [\text{species_13}] + [\text{s135}] + 2 \cdot [\text{species_22}] + [\text{species_21}] + [\text{s126}] \\ & + 2 \cdot [\text{species_25}] + [\text{species_27}] + [\text{s120}] + [\text{s122}] + 2 \cdot [\text{species_14}] \\ & + [\text{species_12}] + [\text{species_18}] + 2 \cdot [\text{species_23}] + [\text{species_26}] + [\text{species_29}] \end{aligned} \quad (12)$$

7.2 Rule s136

Rule s136 is an assignment rule for species s136:

$$\begin{aligned} s136 = & [\text{species_86}] + 2 \cdot [\text{species_101}] + [s135] + [\text{species_90}] + 2 \cdot [\text{species_102}] + [s126] \\ & + [\text{species_94}] + 2 \cdot [\text{species_87}] + [s120] + [\text{species_85}] + [\text{species_91}] \\ & + 2 \cdot [\text{species_92}] + [s122] + [\text{species_95}] + [\text{species_103}] + [s139] \end{aligned} \tag{13}$$

8 Reactions

This model contains 119 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

Nº	Id	Name	Reaction Equation	SBO
1	re160	reaciton-2	$s140 + \text{species_4} \xrightleftharpoons[\text{species_6}]{s140, \text{species_4}, \text{species_6}}$	
2	reaction_1	reaction-1	$\text{species_2} + \text{species_1} \xrightleftharpoons[\text{species_3}]{\text{species_2}, \text{species_1}, \text{species_3}}$	
3	reaction_8	reaction-10	$\text{species_9} + \text{species_12} \xrightleftharpoons[\text{species_13}]{\text{species_9}, \text{species_12}, \text{species_13}}$	
4	reaction_9	reaction-16	$2 \text{ species_12} \xrightleftharpoons[\text{species_14}]{\text{species_12}, \text{species_14}}$	
5	re138	reaction-17	$\text{species_9} + \text{species_108} \xrightleftharpoons[\text{species_16}]{\text{species_9}, \text{species_108}, \text{species_16}}$	
6	re137	reaction-18	$\text{species_16} \xrightarrow[\text{species_8} + \text{species_108}]{\text{species_16}}$	
7	reaction_12	reaction-19	$\text{species_12} + \text{species_20} \xrightleftharpoons[\text{species_21}]{\text{species_12}, \text{species_20}, \text{species_21}}$	
8	reaction_14	reaction-20	$\text{species_21} \xrightarrow[\text{species_11} + \text{species_20}]{\text{species_21}}$	
9	reaction_13	reaction-21	$\text{species_14} + \text{species_20} \xrightleftharpoons[\text{species_22}]{\text{species_14}, \text{species_20}, \text{species_22}}$	
10	reaction_15	reaction-22	$\text{species_22} \xrightarrow[\text{species_18} + \text{species_20}]{\text{species_22}}$	
11	reaction_16	reaction-23	$\text{species_11} + \text{species_12} \xrightleftharpoons[\text{species_18}]{\text{species_11}, \text{species_12}, \text{species_18}}$	
12	reaction_17	reaction-24	$\text{species_14} \xrightarrow[\text{species_23}]{\text{species_14}}$	
13	reaction_65	reaction-25	$\text{species_23} \xrightleftharpoons[2 \text{ species_26}]{\text{species_23}, \text{species_26}}$	
14	reaction_19	reaction-26	$\text{species_24} + \text{species_26} \xrightleftharpoons[\text{species_27}]{\text{species_24}, \text{species_26}, \text{species_27}}$	
15	reaction_20	reaction-27	$\text{species_27} \xrightarrow[\text{species_28} + \text{species_24}]{\text{species_27}}$	

Nº	Id	Name	Reaction Equation	SBO
16	reaction_18	reaction-28	$\text{species_24} + \text{species_23} \xrightleftharpoons{\text{species_24, species_23, species_25}} \text{species_25}$	
17	reaction_21	reaction-29	$\text{species_25} \xrightarrow{\text{species_25}} \text{species_24} + \text{species_29}$	
18	reaction_3	reaction-3	$\text{species_3} + \text{species_6} \xrightleftharpoons{\text{species_3, species_6, species_7}} \text{species_7}$	
19	reaction_66	reaction-30	$\text{species_29} \xrightleftharpoons{\text{species_29, species_26, species_28}} \text{species_26} + \text{species_28}$	
20	reaction_22	reaction-31	$\text{species_28} \xrightarrow{\text{species_28}} \text{species_11}$	
21	reaction_23	reaction-32	$\emptyset \xrightarrow{\text{species_23, species_23}} \text{species_30}$	
22	reaction_24	reaction-33	$\text{species_30} \xrightarrow{\text{species_30}} \text{species_31}$	
23	reaction_25	reaction-34	$\emptyset \xrightarrow{\text{species_31, species_31}} \text{species_19}$	
24	reaction_26	reaction-35	$\text{species_9} + \text{species_19} \xrightleftharpoons{\text{species_9, species_19, species_15}} \text{species_15}$	
25	reaction_27	reaction-36	$\text{species_31} \xrightarrow{\text{species_31}} \emptyset$	
26	reaction_28	reaction-37	$\text{species_19} \xrightarrow{\text{species_19}} \emptyset$	
27	reaction_73	reaction-38	$\text{species_15} \xrightarrow{\text{species_15}} \text{species_8} + \text{species_19}$	
28	reaction_39	reaction-39	$\text{species_16} \xrightleftharpoons{\text{species_16, species_33}} \text{species_33}$	
29	reaction_29	reaction-40	$\text{species_33} + \text{species_32} \xrightleftharpoons{\text{species_33, species_32, species_34}} \text{species_34}$	
30	reaction_30	reaction-41	$\text{species_35} + \text{species_34} \xrightleftharpoons{\text{species_35, species_34, species_37}} \text{species_37}$	
31	reaction_31	reaction-42	$\text{species_38} + \text{species_37} \xrightleftharpoons{\text{species_38, species_37, species_39}} \text{species_39}$	
32	reaction_32	reaction-43	$\text{species_39} \xrightleftharpoons{\text{species_39, species_40, species_37}} \text{species_40} + \text{species_37}$	

Nº	Id	Name	Reaction Equation	SBO
33	reaction_33	reaction-44	$\text{species_40} + \text{species_41} \xrightleftharpoons{\text{species_40, species_41, species_42}} \text{species_42}$	
34	reaction_34	reaction-45	$\text{species_42} \xrightleftharpoons{\text{species_42, species_43, species_44}} \text{species_43} + \text{species_44}$	
35	reaction_35	reaction-46	$\text{species_37} + \text{species_43} \xrightleftharpoons{\text{species_37, species_43, species_45}} \text{species_45}$	
36	reaction_36	reaction-47	$\text{species_45} \xrightleftharpoons{\text{species_45, species_37, species_38}} \text{species_37} + \text{species_38}$	
37	reaction_37	reaction-48	$\text{species_37} \xrightleftharpoons{\text{species_37, species_46, species_9}} \text{species_46} + \text{species_9}$	
38	reaction_38	reaction-49	$\text{species_46} \xrightleftharpoons{\text{species_46, species_47, species_48}} \text{species_47} + \text{species_48}$	
39	reaction_40	reaction-50	$\text{species_47} \xrightleftharpoons{\text{species_47, species_32, species_35}} \text{species_32} + \text{species_35}$	
40	re136	reaction-51	$\text{species_48} \xrightarrow{\text{species_48}} \text{species_108}$	
41	reaction_42	reaction-52	$\text{species_33} \xrightleftharpoons{\text{species_33, species_9, species_48}} \text{species_9} + \text{species_48}$	
42	reaction_43	reaction-53	$\text{species_32} + \text{species_48} \xrightleftharpoons{\text{species_32, species_48, species_36}} \text{species_36}$	
43	reaction_44	reaction-54	$\text{species_34} \xrightleftharpoons{\text{species_34, species_9, species_36}} \text{species_9} + \text{species_36}$	
44	reaction_45	reaction-55	$\text{species_35} + \text{species_36} \xrightleftharpoons{\text{species_35, species_36, species_46}} \text{species_46}$	
45	reaction_46	reaction-56	$\text{species_33} + \text{species_47} \xrightleftharpoons{\text{species_33, species_47, species_37}} \text{species_37}$	
46	reaction_47	reaction-57	$\text{species_49} + \text{species_44} \xrightleftharpoons{\text{species_49, species_44, species_50}} \text{species_50}$	

Nº	Id	Name	Reaction Equation	SBO
47	reaction_48	reaction-58	$\text{species_50} \xrightarrow{\text{species_50}} \text{species_41} + \text{species_49}$	
48	reaction_49	reaction-59	$\text{species_44} + \text{species_51} \xrightleftharpoons{\text{species_44, species_51, species_52}} \text{species_52}$	
49	reaction_5	reaction-6	$2 \text{ species_7} \xrightleftharpoons{\text{species_7, species_8}} \text{species_8}$	
50	reaction_50	reaction-60	$\text{species_52} \xrightarrow{\text{species_52}} \text{species_53} + \text{species_44}$	
51	reaction_51	reaction-61	$\text{species_44} + \text{species_53} \xrightleftharpoons{\text{species_44, species_53, species_54}} \text{species_54}$	
52	reaction_52	reaction-62	$\text{species_54} \xrightarrow{\text{species_54}} \text{species_55} + \text{species_44}$	
53	reaction_53	reaction-63	$\text{species_55} + \text{species_57} \xrightleftharpoons{\text{species_55, species_57, species_56}} \text{species_56}$	
54	reaction_54	reaction-64	$\text{species_56} \xrightarrow{\text{species_56}} \text{species_57} + \text{species_53}$	
55	reaction_55	reaction-65	$\text{species_53} + \text{species_57} \xrightleftharpoons{\text{species_53, species_57, species_58}} \text{species_58}$	
56	reaction_56	reaction-66	$\text{species_58} \xrightarrow{\text{species_58}} \text{species_57} + \text{species_51}$	
57	reaction_57	reaction-67	$\text{species_55} + \text{species_59} \xrightleftharpoons{\text{species_55, species_59, species_60}} \text{species_60}$	
58	reaction_58	reaction-68	$\text{species_60} \xrightarrow{\text{species_60}} \text{species_61} + \text{species_55}$	
59	reaction_59	reaction-69	$\text{species_55} + \text{species_61} \xrightleftharpoons{\text{species_55, species_61, species_62}} \text{species_62}$	
60	reaction_6	reaction-7	$\text{species_8} \xrightarrow{\text{species_8}} \text{species_9}$	
61	reaction_60	reaction-70	$\text{species_62} \xrightarrow{\text{species_62}} \text{species_63} + \text{species_55}$	
62	reaction_64	reaction-71	$\text{species_63} + \text{species_64} \xrightleftharpoons{\text{species_63, species_64, species_65}} \text{species_65}$	
63	reaction_61	reaction-72	$\text{species_65} \xrightarrow{\text{species_65}} \text{species_64} + \text{species_61}$	
64	reaction_62	reaction-73	$\text{species_61} + \text{species_64} \xrightleftharpoons{\text{species_61, species_64, species_66}} \text{species_66}$	
65	reaction_63	reaction-74	$\text{species_66} \xrightarrow{\text{species_66}} \text{species_64} + \text{species_59}$	

Nº	Id	Name	Reaction Equation	SBO
66	reaction_74	reaction-75	$\text{species_74} \xrightarrow{\text{species_63, species_63, species_74}} \text{species_75}$	
67	reaction_75	reaction-76	$\text{species_75} \xrightarrow{\text{species_75}} \text{species_74}$	
68	reaction_76	reaction-77	$2 \text{ species_75} \xrightleftharpoons{\text{species_75, species_76}} \text{species_76}$	
69	reaction_4	reaction-8	$\text{species_9} + \text{species_11} \xrightleftharpoons{\text{species_9, species_11, species_10}} \text{species_10}$	
70	reaction_7	reaction-9	$\text{species_10} \xrightarrow{\text{species_10}} \text{species_9} + \text{species_12}$	
71	re135	reaction-v1	$\text{species_5} + \text{species_107} \xrightleftharpoons{\text{species_5, species_107, species_78}} \text{species_78}$	
72	reaction_87	reaction-v10	$\text{species_88} \xrightarrow{\text{species_88}} \text{species_81} + \text{species_108}$	
73	re140	reaction-v11	$\text{species_85} + \text{species_20} \xrightleftharpoons{\text{species_85, species_20, species_90}} \text{species_90}$	
74	re141	reaction-v12	$\text{species_90} \xrightarrow{\text{species_90}} \text{species_84} + \text{species_20}$	
75	reaction_90	reaction-v13	$\text{species_84} + \text{species_85} \xrightleftharpoons{\text{species_84, species_85, species_91}} \text{species_91}$	
76	reaction_91	reaction-v14	$\text{species_87} \xrightarrow{\text{species_87}} \text{species_92}$	
77	re144	reaction-v15	$\text{species_95} + \text{species_24} \xrightleftharpoons{\text{species_24, species_94, species_95}} \text{species_94}$	
78	re145	reaction-v16	$\text{species_94} \xrightarrow{\text{species_94}} \text{species_96} + \text{species_24}$	
79	reaction_94	reaction-v17	$\text{species_96} \xrightarrow{\text{species_96}} \text{species_84}$	
80	reaction_95	reaction-v18	$\emptyset \xrightarrow{\text{species_92, species_92}} \text{species_97}$	
81	reaction_96	reaction-v19	$\text{species_97} \xrightarrow{\text{species_97}} \text{species_98}$	
82	reaction_80	reaction-v2	$\text{species_79} + \text{species_78} \xrightleftharpoons{\text{species_79, species_78, species_80}} \text{species_80}$	
83	reaction_97	reaction-v20	$\emptyset \xrightarrow{\text{species_98, species_98}} \text{species_99}$	
84	reaction_98	reaction-v21	$\text{species_99} + \text{species_82} \xrightleftharpoons{\text{species_99, species_82, species_100}} \text{species_100}$	

Nº	Id	Name	Reaction Equation	SBO
85	reaction_99	reaction-v22	$\text{species_98} \xrightarrow{\text{species_98}} \emptyset$	
86	reaction_100	reaction-v23	$\text{species_99} \xrightarrow{\text{species_99}} \emptyset$	
87	re142	reaction-v24	$\text{species_87} + \text{species_20} \xrightleftharpoons{\text{species_87, species_20, species_101}} \text{species_101}$	
88	re143	reaction-v25	$\text{species_101} \xrightarrow{\text{species_101}} \text{species_91} + \text{species_20}$	
89	reaction_103	reaction-v26	$2 \text{ species_95} \xrightleftharpoons{\text{species_95, species_92}} \text{species_92}$	
90	re147	reaction-v27	$\text{species_92} + \text{species_24} \xrightleftharpoons{\text{species_102, species_24, species_92}} \text{species_102}$	
91	re148	reaction-v28	$\text{species_102} \xrightarrow{\text{species_102}} \text{species_103} + \text{species_24}$	
92	reaction_106	reaction-v29	$\text{species_96} + \text{species_95} \xrightleftharpoons{\text{species_96, species_95, species_103}} \text{species_103}$	
93	reaction_79	reaction-v3	$2 \text{ species_80} \xrightleftharpoons{\text{species_80, species_81}} \text{species_81}$	
94	reaction_107	reaction-v30	$\text{species_84} + \text{species_100} \xrightleftharpoons{\text{species_84, species_100, species_104}} \text{species_104}$	
95	reaction_110	reaction-v31	$\text{species_108} + \text{species_104} \xrightleftharpoons{\text{species_108, species_104, species_105}} \text{species_105}$	
96	reaction_108	reaction-v32	$\text{species_105} \xrightarrow{\text{species_105}} \text{species_99} + \text{species_81} + \text{species_84} + \text{species_108}$	
97	reaction_109	reaction-v33	$\text{species_105} \xrightarrow{\text{species_105}} \text{species_99} + \text{species_106}$	
98	reaction_81	reaction-v4	$\text{species_81} \xrightarrow{\text{species_81}} \text{species_82}$	
99	reaction_82	reaction-v5	$\text{species_82} + \text{species_84} \xrightleftharpoons{\text{species_82, species_84, species_83}} \text{species_83}$	
100	reaction_83	reaction-v6	$\text{species_83} \xrightarrow{\text{species_83}} \text{species_82} + \text{species_85}$	
101	reaction_84	reaction-v7	$\text{species_82} + \text{species_85} \xrightleftharpoons{\text{species_82, species_85, species_86}} \text{species_86}$	
102	reaction_85	reaction-v8	$2 \text{ species_85} \xrightleftharpoons{\text{species_85, species_87}} \text{species_87}$	

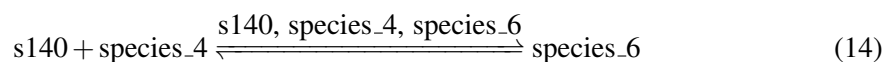
Nº	Id	Name	Reaction Equation	SBO
103	reaction_86	reaction-v9	$\text{species_82} + \text{species_108} \xrightleftharpoons{\text{species_82, species_108, species_88}} \text{species_88}$	
104	re112	reaction_n1	$\text{species_82} + \text{species_11} \xrightleftharpoons{\text{species_82, species_11, s118}} \text{s118}$	
105	re117	reaction_n10	$\text{s120} \xrightarrow{\text{s120}} \text{s122}$	
106	re153	reaction_n11	$\text{species_20} + \text{s120} \xrightleftharpoons{\text{species_20, s120, s135}} \text{s135}$	
107	re126	reaction_n12	$\text{s122} + \text{species_24} \xrightleftharpoons{\text{s122, species_24, s126}} \text{s126}$	
108	re113	reaction_n2	$\text{s118} \xrightarrow{\text{s118}} \text{species_12} + \text{species_82}$	
109	re114	reaction_n3	$\text{species_12} + \text{species_82} \xrightleftharpoons{\text{species_12, species_82, s119}} \text{s119}$	
110	re157	reaction_n4	$\text{species_9} + \text{species_84} \xrightleftharpoons{\text{species_9, species_84, s138}} \text{s138}$	
111	re158	reaction_n5	$\text{s138} \xrightarrow{\text{s138}} \text{species_9} + \text{species_85}$	
112	re159	reaction_n6	$\text{species_85} + \text{species_9} \xrightleftharpoons{\text{species_85, species_9, s139}} \text{s139}$	
113	re116	reaction_n7	$\emptyset \xrightarrow{\text{species_92, species_92}} \text{species_30}$	
114	re115	reaction_n8	$\text{species_12} + \text{species_85} \xrightleftharpoons{\text{species_12, species_85, s120}} \text{s120}$	
115	re121	reaction_n9	$\text{species_26} + \text{species_95} \xrightleftharpoons{\text{species_26, species_95, s122}} \text{s122}$	
116	re161	reaction_n13	$\text{s135} \xrightarrow{\text{s135}} \text{species_20} + \text{species_12} + \text{species_84}$	
117	re162	reaction_n14	$\text{s135} \xrightarrow{\text{s135}} \text{species_85} + \text{species_11} + \text{species_20}$	
118	re163	reaction_n15	$\text{s126} \xrightarrow{\text{s126}} \text{species_26} + \text{species_24} + \text{species_96}$	
119	re164	reaction_n16	$\text{s126} \xrightarrow{\text{s126}} \text{species_95} + \text{species_28} + \text{species_24}$	

8.1 Reaction `re160`

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

Name `reaciton-2`

Reaction equation



Reactants

Table 6: Properties of each reactant.

Id	Name	SBO
s140	JAK(IL-6)	
species_4	gp130	

Modifiers

Table 7: Properties of each modifier.

Id	Name	SBO
s140	JAK(IL-6)	
species_4	gp130	
species_6	gp130-JAK	

Product

Table 8: Properties of each product.

Id	Name	SBO
species_6	gp130-JAK	

Kinetic Law

Derived unit `contains undeclared units`

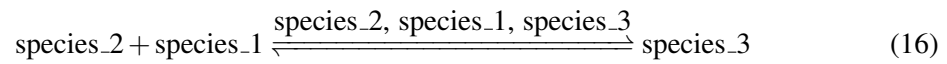
$$v_1 = \text{vol}(\text{compartment_1}) \cdot (\text{parameter_3} \cdot [\text{s140}] \cdot [\text{species_4}] - \text{parameter_4} \cdot [\text{species_6}]) \quad (15)$$

8.2 Reaction `reaction_1`

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

Name reaction-1

Reaction equation



Reactants

Table 9: Properties of each reactant.

Id	Name	SBO
species_2	gp80	
species_1	IL6	

Modifiers

Table 10: Properties of each modifier.

Id	Name	SBO
species_2	gp80	
species_1	IL6	
species_3	IL6-gp80	

Product

Table 11: Properties of each product.

Id	Name	SBO
species_3	IL6-gp80	

Kinetic Law

Derived unit contains undeclared units

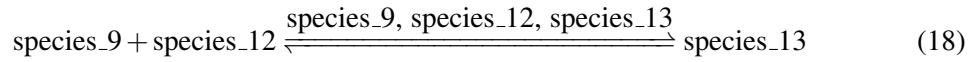
$$v_2 = \text{parameter_1} \cdot [\text{species_2}] \cdot [\text{species_1}] - \text{parameter_2} \cdot [\text{species_3}] \quad (17)$$

8.3 Reaction reaction_8

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

Name reaction-10

Reaction equation



Reactants

Table 12: Properties of each reactant.

Id	Name	SBO
species_9	(IL6-gp80-gp130-JAK)2*	
species_12	STAT3C*	

Modifiers

Table 13: Properties of each modifier.

Id	Name	SBO
species_9	(IL6-gp80-gp130-JAK)2*	
species_12	STAT3C*	
species_13	(IL6-gp80-gp130-JAK)2*-STAT3C*	

Product

Table 14: Properties of each product.

Id	Name	SBO
species_13	(IL6-gp80-gp130-JAK)2*-STAT3C*	

Kinetic Law

Derived unit contains undeclared units

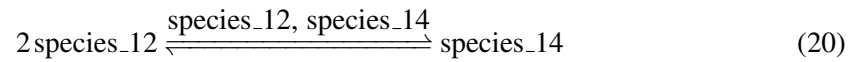
$$v_3 = \text{vol}(\text{compartment_1}) \cdot (\text{parameter_17} \cdot [\text{species_9}] \cdot [\text{species_12}] - \text{parameter_18} \cdot [\text{species_13}]) \quad (19)$$

8.4 Reaction `reaction_9`

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

Name reaction-16

Reaction equation



Reactant

Table 15: Properties of each reactant.

Id	Name	SBO
species_12	STAT3C*	

Modifiers

Table 16: Properties of each modifier.

Id	Name	SBO
species_12	STAT3C*	
species_14	(STAT3C*)2	

Product

Table 17: Properties of each product.

Id	Name	SBO
species_14	(STAT3C*)2	

Kinetic Law

Derived unit contains undeclared units

$$v_4 = \text{vol}(\text{compartment_1}) \cdot (\text{parameter_27} \cdot [\text{species_12}]^2 - \text{parameter_28} \cdot [\text{species_14}]) \quad (21)$$

8.5 Reaction re138

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

Name reaction-17

Reaction equation



Reactants

Table 18: Properties of each reactant.

Id	Name	SBO
species_9	(IL6-gp80-gp130-JAK)2*	
species_108	SHP2	

Modifiers

Table 19: Properties of each modifier.

Id	Name	SBO
species_9	(IL6-gp80-gp130-JAK)2*	
species_108	SHP2	
species_16	(IL6-gp80-gp130-JAK)2*-SHP2	

Product

Table 20: Properties of each product.

Id	Name	SBO
species_16	(IL6-gp80-gp130-JAK)2*-SHP2	

Kinetic Law

Derived unit contains undeclared units

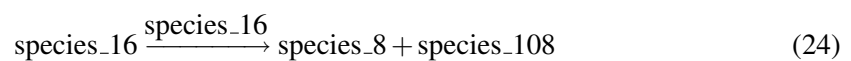
$$v_5 = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{29} \cdot [\text{species}_9] \cdot [\text{species}_{108}] - \text{parameter}_{30} \cdot [\text{species}_{16}]) \quad (23)$$

8.6 Reaction re137

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

Name reaction-18

Reaction equation



Reactant

Table 21: Properties of each reactant.

Id	Name	SBO
species_16	(IL6-gp80-gp130-JAK)2*-SHP2	

Modifier

Table 22: Properties of each modifier.

Id	Name	SBO
species_16	(IL6-gp80-gp130-JAK)2*-SHP2	

Products

Table 23: Properties of each product.

Id	Name	SBO
species_8	(IL6-gp80-gp130-JAK)2	
species_108	SHP2	

Kinetic Law

Derived unit contains undeclared units

$$v_6 = \text{vol}(\text{compartment}_1) \cdot \text{parameter}_{31} \cdot [\text{species}_{16}] \quad (25)$$

8.7 Reaction `reaction_12`

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

Name `reaction-19`

Reaction equation



Reactants

Table 24: Properties of each reactant.

Id	Name	SBO
species_12	STAT3C*	
species_20	PP1	

Modifiers

Table 25: Properties of each modifier.

Id	Name	SBO
species_12	STAT3C*	
species_20	PP1	
species_21	PP1-STAT3C*	

Product

Table 26: Properties of each product.

Id	Name	SBO
species_21	PP1-STAT3C*	

Kinetic Law

Derived unit contains undeclared units

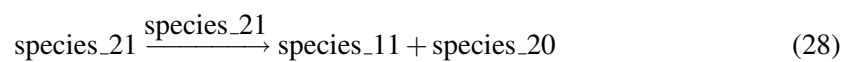
$$v_7 = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{32} \cdot [\text{species}_{12}] \cdot [\text{species}_{20}] - \text{parameter}_{33} \cdot [\text{species}_{21}]) \quad (27)$$

8.8 Reaction `reaction_14`

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

Name reaction-20

Reaction equation



Reactant

Table 27: Properties of each reactant.

Id	Name	SBO
species_21	PP1-STAT3C*	

Modifier

Table 28: Properties of each modifier.

Id	Name	SBO
species_21	PP1-STAT3C*	

Products

Table 29: Properties of each product.

Id	Name	SBO
species_11	STAT3C	
species_20	PP1	

Kinetic Law

Derived unit contains undeclared units

$$v_8 = \text{vol}(\text{compartment}_1) \cdot \text{parameter}_{34} \cdot [\text{species}_{21}] \quad (29)$$

8.9 Reaction `reaction_13`

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

Name `reaction-21`

Reaction equation



Reactants

Table 30: Properties of each reactant.

Id	Name	SBO
species_14	(STAT3C*)2	
species_20	PP1	

Modifiers

Table 31: Properties of each modifier.

Id	Name	SBO
species_14	(STAT3C*)2	
species_20	PP1	
species_22	PP1-(STAT3C*)2	

Product

Table 32: Properties of each product.

Id	Name	SBO
species_22	PP1-(STAT3C*)2	

Kinetic Law

Derived unit contains undeclared units

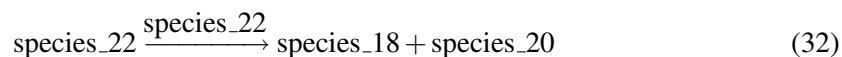
$$v_9 = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{35} \cdot [\text{species}_{14}] \cdot [\text{species}_{20}] - \text{parameter}_{36} \cdot [\text{species}_{22}]) \quad (31)$$

8.10 Reaction `reaction_15`

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

Name reaction-22

Reaction equation



Reactant

Table 33: Properties of each reactant.

Id	Name	SBO
species_22	PP1-(STAT3C*)2	

Modifier

Table 34: Properties of each modifier.

Id	Name	SBO
species_22	PP1-(STAT3C*)2	

Products

Table 35: Properties of each product.

Id	Name	SBO
species_18	STAT3C-STAT3C*	
species_20	PP1	

Kinetic Law

Derived unit contains undeclared units

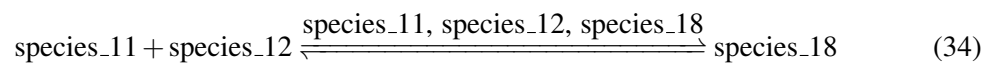
$$v_{10} = \text{vol}(\text{compartment}_1) \cdot \text{parameter}_{37} \cdot [\text{species}_{22}] \quad (33)$$

8.11 Reaction `reaction_16`

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

Name `reaction-23`

Reaction equation



Reactants

Table 36: Properties of each reactant.

Id	Name	SBO
species_11	STAT3C	
species_12	STAT3C*	

Modifiers

Table 37: Properties of each modifier.

Id	Name	SBO
species_11	STAT3C	
species_12	STAT3C*	
species_18	STAT3C-STAT3C*	

Product

Table 38: Properties of each product.

Id	Name	SBO
species_18	STAT3C-STAT3C*	

Kinetic Law

Derived unit contains undeclared units

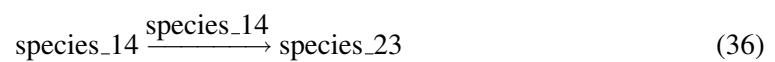
$$v_{11} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{38} \cdot [\text{species}_{11}] \cdot [\text{species}_{12}] - \text{parameter}_{39} \cdot [\text{species}_{18}]) \quad (35)$$

8.12 Reaction [reaction_17](#)

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

Name reaction-24

Reaction equation



Reactant

Table 39: Properties of each reactant.

Id	Name	SBO
species_14	(STAT3C*)2	

Modifier

Table 40: Properties of each modifier.

Id	Name	SBO
species_14	(STAT3C*)2	

Product

Table 41: Properties of each product.

Id	Name	SBO
species_23	(STAT3N*)2	

Kinetic Law

Derived unit contains undeclared units

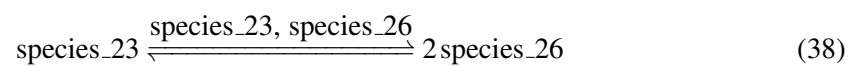
$$v_{12} = \text{parameter_40} \cdot [\text{species_14}] \quad (37)$$

8.13 Reaction [reaction_65](#)

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

Name reaction-25

Reaction equation



Reactant

Table 42: Properties of each reactant.

Id	Name	SBO
species_23	(STAT3N*)2	

Modifiers

Table 43: Properties of each modifier.

Id	Name	SBO
species_23	(STAT3N*)2	
species_26	STAT3N*	

Product

Table 44: Properties of each product.

Id	Name	SBO
species_26	STAT3N*	

Kinetic Law

Derived unit contains undeclared units

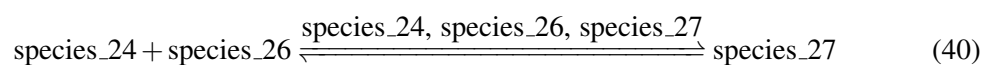
$$v_{13} = \text{vol}(c3) \cdot (\text{parameter_41} \cdot [\text{species_23}] - \text{parameter_42} \cdot [\text{species_26}]^2) \quad (39)$$

8.14 Reaction [reaction_19](#)

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

Name reaction-26

Reaction equation



Reactants

Table 45: Properties of each reactant.

Id	Name	SBO
species_24	PP2	
species_26	STAT3N*	

Modifiers

Table 46: Properties of each modifier.

Id	Name	SBO
species_24	PP2	
species_26	STAT3N*	
species_27	PP2-STAT3N*	

Product

Table 47: Properties of each product.

Id	Name	SBO
species_27	PP2-STAT3N*	

Kinetic Law

Derived unit contains undeclared units

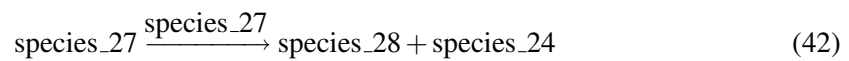
$$v_{14} = \text{vol}(c3) \cdot (\text{parameter_43} \cdot [\text{species_24}] \cdot [\text{species_26}] - \text{parameter_44} \cdot [\text{species_27}]) \quad (41)$$

8.15 Reaction `reaction_20`

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

Name reaction-27

Reaction equation



Reactant

Table 48: Properties of each reactant.

Id	Name	SBO
species_27	PP2-STAT3N*	

Modifier

Table 49: Properties of each modifier.

Id	Name	SBO
species_27	PP2-STAT3N*	

Products

Table 50: Properties of each product.

Id	Name	SBO
species_28	STAT3N	
species_24	PP2	

Kinetic Law

Derived unit contains undeclared units

$$v_{15} = \text{vol}(c3) \cdot \text{parameter_45} \cdot [\text{species_27}] \quad (43)$$

8.16 Reaction [reaction_18](#)

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

Name reaction-28

Reaction equation



Reactants

Table 51: Properties of each reactant.

Id	Name	SBO
species_24	PP2	
species_23	(STAT3N*)2	

Modifiers

Table 52: Properties of each modifier.

Id	Name	SBO
species_24	PP2	
species_23	(STAT3N*)2	
species_25	PP2-(STAT3N*)2	

Product

Table 53: Properties of each product.

Id	Name	SBO
species_25	PP2-(STAT3N*)2	

Kinetic Law

Derived unit contains undeclared units

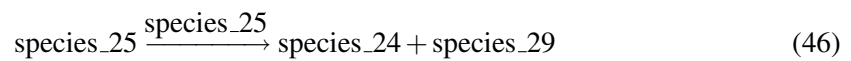
$$v_{16} = \text{vol}(c3) \cdot (\text{parameter_46} \cdot [\text{species_24}] \cdot [\text{species_23}] - \text{parameter_47} \cdot [\text{species_25}]) \quad (45)$$

8.17 Reaction [reaction_21](#)

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

Name reaction-29

Reaction equation



Reactant

Table 54: Properties of each reactant.

Id	Name	SBO
species_25	PP2-(STAT3N*)2	

Modifier

Table 55: Properties of each modifier.

Id	Name	SBO
species_25	PP2-(STAT3N*)2	

Products

Table 56: Properties of each product.

Id	Name	SBO
species_24	PP2	
species_29	STAT3N-STAT3N*	

Kinetic Law

Derived unit contains undeclared units

$$v_{17} = \text{vol}(c3) \cdot \text{parameter_48} \cdot [\text{species_25}] \quad (47)$$

8.18 Reaction `reaction_3`

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

Name reaction-3

Reaction equation



Reactants

Table 57: Properties of each reactant.

Id	Name	SBO
species_3	IL6-gp80	
species_6	gp130-JAK	

Modifiers

Table 58: Properties of each modifier.

Id	Name	SBO
species_3	IL6-gp80	
species_6	gp130-JAK	
species_7	IL6-gp80-gp130-JAK	

Product

Table 59: Properties of each product.

Id	Name	SBO
species_7	IL6-gp80-gp130-JAK	

Kinetic Law

Derived unit contains undeclared units

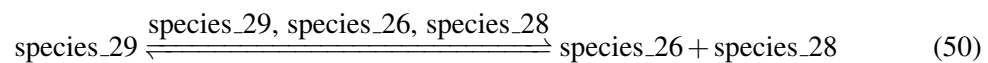
$$v_{18} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_5 \cdot [\text{species}_3] \cdot [\text{species}_6] - \text{parameter}_6 \cdot [\text{species}_7]) \quad (49)$$

8.19 Reaction [reaction_66](#)

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name reaction-30

Reaction equation



Reactant

Table 60: Properties of each reactant.

Id	Name	SBO
species_29	STAT3N-STAT3N*	

Modifiers

Table 61: Properties of each modifier.

Id	Name	SBO
species_29	STAT3N-STAT3N*	
species_26	STAT3N*	
species_28	STAT3N	

Products

Table 62: Properties of each product.

Id	Name	SBO
species_26	STAT3N*	
species_28	STAT3N	

Kinetic Law

Derived unit contains undeclared units

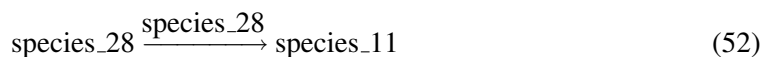
$$v_{19} = \text{vol}(c3) \cdot (\text{parameter_49} \cdot [\text{species_29}] - \text{parameter_50} \cdot [\text{species_26}] \cdot [\text{species_28}]) \quad (51)$$

8.20 Reaction [reaction_22](#)

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

Name reaction-31

Reaction equation



Reactant

Table 63: Properties of each reactant.

Id	Name	SBO
species_28	STAT3N	

Modifier

Table 64: Properties of each modifier.

Id	Name	SBO
species_28	STAT3N	

Product

Table 65: Properties of each product.

Id	Name	SBO
species_11	STAT3C	

Kinetic Law

Derived unit contains undeclared units

$$v_{20} = \text{parameter_51} \cdot [\text{species_28}] \quad (53)$$

8.21 Reaction reaction_23

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

Name reaction-32

Reaction equation



Modifiers

Table 66: Properties of each modifier.

Id	Name	SBO
species_23	(STAT3N*)2	
species_23	(STAT3N*)2	

Product

Table 67: Properties of each product.

Id	Name	SBO
species_30	mRNA-SOCS3N	

Kinetic Law

Derived unit contains undeclared units

$$v_{21} = \text{vol}(c3) \cdot \text{function_1}(\text{parameter_52}, \text{parameter_53}, [\text{species_23}]) \quad (55)$$

$$\text{function_1}(\text{parameter_52}, \text{parameter_53}, [\text{species_23}]) = \frac{\text{parameter_52} \cdot [\text{species_23}]}{\text{parameter_53} + [\text{species_23}]} \quad (56)$$

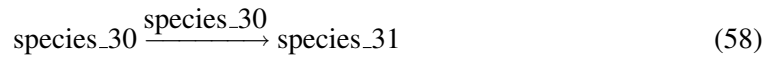
$$\text{function_1}(\text{parameter_52}, \text{parameter_53}, [\text{species_23}]) = \frac{\text{parameter_52} \cdot [\text{species_23}]}{\text{parameter_53} + [\text{species_23}]} \quad (57)$$

8.22 Reaction [reaction_24](#)

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

Name reaction-33

Reaction equation



Reactant

Table 68: Properties of each reactant.

Id	Name	SBO
species_30	mRNA-SOCS3N	

Modifier

Table 69: Properties of each modifier.

Id	Name	SBO
species_30	mRNA-SOCS3N	

Product

Table 70: Properties of each product.

Id	Name	SBO
species_31	mRNA-SOCS3C	

Kinetic Law

Derived unit contains undeclared units

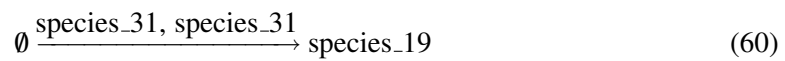
$$v_{22} = \text{parameter_54} \cdot [\text{species_30}] \quad (59)$$

8.23 Reaction [reaction_25](#)

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

Name reaction-34

Reaction equation



Modifiers

Table 71: Properties of each modifier.

Id	Name	SBO
species_31	mRNA-SOCS3C	
species_31	mRNA-SOCS3C	

Product

Table 72: Properties of each product.

Id	Name	SBO
species_19	SOCS3	

Kinetic Law

Derived unit contains undeclared units

$$v_{23} = \text{vol}(\text{compartment_1}) \cdot \text{function_2}(\text{parameter_55}, [\text{species_31}]) \quad (61)$$

$$\text{function_2}(\text{parameter_55}, [\text{species_31}]) = \text{parameter_55} \cdot [\text{species_31}] \quad (62)$$

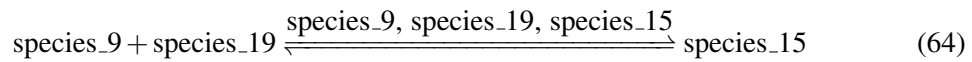
$$\text{function_2}(\text{parameter_55}, [\text{species_31}]) = \text{parameter_55} \cdot [\text{species_31}] \quad (63)$$

8.24 Reaction `reaction_26`

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

Name `reaction-35`

Reaction equation



Reactants

Table 73: Properties of each reactant.

Id	Name	SBO
<code>species_9</code>	(IL6-gp80-gp130-JAK)2*	
<code>species_19</code>	SOCS3	

Modifiers

Table 74: Properties of each modifier.

Id	Name	SBO
<code>species_9</code>	(IL6-gp80-gp130-JAK)2*	
<code>species_19</code>	SOCS3	
<code>species_15</code>	(IL6-gp80-gp130-JAK)2*-SOCS3	

Product

Table 75: Properties of each product.

Id	Name	SBO
<code>species_15</code>	(IL6-gp80-gp130-JAK)2*-SOCS3	

Kinetic Law

Derived unit contains undeclared units

$$v_{24} = \text{vol}(\text{compartment_1}) \cdot (\text{parameter_56} \cdot [\text{species_9}] \cdot [\text{species_19}] - \text{parameter_57} \cdot [\text{species_15}]) \quad (65)$$

8.25 Reaction [reaction_27](#)

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

Name reaction-36

Reaction equation



Reactant

Table 76: Properties of each reactant.

Id	Name	SBO
species_31	mRNA-SOCS3C	

Modifier

Table 77: Properties of each modifier.

Id	Name	SBO
species_31	mRNA-SOCS3C	

Kinetic Law

Derived unit contains undeclared units

$$v_{25} = \text{vol}(\text{compartment_1}) \cdot \text{parameter_58} \cdot [\text{species_31}] \quad (67)$$

8.26 Reaction [reaction_28](#)

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

Name reaction-37

Reaction equation



Reactant

Table 78: Properties of each reactant.

Id	Name	SBO
species_19	SOCS3	

Modifier

Table 79: Properties of each modifier.

Id	Name	SBO
species_19	SOCS3	

Kinetic Law

Derived unit contains undeclared units

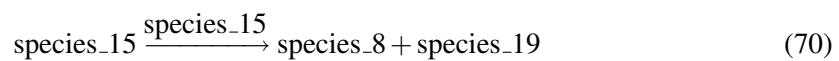
$$v_{26} = \text{vol}(\text{compartment_1}) \cdot \text{parameter_59} \cdot [\text{species_19}] \quad (69)$$

8.27 Reaction [reaction_73](#)

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

Name reaction-38

Reaction equation



Reactant

Table 80: Properties of each reactant.

Id	Name	SBO
species_15	(IL6-gp80-gp130-JAK)2*-SOCS3	

Modifier

Table 81: Properties of each modifier.

Id	Name	SBO
species_15	(IL6-gp80-gp130-JAK)2*-SOCS3	

Products

Table 82: Properties of each product.

Id	Name	SBO
species_8	(IL6-gp80-gp130-JAK)2	
species_19	SOCS3	

Kinetic Law

Derived unit contains undeclared units

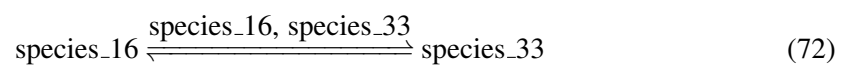
$$v_{27} = \text{vol}(\text{compartment}_1) \cdot \text{parameter}_{.60} \cdot [\text{species}_{15}] \quad (71)$$

8.28 Reaction [reaction_39](#)

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

Name reaction-39

Reaction equation



Reactant

Table 83: Properties of each reactant.

Id	Name	SBO
species_16	(IL6-gp80-gp130-JAK)2*-SHP2	

Modifiers

Table 84: Properties of each modifier.

Id	Name	SBO
species_16	(IL6-gp80-gp130-JAK)2*-SHP2	
species_33	(IL6-gp80-gp130-JAK)2*-SHP2*	

Product

Table 85: Properties of each product.

Id	Name	SBO
species_33	(IL6-gp80-gp130-JAK)2*-SHP2*	

Kinetic Law

Derived unit contains undeclared units

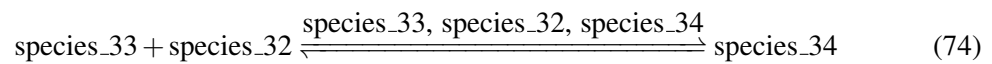
$$v_{28} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{.61} \cdot [\text{species}_{16}] - \text{parameter}_{.62} \cdot [\text{species}_{33}]) \quad (73)$$

8.29 Reaction [reaction_29](#)

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

Name reaction-40

Reaction equation



Reactants

Table 86: Properties of each reactant.

Id	Name	SBO
species_33	(IL6-gp80-gp130-JAK)2*-SHP2*	
species_32	Grb2	

Modifiers

Table 87: Properties of each modifier.

Id	Name	SBO
species_33	(IL6-gp80-gp130-JAK)2*-SHP2*	
species_32	Grb2	
species_34	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2	

Product

Table 88: Properties of each product.

Id	Name	SBO
species_34	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2	

Kinetic Law

Derived unit contains undeclared units

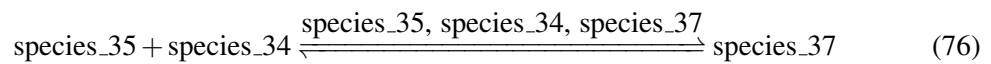
$$v_{29} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{63} \cdot [\text{species}_{33}] \cdot [\text{species}_{32}] - \text{parameter}_{64} \cdot [\text{species}_{34}]) \quad (75)$$

8.30 Reaction `reaction_30`

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

Name `reaction-41`

Reaction equation



Reactants

Table 89: Properties of each reactant.

Id	Name	SBO
species_35	SOS	
species_34	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2	

Modifiers

Table 90: Properties of each modifier.

Id	Name	SBO
species_35	SOS	
species_34	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2	
species_37	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS	

Product

Table 91: Properties of each product.

Id	Name	SBO
species_37	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS	

Kinetic Law

Derived unit contains undeclared units

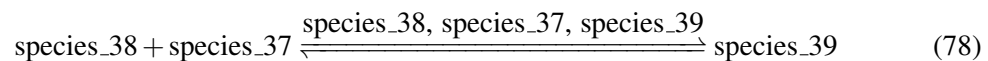
$$v_{30} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{65} \cdot [\text{species}_{35}] \cdot [\text{species}_{34}] - \text{parameter}_{66} \cdot [\text{species}_{37}]) \quad (77)$$

8.31 Reaction [reaction_31](#)

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

Name reaction-42

Reaction equation



Reactants

Table 92: Properties of each reactant.

Id	Name	SBO
species_38	Ras-GDP	
species_37	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS	

Modifiers

Table 93: Properties of each modifier.

Id	Name	SBO
species_38	Ras-GDP	
species_37	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS	
species_39	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS-Ras-GDP	

Product

Table 94: Properties of each product.

Id	Name	SBO
species_39	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS-Ras-GDP	

Kinetic Law

Derived unit contains undeclared units

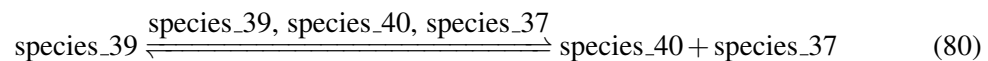
$$v_{31} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{67} \cdot [\text{species}_{38}] \cdot [\text{species}_{37}] - \text{parameter}_{68} \cdot [\text{species}_{39}]) \quad (79)$$

8.32 Reaction [reaction_32](#)

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name reaction-43

Reaction equation



Reactant

Table 95: Properties of each reactant.

Id	Name	SBO
species_39	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS-Ras-GDP	

Modifiers

Table 96: Properties of each modifier.

Id	Name	SBO
species_39	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS-Ras-GDP	
species_40	Ras-GTP	
species_37	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS	

Products

Table 97: Properties of each product.

Id	Name	SBO
species_40	Ras-GTP	
species_37	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS	

Kinetic Law

Derived unit contains undeclared units

$$v_{32} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{69} \cdot [\text{species}_{39}] - \text{parameter}_{70} \cdot [\text{species}_{40}] \cdot [\text{species}_{37}]) \quad (81)$$

8.33 Reaction [reaction_33](#)

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

Name reaction-44

Reaction equation



Reactants

Table 98: Properties of each reactant.

Id	Name	SBO
species_40	Ras-GTP	
species_41	Raf	

Modifiers

Table 99: Properties of each modifier.

Id	Name	SBO
species_40	Ras-GTP	
species_41	Raf	
species_42	Raf-Ras-GTP	

Product

Table 100: Properties of each product.

Id	Name	SBO
species_42	Raf-Ras-GTP	

Kinetic Law

Derived unit contains undeclared units

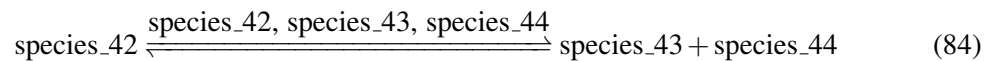
$$v_{33} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{71} \cdot [\text{species}_{40}] \cdot [\text{species}_{41}] - \text{parameter}_{72} \cdot [\text{species}_{42}]) \quad (83)$$

8.34 Reaction [reaction_34](#)

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name reaction-45

Reaction equation



Reactant

Table 101: Properties of each reactant.

Id	Name	SBO
species_42	Raf-Ras-GTP	

Modifiers

Table 102: Properties of each modifier.

Id	Name	SBO
species_42	Raf-Ras-GTP	
species_43	Ras-GTP*	
species_44	Raf*	

Products

Table 103: Properties of each product.

Id	Name	SBO
species_43	Ras-GTP*	
species_44	Raf*	

Kinetic Law

Derived unit contains undeclared units

$$v_{34} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{73} \cdot [\text{species}_{42}] - \text{parameter}_{74} \cdot [\text{species}_{43}] \cdot [\text{species}_{44}]) \quad (85)$$

8.35 Reaction [reaction_35](#)

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

Name reaction-46

Reaction equation



Reactants

Table 104: Properties of each reactant.

Id	Name	SBO
species_37	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS	
species_43	Ras-GTP*	

Modifiers

Table 105: Properties of each modifier.

Id	Name	SBO
species_37	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS	
species_43	Ras-GTP*	
species_45	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS-Ras-GTP	

Product

Table 106: Properties of each product.

Id	Name	SBO
species_45	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS-Ras-GTP	

Kinetic Law

Derived unit contains undeclared units

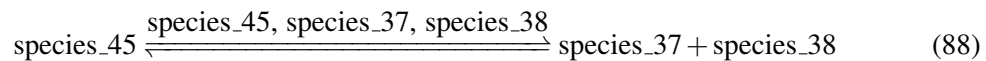
$$v_{35} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{75} \cdot [\text{species}_{37}] \cdot [\text{species}_{43}] - \text{parameter}_{76} \cdot [\text{species}_{45}]) \quad (87)$$

8.36 Reaction [reaction_36](#)

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name reaction-47

Reaction equation



Reactant

Table 107: Properties of each reactant.

Id	Name	SBO
species_45	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS-Ras-GTP	

Modifiers

Table 108: Properties of each modifier.

Id	Name	SBO
species_45	(IL6-gp80-gp130-JAK)2*.-SHP2*.-Grb2-SOS-Ras-GTP	
species_37	(IL6-gp80-gp130-JAK)2*.-SHP2*.-Grb2-SOS	
species_38	Ras-GDP	

Products

Table 109: Properties of each product.

Id	Name	SBO
species_37	(IL6-gp80-gp130-JAK)2*.-SHP2*.-Grb2-SOS	
species_38	Ras-GDP	

Kinetic Law

Derived unit contains undeclared units

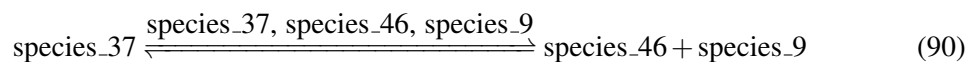
$$v_{36} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{77} \cdot [\text{species}_{45}] - \text{parameter}_{78} \cdot [\text{species}_{37}] \cdot [\text{species}_{38}]) \quad (89)$$

8.37 Reaction [reaction_37](#)

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name reaction-48

Reaction equation



Reactant

Table 110: Properties of each reactant.

Id	Name	SBO
species_37	(IL6-gp80-gp130-JAK)2*.-SHP2*.-Grb2-SOS	

Modifiers

Table 111: Properties of each modifier.

Id	Name	SBO
species_37	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS	
species_46	SHP2*-Grb2-SOS	
species_9	(IL6-gp80-gp130-JAK)2*	

Products

Table 112: Properties of each product.

Id	Name	SBO
species_46	SHP2*-Grb2-SOS	
species_9	(IL6-gp80-gp130-JAK)2*	

Kinetic Law

Derived unit contains undeclared units

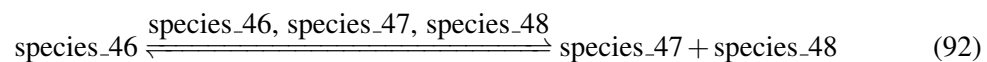
$$v_{37} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{79} \cdot [\text{species}_{37}] - \text{parameter}_{80} \cdot [\text{species}_{46}] \cdot [\text{species}_9]) \quad (91)$$

8.38 Reaction [reaction_38](#)

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name reaction-49

Reaction equation



Reactant

Table 113: Properties of each reactant.

Id	Name	SBO
species_46	SHP2*-Grb2-SOS	

Modifiers

Table 114: Properties of each modifier.

Id	Name	SBO
species_46	SHP2*-Grb2-SOS	
species_47	Grb2-SOS	
species_48	SHP2*	

Products

Table 115: Properties of each product.

Id	Name	SBO
species_47	Grb2-SOS	
species_48	SHP2*	

Kinetic Law

Derived unit contains undeclared units

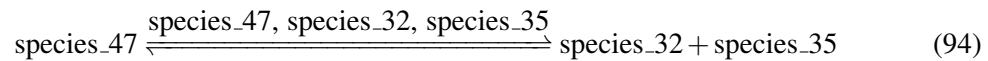
$$v_{38} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{81} \cdot [\text{species}_{46}] - \text{parameter}_{82} \cdot [\text{species}_{47}] \cdot [\text{species}_{48}]) \quad (93)$$

8.39 Reaction [reaction_40](#)

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name reaction-50

Reaction equation



Reactant

Table 116: Properties of each reactant.

Id	Name	SBO
species_47	Grb2-SOS	

Modifiers

Table 117: Properties of each modifier.

Id	Name	SBO
species_47	Grb2-SOS	
species_32	Grb2	
species_35	SOS	

Products

Table 118: Properties of each product.

Id	Name	SBO
species_32	Grb2	
species_35	SOS	

Kinetic Law

Derived unit contains undeclared units

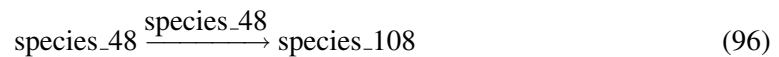
$$v_{39} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{83} \cdot [\text{species}_{47}] - \text{parameter}_{84} \cdot [\text{species}_{32}] \cdot [\text{species}_{35}]) \quad (95)$$

8.40 Reaction re136

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

Name reaction-51

Reaction equation



Reactant

Table 119: Properties of each reactant.

Id	Name	SBO
species_48	SHP2*	

Modifier

Table 120: Properties of each modifier.

Id	Name	SBO
species_48	SHP2*	

Product

Table 121: Properties of each product.

Id	Name	SBO
species_108	SHP2	

Kinetic Law

Derived unit contains undeclared units

$$v_{40} = \text{vol}(\text{compartment}_1) \cdot \text{function_3}([\text{species_48}], \text{parameter_86}, \text{parameter_85}) \quad (97)$$

$$\text{function_3}(\text{substrate}, \text{Km}, \text{V}) = \frac{\text{V} \cdot \text{substrate}}{\text{Km} + \text{substrate}} \quad (98)$$

$$\text{function_3}(\text{substrate}, \text{Km}, \text{V}) = \frac{\text{V} \cdot \text{substrate}}{\text{Km} + \text{substrate}} \quad (99)$$

8.41 Reaction [reaction_42](#)

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name reaction-52

Reaction equation



Reactant

Table 122: Properties of each reactant.

Id	Name	SBO
species_33	(IL6-gp80-gp130-JAK)2*-SHP2*	

Modifiers

Table 123: Properties of each modifier.

Id	Name	SBO
species_33	(IL6-gp80-gp130-JAK)2*-SHP2*	
species_9	(IL6-gp80-gp130-JAK)2*	
species_48	SHP2*	

Products

Table 124: Properties of each product.

Id	Name	SBO
species_9	(IL6-gp80-gp130-JAK)2*	
species_48	SHP2*	

Kinetic Law

Derived unit contains undeclared units

$$v_{41} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{87} \cdot [\text{species}_{33}] - \text{parameter}_{88} \cdot [\text{species}_9] \cdot [\text{species}_{48}]) \quad (101)$$

8.42 Reaction [reaction_43](#)

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

Name reaction-53

Reaction equation



Reactants

Table 125: Properties of each reactant.

Id	Name	SBO
species_32	Grb2	
species_48	SHP2*	

Modifiers

Table 126: Properties of each modifier.

Id	Name	SBO
species_32	Grb2	
species_48	SHP2*	
species_36	SHP2*-Grb2	

Product

Table 127: Properties of each product.

Id	Name	SBO
species_36	SHP2*-Grb2	

Kinetic Law

Derived unit contains undeclared units

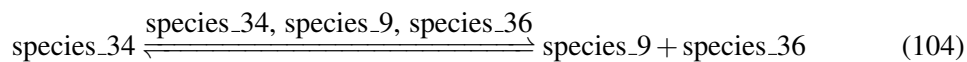
$$v_{42} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{89} \cdot [\text{species}_{32}] \cdot [\text{species}_{48}] - \text{parameter}_{90} \cdot [\text{species}_{36}]) \quad (103)$$

8.43 Reaction [reaction_44](#)

This is a reversible reaction of one reactant forming two products influenced by three modifiers.

Name reaction-54

Reaction equation



Reactant

Table 128: Properties of each reactant.

Id	Name	SBO
species_34	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2	

Modifiers

Table 129: Properties of each modifier.

Id	Name	SBO
species_34	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2	
species_9	(IL6-gp80-gp130-JAK)2*	
species_36	SHP2*-Grb2	

Products

Table 130: Properties of each product.

Id	Name	SBO
species_9	(IL6-gp80-gp130-JAK)2*	
species_36	SHP2*-Grb2	

Kinetic Law

Derived unit contains undeclared units

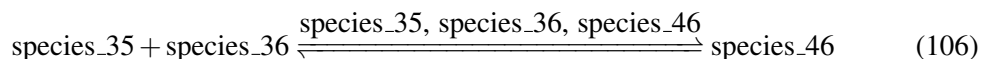
$$v_{43} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{91} \cdot [\text{species}_{34}] - \text{parameter}_{92} \cdot [\text{species}_9] \cdot [\text{species}_{36}]) \quad (105)$$

8.44 Reaction [reaction_45](#)

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

Name reaction-55

Reaction equation



Reactants

Table 131: Properties of each reactant.

Id	Name	SBO
species_35	SOS	
species_36	SHP2*-Grb2	

Modifiers

Table 132: Properties of each modifier.

Id	Name	SBO
species_35	SOS	
species_36	SHP2*-Grb2	
species_46	SHP2*-Grb2-SOS	

Product

Table 133: Properties of each product.

Id	Name	SBO
species_46	SHP2*-Grb2-SOS	

Kinetic Law

Derived unit contains undeclared units

$$v_{44} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{93} \cdot [\text{species}_{35}] \cdot [\text{species}_{36}] - \text{parameter}_{94} \cdot [\text{species}_{46}]) \quad (107)$$

8.45 Reaction [reaction_46](#)

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

Name reaction-56

Reaction equation



Reactants

Table 134: Properties of each reactant.

Id	Name	SBO
species_33	(IL6-gp80-gp130-JAK)2*-SHP2*	
species_47	Grb2-SOS	

Modifiers

Table 135: Properties of each modifier.

Id	Name	SBO
species_33	(IL6-gp80-gp130-JAK)2*-SHP2*	
species_47	Grb2-SOS	
species_37	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS	

Product

Table 136: Properties of each product.

Id	Name	SBO
species_37	(IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS	

Kinetic Law

Derived unit contains undeclared units

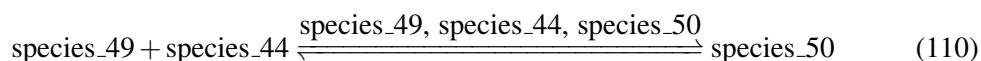
$$v_{45} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{95} \cdot [\text{species}_{33}] \cdot [\text{species}_{47}] - \text{parameter}_{96} \cdot [\text{species}_{37}]) \quad (109)$$

8.46 Reaction [reaction_47](#)

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

Name reaction-57

Reaction equation



Reactants

Table 137: Properties of each reactant.

Id	Name	SBO
species_49	Phosp1	
species_44	Raf*	

Modifiers

Table 138: Properties of each modifier.

Id	Name	SBO
species_49	Phosp1	
species_44	Raf*	
species_50	Raf*-Phosp1	

Product

Table 139: Properties of each product.

Id	Name	SBO
species_50	Raf*-Phosp1	

Kinetic Law

Derived unit contains undeclared units

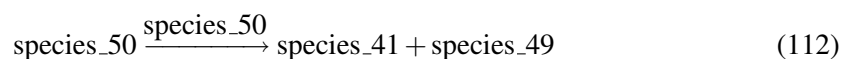
$$v_{46} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{97} \cdot [\text{species}_{49}] \cdot [\text{species}_{44}] - \text{parameter}_{98} \cdot [\text{species}_{50}]) \quad (111)$$

8.47 Reaction [reaction_48](#)

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

Name reaction-58

Reaction equation



Reactant

Table 140: Properties of each reactant.

Id	Name	SBO
species_50	Raf*-Phosp1	

Modifier

Table 141: Properties of each modifier.

Id	Name	SBO
species_50	Raf*-Phosp1	

Products

Table 142: Properties of each product.

Id	Name	SBO
species_41	Raf	
species_49	Phosp1	

Kinetic Law

Derived unit contains undeclared units

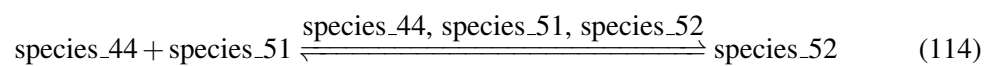
$$v_{47} = \text{vol}(\text{compartment}_1) \cdot \text{parameter}_{99} \cdot [\text{species}_{50}] \quad (113)$$

8.48 Reaction `reaction_49`

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

Name `reaction-59`

Reaction equation



Reactants

Table 143: Properties of each reactant.

Id	Name	SBO
species_44	Raf*	
species_51	MEK	

Modifiers

Table 144: Properties of each modifier.

Id	Name	SBO
species_44	Raf*	
species_51	MEK	
species_52	MEK-Raf*	

Product

Table 145: Properties of each product.

Id	Name	SBO
species_52	MEK-Raf*	

Kinetic Law

Derived unit contains undeclared units

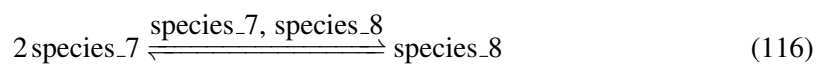
$$v_{48} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{100} \cdot [\text{species}_{44}] \cdot [\text{species}_{51}] - \text{parameter}_{101} \cdot [\text{species}_{52}]) \quad (115)$$

8.49 Reaction `reaction_5`

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

Name reaction-6

Reaction equation



Reactant

Table 146: Properties of each reactant.

Id	Name	SBO
species_7	IL6-gp80-gp130-JAK	

Modifiers

Table 147: Properties of each modifier.

Id	Name	SBO
species_7	IL6-gp80-gp130-JAK	
species_8	(IL6-gp80-gp130-JAK)2	

Product

Table 148: Properties of each product.

Id	Name	SBO
species_8	(IL6-gp80-gp130-JAK)2	

Kinetic Law

Derived unit contains undeclared units

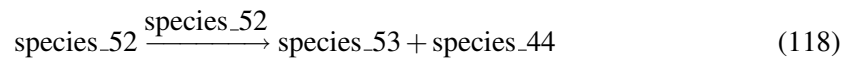
$$v_{49} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{11} \cdot [\text{species}_7]^2 - \text{parameter}_{12} \cdot [\text{species}_8]) \quad (117)$$

8.50 Reaction [reaction_50](#)

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

Name reaction-60

Reaction equation



Reactant

Table 149: Properties of each reactant.

Id	Name	SBO
species_52	MEK-Raf*	

Modifier

Table 150: Properties of each modifier.

Id	Name	SBO
species_52	MEK-Raf*	

Products

Table 151: Properties of each product.

Id	Name	SBO
species_53	MEK-P	
species_44	Raf*	

Kinetic Law

Derived unit contains undeclared units

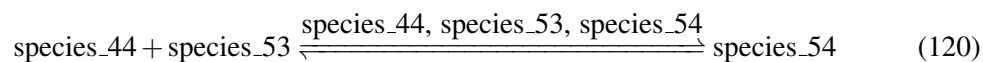
$$v_{50} = \text{vol}(\text{compartment}_1) \cdot \text{parameter}_{102} \cdot [\text{species}_{52}] \quad (119)$$

8.51 Reaction `reaction_51`

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

Name reaction-61

Reaction equation



Reactants

Table 152: Properties of each reactant.

Id	Name	SBO
species_44	Raf*	
species_53	MEK-P	

Modifiers

Table 153: Properties of each modifier.

Id	Name	SBO
species_44	Raf*	
species_53	MEK-P	
species_54	MEK-P-Raf*	

Product

Table 154: Properties of each product.

Id	Name	SBO
species_54	MEK-P-Raf*	

Kinetic Law

Derived unit contains undeclared units

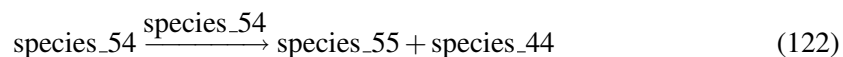
$$v_{51} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{103} \cdot [\text{species}_{44}] \cdot [\text{species}_{53}] - \text{parameter}_{104} \cdot [\text{species}_{54}]) \quad (121)$$

8.52 Reaction [reaction_52](#)

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

Name reaction-62

Reaction equation



Reactant

Table 155: Properties of each reactant.

Id	Name	SBO
species_54	MEK-P-Raf*	

Modifier

Table 156: Properties of each modifier.

Id	Name	SBO
species_54	MEK-P-Raf*	

Products

Table 157: Properties of each product.

Id	Name	SBO
species_55	MEK-PP	
species_44	Raf*	

Kinetic Law

Derived unit contains undeclared units

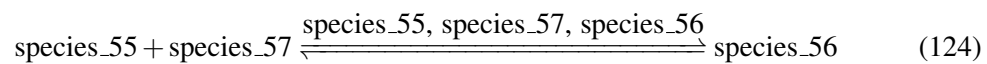
$$v_{52} = \text{vol}(\text{compartment}_1) \cdot \text{parameter}_{105} \cdot [\text{species}_{54}] \quad (123)$$

8.53 Reaction `reaction_53`

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

Name reaction-63

Reaction equation



Reactants

Table 158: Properties of each reactant.

Id	Name	SBO
species_55	MEK-PP	
species_57	Phosp2	

Modifiers

Table 159: Properties of each modifier.

Id	Name	SBO
species_55	MEK-PP	
species_57	Phosp2	
species_56	MEK-PP-Phosp2	

Product

Table 160: Properties of each product.

Id	Name	SBO
species_56	MEK-PP-Phosp2	

Kinetic Law

Derived unit contains undeclared units

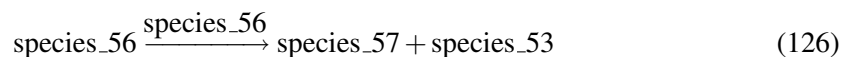
$$v_{53} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{106} \cdot [\text{species}_{55}] \cdot [\text{species}_{57}] - \text{parameter}_{107} \cdot [\text{species}_{56}]) \quad (125)$$

8.54 Reaction [reaction_54](#)

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

Name reaction-64

Reaction equation



Reactant

Table 161: Properties of each reactant.

Id	Name	SBO
species_56	MEK-PP-Phosp2	

Modifier

Table 162: Properties of each modifier.

Id	Name	SBO
species_56	MEK-PP-Phosp2	

Products

Table 163: Properties of each product.

Id	Name	SBO
species_57	Phosp2	
species_53	MEK-P	

Kinetic Law

Derived unit contains undeclared units

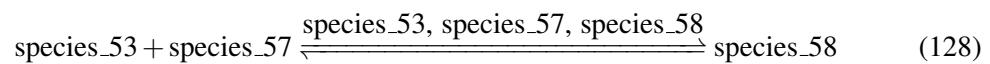
$$v_{54} = \text{vol}(\text{compartment}_1) \cdot \text{parameter}_{108} \cdot [\text{species}_{56}] \quad (127)$$

8.55 Reaction `reaction_55`

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

Name reaction-65

Reaction equation



Reactants

Table 164: Properties of each reactant.

Id	Name	SBO
species_53	MEK-P	
species_57	Phosp2	

Modifiers

Table 165: Properties of each modifier.

Id	Name	SBO
species_53	MEK-P	
species_57	Phosp2	
species_58	MEK-P-Phosp2	

Product

Table 166: Properties of each product.

Id	Name	SBO
species_58	MEK-P-Phosp2	

Kinetic Law

Derived unit contains undeclared units

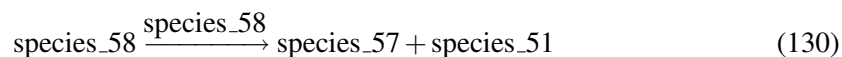
$$v_{55} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{109} \cdot [\text{species}_{53}] \cdot [\text{species}_{57}] - \text{parameter}_{110} \cdot [\text{species}_{58}]) \quad (129)$$

8.56 Reaction [reaction_56](#)

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

Name reaction-66

Reaction equation



Reactant

Table 167: Properties of each reactant.

Id	Name	SBO
species_58	MEK-P-Phosp2	

Modifier

Table 168: Properties of each modifier.

Id	Name	SBO
species_58	MEK-P-Phosp2	

Products

Table 169: Properties of each product.

Id	Name	SBO
species_57	Phosp2	
species_51	MEK	

Kinetic Law**Derived unit** contains undeclared units

$$v_{56} = \text{vol}(\text{compartment}_1) \cdot \text{parameter}_{111} \cdot [\text{species}_{58}] \quad (131)$$

8.57 Reaction reaction_57

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

Name reaction-67**Reaction equation****Reactants**

Table 170: Properties of each reactant.

Id	Name	SBO
species_55	MEK-PP	
species_59	ERK	

Modifiers

Table 171: Properties of each modifier.

Id	Name	SBO
species_55	MEK-PP	
species_59	ERK	
species_60	ERK-MEK-PP	

Product

Table 172: Properties of each product.

Id	Name	SBO
species_60	ERK-MEK-PP	

Kinetic Law

Derived unit contains undeclared units

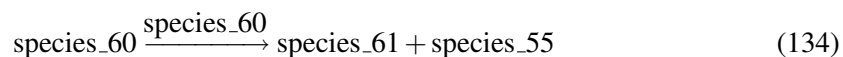
$$v_{57} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{112} \cdot [\text{species}_{55}] \cdot [\text{species}_{59}] - \text{parameter}_{113} \cdot [\text{species}_{60}]) \quad (133)$$

8.58 Reaction `reaction_58`

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

Name reaction-68

Reaction equation



Reactant

Table 173: Properties of each reactant.

Id	Name	SBO
species_60	ERK-MEK-PP	

Modifier

Table 174: Properties of each modifier.

Id	Name	SBO
species_60	ERK-MEK-PP	

Products

Table 175: Properties of each product.

Id	Name	SBO
species_61	ERK-P	
species_55	MEK-PP	

Kinetic Law

Derived unit contains undeclared units

$$v_{58} = \text{vol}(\text{compartment}_1) \cdot \text{parameter}_{114} \cdot [\text{species}_{60}] \quad (135)$$

8.59 Reaction `reaction_59`

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

Name `reaction-69`

Reaction equation



Reactants

Table 176: Properties of each reactant.

Id	Name	SBO
species_55	MEK-PP	
species_61	ERK-P	

Modifiers

Table 177: Properties of each modifier.

Id	Name	SBO
species_55	MEK-PP	
species_61	ERK-P	
species_62	ERK-P-MEK-PP	

Product

Table 178: Properties of each product.

Id	Name	SBO
species_62	ERK-P-MEK-PP	

Kinetic Law

Derived unit contains undeclared units

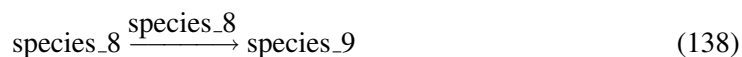
$$v_{59} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{115} \cdot [\text{species}_{55}] \cdot [\text{species}_{61}] - \text{parameter}_{116} \cdot [\text{species}_{62}]) \quad (137)$$

8.60 Reaction `reaction_6`

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

Name reaction-7

Reaction equation



Reactant

Table 179: Properties of each reactant.

Id	Name	SBO
species_8	(IL6-gp80-gp130-JAK)2	

Modifier

Table 180: Properties of each modifier.

Id	Name	SBO
species_8	(IL6-gp80-gp130-JAK)2	

Product

Table 181: Properties of each product.

Id	Name	SBO
species_9	(IL6-gp80-gp130-JAK)2*	

Kinetic Law

Derived unit contains undeclared units

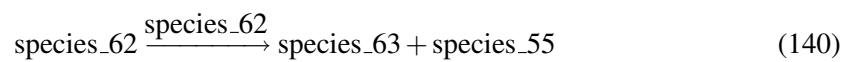
$$v_{60} = \text{vol}(\text{compartment_1}) \cdot \text{parameter_13} \cdot [\text{species_8}] \quad (139)$$

8.61 Reaction `reaction_60`

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

Name reaction-70

Reaction equation



Reactant

Table 182: Properties of each reactant.

Id	Name	SBO
species_62	ERK-P-MEK-PP	

Modifier

Table 183: Properties of each modifier.

Id	Name	SBO
species_62	ERK-P-MEK-PP	

Products

Table 184: Properties of each product.

Id	Name	SBO
species_63	ERK-PP	
species_55	MEK-PP	

Kinetic Law

Derived unit contains undeclared units

$$v_{61} = \text{vol}(\text{compartment_1}) \cdot \text{parameter_117} \cdot [\text{species_62}] \quad (141)$$

8.62 Reaction [reaction_64](#)

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

Name reaction-71

Reaction equation



Reactants

Table 185: Properties of each reactant.

Id	Name	SBO
species_63	ERK-PP	
species_64	Phosp3	

Modifiers

Table 186: Properties of each modifier.

Id	Name	SBO
species_63	ERK-PP	
species_64	Phosp3	
species_65	ERK-PP-Phosp3	

Product

Table 187: Properties of each product.

Id	Name	SBO
species_65	ERK-PP-Phosp3	

Kinetic Law

Derived unit contains undeclared units

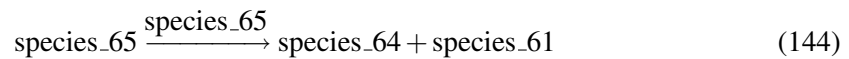
$$v_{62} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{118} \cdot [\text{species}_{63}] \cdot [\text{species}_{64}] - \text{parameter}_{119} \cdot [\text{species}_{65}]) \quad (143)$$

8.63 Reaction `reaction_61`

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

Name `reaction-72`

Reaction equation



Reactant

Table 188: Properties of each reactant.

Id	Name	SBO
species_65	ERK-PP-Phosp3	

Modifier

Table 189: Properties of each modifier.

Id	Name	SBO
species_65	ERK-PP-Phosp3	

Products

Table 190: Properties of each product.

Id	Name	SBO
species_64	Phosp3	
species_61	ERK-P	

Kinetic Law

Derived unit contains undeclared units

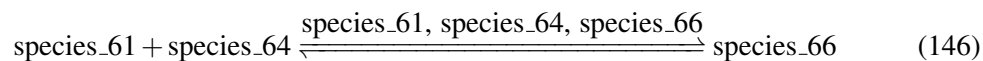
$$v_{63} = \text{vol}(\text{compartment_1}) \cdot \text{parameter_120} \cdot [\text{species_65}] \quad (145)$$

8.64 Reaction [reaction_62](#)

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

Name reaction-73

Reaction equation



Reactants

Table 191: Properties of each reactant.

Id	Name	SBO
species_61	ERK-P	
species_64	Phosp3	

Modifiers

Table 192: Properties of each modifier.

Id	Name	SBO
species_61	ERK-P	
species_64	Phosp3	
species_66	ERK-P-Phosp3	

Product

Table 193: Properties of each product.

Id	Name	SBO
species_66	ERK-P-Phosp3	

Kinetic Law

Derived unit contains undeclared units

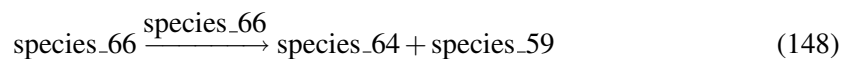
$$v_{64} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{121} \cdot [\text{species}_{61}] \cdot [\text{species}_{64}] - \text{parameter}_{122} \cdot [\text{species}_{66}]) \quad (147)$$

8.65 Reaction `reaction_63`

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

Name `reaction-74`

Reaction equation



Reactant

Table 194: Properties of each reactant.

Id	Name	SBO
species_66	ERK-P-Phosp3	

Modifier

Table 195: Properties of each modifier.

Id	Name	SBO
species_66	ERK-P-Phosp3	

Products

Table 196: Properties of each product.

Id	Name	SBO
species_64	Phosp3	
species_59	ERK	

Kinetic Law

Derived unit contains undeclared units

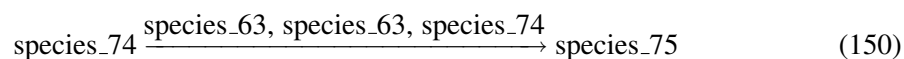
$$v_{65} = \text{vol}(\text{compartment}_1) \cdot \text{parameter}_{123} \cdot [\text{species}_{66}] \quad (149)$$

8.66 Reaction [reaction_74](#)

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

Name reaction-75

Reaction equation



Reactant

Table 197: Properties of each reactant.

Id	Name	SBO
species_74	CEBPi	

Modifiers

Table 198: Properties of each modifier.

Id	Name	SBO
species_63	ERK-PP	
species_63	ERK-PP	
species_74	CEBPI	

Product

Table 199: Properties of each product.

Id	Name	SBO
species_75	CEBP	

Kinetic Law

Derived unit contains undeclared units

$$v_{66} = \text{vol}(\text{compartment}_1) \cdot \text{function_activation}(\text{parameter}_{124}, [\text{species}_{63}], [\text{species}_{74}], \text{parameter}_{125}) \quad (151)$$

$$\text{function_activation}(v, a, b, k) = \frac{v \cdot a \cdot b}{b + k} \quad (152)$$

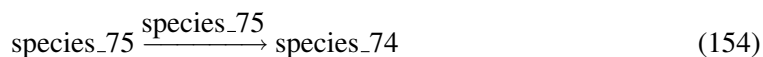
$$\text{function_activation}(v, a, b, k) = \frac{v \cdot a \cdot b}{b + k} \quad (153)$$

8.67 Reaction reaction_75

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

Name reaction-76

Reaction equation



Reactant

Table 200: Properties of each reactant.

Id	Name	SBO
species_75	CEBP	

Modifier

Table 201: Properties of each modifier.

Id	Name	SBO
species_75	CEBP	

Product

Table 202: Properties of each product.

Id	Name	SBO
species_74	CEBPi	

Kinetic Law

Derived unit contains undeclared units

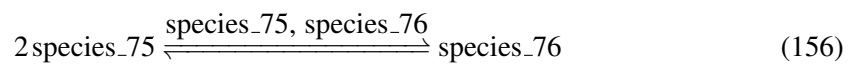
$$v_{67} = \text{vol}(\text{compartment}_1) \cdot \text{parameter}_{126} \cdot [\text{species}_{75}] \quad (155)$$

8.68 Reaction `reaction_76`

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

Name reaction-77

Reaction equation



Reactant

Table 203: Properties of each reactant.

Id	Name	SBO
species_75	CEBP	

Modifiers

Table 204: Properties of each modifier.

Id	Name	SBO
species_75	CEBP	
species_76	CEBPn	

Product

Table 205: Properties of each product.

Id	Name	SBO
species_76	CEBPn	

Kinetic Law

Derived unit contains undeclared units

$$v_{68} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{127} \cdot [\text{species}_{75}]^2 - \text{parameter}_{128} \cdot [\text{species}_{76}]) \quad (157)$$

8.69 Reaction [reaction_4](#)

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

Name reaction-8

Reaction equation



Reactants

Table 206: Properties of each reactant.

Id	Name	SBO
species_9	(IL6-gp80-gp130-JAK)2*	
species_11	STAT3C	

Modifiers

Table 207: Properties of each modifier.

Id	Name	SBO
species_9	(IL6-gp80-gp130-JAK)2*	
species_11	STAT3C	
species_10	(IL6-gp80-gp130-JAK)2*-STAT3C	

Product

Table 208: Properties of each product.

Id	Name	SBO
species_10	(IL6-gp80-gp130-JAK)2*-STAT3C	

Kinetic Law

Derived unit contains undeclared units

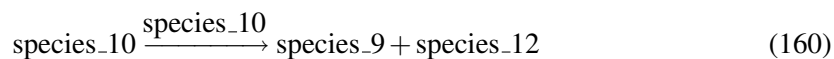
$$v_{69} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{14} \cdot [\text{species}_9] \cdot [\text{species}_{11}] - \text{parameter}_{15} \cdot [\text{species}_{10}]) \quad (159)$$

8.70 Reaction `reaction_7`

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

Name reaction-9

Reaction equation



Reactant

Table 209: Properties of each reactant.

Id	Name	SBO
species_10	(IL6-gp80-gp130-JAK)2*-STAT3C	

Modifier

Table 210: Properties of each modifier.

Id	Name	SBO
species_10	(IL6-gp80-gp130-JAK)2*-STAT3C	

Products

Table 211: Properties of each product.

Id	Name	SBO
species_9	(IL6-gp80-gp130-JAK)2*	
species_12	STAT3C*	

Kinetic Law

Derived unit contains undeclared units

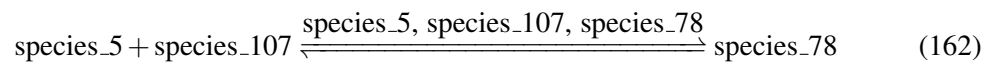
$$v_{70} = \text{vol}(\text{compartment}_1) \cdot \text{parameter}_{16} \cdot [\text{species}_{10}] \quad (161)$$

8.71 Reaction re135

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

Name reaction-v1

Reaction equation



Reactants

Table 212: Properties of each reactant.

Id	Name	SBO
species_5	JAK(IFN)	
species_107	R	

Modifiers

Table 213: Properties of each modifier.

Id	Name	SBO
species_5	JAK(IFN)	
species_107	R	
species_78	R-JAK	

Product

Table 214: Properties of each product.

Id	Name	SBO
species_78	R-JAK	

Kinetic Law

Derived unit contains undeclared units

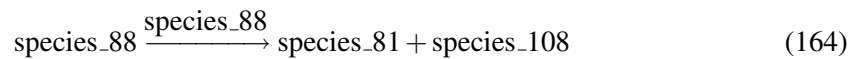
$$v_{71} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{129} \cdot [\text{species}_5] \cdot [\text{species}_{107}] - \text{parameter}_{130} \cdot [\text{species}_{78}]) \quad (163)$$

8.72 Reaction `reaction_87`

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

Name reaction-v10

Reaction equation



Reactant

Table 215: Properties of each reactant.

Id	Name	SBO
species_88	(IFN-R-JAK) ² *-SHP2	

Modifier

Table 216: Properties of each modifier.

Id	Name	SBO
species_88	(IFN-R-JAK)2*-SHP2	

Products

Table 217: Properties of each product.

Id	Name	SBO
species_81	(IFN-R-JAK)2	
species_108	SHP2	

Kinetic Law

Derived unit contains undeclared units

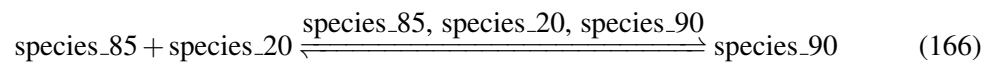
$$v_{72} = \text{vol}(\text{compartment_1}) \cdot \text{parameter_145} \cdot [\text{species_88}] \quad (165)$$

8.73 Reaction re140

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

Name reaction-v11

Reaction equation



Reactants

Table 218: Properties of each reactant.

Id	Name	SBO
species_85	STATIC*	
species_20	PP1	

Modifiers

Table 219: Properties of each modifier.

Id	Name	SBO
species_85	STAT1C*	
species_20	PP1	
species_90	PP1-STAT1C*	

Product

Table 220: Properties of each product.

Id	Name	SBO
species_90	PP1-STAT1C*	

Kinetic Law

Derived unit contains undeclared units

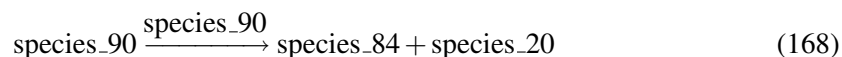
$$v_{73} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{146} \cdot [\text{species}_{85}] \cdot [\text{species}_{20}] - \text{parameter}_{147} \cdot [\text{species}_{90}]) \quad (167)$$

8.74 Reaction re141

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

Name reaction-v12

Reaction equation



Reactant

Table 221: Properties of each reactant.

Id	Name	SBO
species_90	PP1-STAT1C*	

Modifier

Table 222: Properties of each modifier.

Id	Name	SBO
species_90	PP1-STAT1C*	

Products

Table 223: Properties of each product.

Id	Name	SBO
species_84	STAT1C	
species_20	PP1	

Kinetic Law

Derived unit contains undeclared units

$$v_{74} = \text{vol}(\text{compartment}_1) \cdot \text{parameter}_{148} \cdot [\text{species}_{90}] \quad (169)$$

8.75 Reaction `reaction_90`

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

Name reaction-v13

Reaction equation



Reactants

Table 224: Properties of each reactant.

Id	Name	SBO
species_84	STAT1C	
species_85	STAT1C*	

Modifiers

Table 225: Properties of each modifier.

Id	Name	SBO
species_84	STAT1C	
species_85	STAT1C*	
species_91	STAT1C-STAT1C*	

Product

Table 226: Properties of each product.

Id	Name	SBO
species_91	STAT1C-STAT1C*	

Kinetic Law

Derived unit contains undeclared units

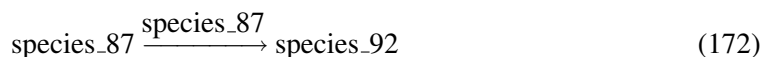
$$v_{75} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{149} \cdot [\text{species}_{84}] \cdot [\text{species}_{85}] - \text{parameter}_{150} \cdot [\text{species}_{91}]) \quad (171)$$

8.76 Reaction `reaction_91`

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

Name reaction-v14

Reaction equation



Reactant

Table 227: Properties of each reactant.

Id	Name	SBO
species_87	(STAT1C*)2	

Modifier

Table 228: Properties of each modifier.

Id	Name	SBO
species_87	(STAT1C*)2	

Product

Table 229: Properties of each product.

Id	Name	SBO
species_92	(STAT1N*)2	

Kinetic Law

Derived unit contains undeclared units

$$v_{76} = \text{parameter_151} \cdot [\text{species_87}] \quad (173)$$

8.77 Reaction re144

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

Name reaction-v15

Reaction equation



Reactants

Table 230: Properties of each reactant.

Id	Name	SBO
species_95	STAT1N*	
species_24	PP2	

Modifiers

Table 231: Properties of each modifier.

Id	Name	SBO
species_24	PP2	
species_94	PP2-STAT1N*	
species_95	STAT1N*	

Product

Table 232: Properties of each product.

Id	Name	SBO
species_94	PP2-STAT1N*	

Kinetic Law

Derived unit contains undeclared units

$$v_{77} = \text{function_4}(\text{vol}(c2), \text{parameter_152}, \text{parameter_153}, [\text{species_24}], [\text{species_94}], [\text{species_95}]) \quad (175)$$

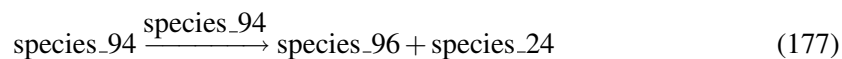
$$\begin{aligned} & \text{function_4}(\text{vol}(c2), \text{parameter_152}, \text{parameter_153}, [\text{species_24}], [\text{species_94}], [\text{species_95}]) \\ &= \text{vol}(c2) \cdot (\text{parameter_152} \cdot [\text{species_24}] \cdot [\text{species_95}] - \text{parameter_153} \cdot [\text{species_94}]) \end{aligned} \quad (176)$$

8.78 Reaction re145

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

Name reaction-v16

Reaction equation



Reactant

Table 233: Properties of each reactant.

Id	Name	SBO
species_94	PP2-STAT1N*	

Modifier

Table 234: Properties of each modifier.

Id	Name	SBO
species_94	PP2-STAT1N*	

Products

Table 235: Properties of each product.

Id	Name	SBO
species_96	STAT1N	
species_24	PP2	

Kinetic Law

Derived unit contains undeclared units

$$v_{78} = \text{function_5}(\text{vol}(c2), \text{parameter_155}, [\text{species_94}]) \quad (178)$$

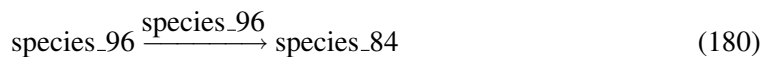
$$\text{function_5}(\text{vol}(c2), \text{parameter_155}, [\text{species_94}]) = \text{vol}(c2) \cdot \text{parameter_155} \cdot [\text{species_94}] \quad (179)$$

8.79 Reaction [reaction_94](#)

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

Name reaction-v17

Reaction equation



Reactant

Table 236: Properties of each reactant.

Id	Name	SBO
species_96	STAT1N	

Modifier

Table 237: Properties of each modifier.

Id	Name	SBO
species_96	STAT1N	

Product

Table 238: Properties of each product.

Id	Name	SBO
species_84	STAT1C	

Kinetic Law

Derived unit contains undeclared units

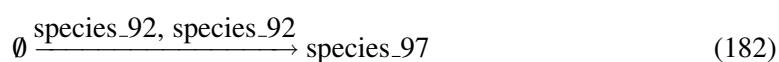
$$v_{79} = \text{parameter_154} \cdot [\text{species_96}] \quad (181)$$

8.80 Reaction [reaction_95](#)

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

Name reaction-v18

Reaction equation



Modifiers

Table 239: Properties of each modifier.

Id	Name	SBO
species_92	(STAT1N*)2	
species_92	(STAT1N*)2	

Product

Table 240: Properties of each product.

Id	Name	SBO
species_97	mRNA-SOCS1N	

Kinetic Law

Derived unit contains undeclared units

$$v_{80} = \text{vol}(c2) \cdot \text{function_6}(\text{parameter_156}, \text{parameter_157}, [\text{species_92}]) \quad (183)$$

$$\text{function_6}(\text{parameter_156}, \text{parameter_157}, [\text{species_92}]) = \frac{\text{parameter_156} \cdot [\text{species_92}]}{\text{parameter_157} + [\text{species_92}]} \quad (184)$$

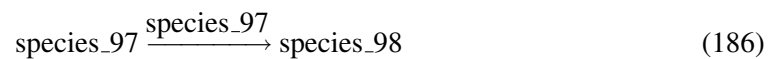
$$\text{function_6}(\text{parameter_156}, \text{parameter_157}, [\text{species_92}]) = \frac{\text{parameter_156} \cdot [\text{species_92}]}{\text{parameter_157} + [\text{species_92}]} \quad (185)$$

8.81 Reaction `reaction_96`

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

Name reaction-v19

Reaction equation



Reactant

Table 241: Properties of each reactant.

Id	Name	SBO
species_97	mRNA-SOCS1N	

Modifier

Table 242: Properties of each modifier.

Id	Name	SBO
species_97	mRNA-SOCS1N	

Product

Table 243: Properties of each product.

Id	Name	SBO
species_98	mRNA-SOCS1C	

Kinetic Law

Derived unit contains undeclared units

$$v_{81} = \text{parameter_158} \cdot [\text{species_97}] \quad (187)$$

8.82 Reaction reaction_80

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

Name reaction-v2

Reaction equation



Reactants

Table 244: Properties of each reactant.

Id	Name	SBO
species_79	IFN	
species_78	R-JAK	

Modifiers

Table 245: Properties of each modifier.

Id	Name	SBO
species_79	IFN	
species_78	R-JAK	
species_80	IFN-R-JAK	

Product

Table 246: Properties of each product.

Id	Name	SBO
species_80	IFN-R-JAK	

Kinetic Law

Derived unit contains undeclared units

$$v_{82} = \text{parameter_131} \cdot [\text{species_79}] \cdot [\text{species_78}] - \text{parameter_132} \cdot [\text{species_80}] \quad (189)$$

8.83 Reaction [reaction_97](#)

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

Name reaction-v20

Reaction equation



Modifiers

Table 247: Properties of each modifier.

Id	Name	SBO
species_98	mRNA-SOCS1C	
species_98	mRNA-SOCS1C	

Product

Table 248: Properties of each product.

Id	Name	SBO
species_99	SOCS1	

Kinetic Law

Derived unit contains undeclared units

$$v_{83} = \text{vol}(\text{compartment_1}) \cdot \text{function_7}(\text{parameter_159}, [\text{species_98}]) \quad (191)$$

$$\text{function_7}(\text{parameter_159}, [\text{species_98}]) = \text{parameter_159} \cdot [\text{species_98}] \quad (192)$$

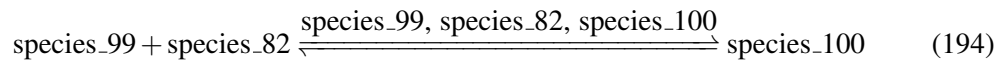
$$\text{function_7}(\text{parameter_159}, [\text{species_98}]) = \text{parameter_159} \cdot [\text{species_98}] \quad (193)$$

8.84 Reaction [reaction_98](#)

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

Name reaction-v21

Reaction equation



Reactants

Table 249: Properties of each reactant.

Id	Name	SBO
species_99	SOCS1	
species_82	(IFN-R-JAK)2*	

Modifiers

Table 250: Properties of each modifier.

Id	Name	SBO
species_99	SOCS1	
species_82	(IFN-R-JAK)2*	
species_100	(IFN-R-JAK)2*-SOCS1	

Product

Table 251: Properties of each product.

Id	Name	SBO
species_100	(IFN-R-JAK)2*-SOCS1	

Kinetic Law

Derived unit contains undeclared units

$$v_{84} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{160} \cdot [\text{species}_{99}] \cdot [\text{species}_{82}] - \text{parameter}_{161} \cdot [\text{species}_{100}]) \quad (195)$$

8.85 Reaction [reaction_99](#)

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

Name reaction-v22

Reaction equation



Reactant

Table 252: Properties of each reactant.

Id	Name	SBO
species_98	mRNA-SOCS1C	

Modifier

Table 253: Properties of each modifier.

Id	Name	SBO
species_98	mRNA-SOCS1C	

Kinetic Law

Derived unit contains undeclared units

$$v_{85} = \text{vol}(\text{compartment_1}) \cdot \text{parameter_162} \cdot [\text{species_98}] \quad (197)$$

8.86 Reaction `reaction_100`

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

Name `reaction-v23`

Reaction equation



Reactant

Table 254: Properties of each reactant.

Id	Name	SBO
<code>species_99</code>	SOCS1	

Modifier

Table 255: Properties of each modifier.

Id	Name	SBO
<code>species_99</code>	SOCS1	

Kinetic Law

Derived unit contains undeclared units

$$v_{86} = \text{vol}(\text{compartment_1}) \cdot \text{parameter_163} \cdot [\text{species_99}] \quad (199)$$

8.87 Reaction `re142`

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

Name `reaction-v24`

Reaction equation



Reactants

Table 256: Properties of each reactant.

Id	Name	SBO
species_87	(STAT1C*)2	
species_20	PP1	

Modifiers

Table 257: Properties of each modifier.

Id	Name	SBO
species_87	(STAT1C*)2	
species_20	PP1	
species_101	PP1-(STAT1C*)2	

Product

Table 258: Properties of each product.

Id	Name	SBO
species_101	PP1-(STAT1C*)2	

Kinetic Law

Derived unit contains undeclared units

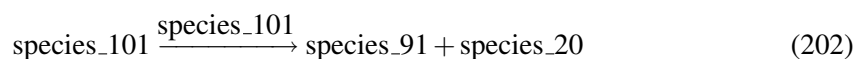
$$v_{87} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{164} \cdot [\text{species}_{87}] \cdot [\text{species}_{20}] - \text{parameter}_{165} \cdot [\text{species}_{101}]) \quad (201)$$

8.88 Reaction re143

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

Name reaction-v25

Reaction equation



Reactant

Table 259: Properties of each reactant.

Id	Name	SBO
species_101	PP1-(STAT1C*)2	

Modifier

Table 260: Properties of each modifier.

Id	Name	SBO
species_101	PP1-(STAT1C*)2	

Products

Table 261: Properties of each product.

Id	Name	SBO
species_91	STAT1C-STAT1C*	
species_20	PP1	

Kinetic Law

Derived unit contains undeclared units

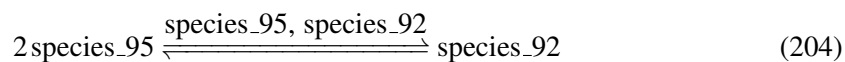
$$v_{88} = \text{vol}(\text{compartment}_1) \cdot \text{parameter}_{166} \cdot [\text{species}_{101}] \quad (203)$$

8.89 Reaction `reaction_103`

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

Name `reaction-v26`

Reaction equation



Reactant

Table 262: Properties of each reactant.

Id	Name	SBO
species_95	STAT1N*	

Modifiers

Table 263: Properties of each modifier.

Id	Name	SBO
species_95	STAT1N*	
species_92	(STAT1N*)2	

Product

Table 264: Properties of each product.

Id	Name	SBO
species_92	(STAT1N*)2	

Kinetic Law

Derived unit contains undeclared units

$$v_{89} = \text{vol}(c2) \cdot (\text{parameter_167} \cdot [\text{species_95}]^2 - \text{parameter_168} \cdot [\text{species_92}]) \quad (205)$$

8.90 Reaction re147

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

Name reaction-v27

Reaction equation



Reactants

Table 265: Properties of each reactant.

Id	Name	SBO
species_92	(STAT1N*)2	
species_24	PP2	

Modifiers

Table 266: Properties of each modifier.

Id	Name	SBO
species_102	PP2-(STAT1N*)2	
species_24	PP2	
species_92	(STAT1N*)2	

Product

Table 267: Properties of each product.

Id	Name	SBO
species_102	PP2-(STAT1N*)2	

Kinetic Law

Derived unit contains undeclared units

$$v_{90} = \text{function_8}(\text{vol}(c2), \text{parameter_169}, \text{parameter_170}, [\text{species_102}], [\text{species_24}], [\text{species_92}]) \quad (207)$$

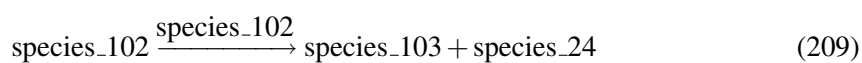
$$\begin{aligned} & \text{function_8}(\text{vol}(c2), \text{parameter_169}, \text{parameter_170}, [\text{species_102}], [\text{species_24}], [\text{species_92}]) \\ &= \text{vol}(c2) \cdot (\text{parameter_169} \cdot [\text{species_24}] \cdot [\text{species_92}] - \text{parameter_170} \cdot [\text{species_102}]) \end{aligned} \quad (208)$$

8.91 Reaction re148

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

Name reaction-v28

Reaction equation



Reactant

Table 268: Properties of each reactant.

Id	Name	SBO
species_102	PP2-(STAT1N*)2	

Modifier

Table 269: Properties of each modifier.

Id	Name	SBO
species_102	PP2-(STAT1N*)2	

Products

Table 270: Properties of each product.

Id	Name	SBO
species_103	STAT1N-STAT1N*	
species_24	PP2	

Kinetic Law

Derived unit contains undeclared units

$$v_{91} = \text{function_9}(\text{vol}(c2), \text{parameter_171}, [\text{species_102}]) \quad (210)$$

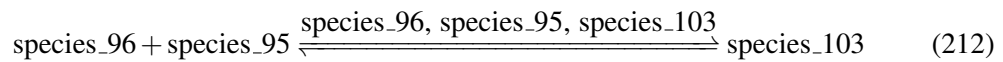
$$\text{function_9}(\text{vol}(c2), \text{parameter_171}, [\text{species_102}]) = \text{vol}(c2) \cdot \text{parameter_171} \cdot [\text{species_102}] \quad (211)$$

8.92 Reaction [reaction_106](#)

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

Name reaction-v29

Reaction equation



Reactants

Table 271: Properties of each reactant.

Id	Name	SBO
species_96	STAT1N	
species_95	STAT1N*	

Modifiers

Table 272: Properties of each modifier.

Id	Name	SBO
species_96	STAT1N	
species_95	STAT1N*	
species_103	STAT1N-STAT1N*	

Product

Table 273: Properties of each product.

Id	Name	SBO
species_103	STAT1N-STAT1N*	

Kinetic Law

Derived unit contains undeclared units

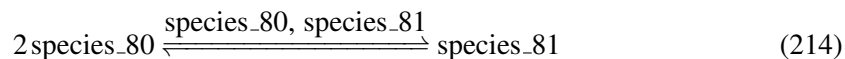
$$v_{92} = \text{vol}(c2) \cdot (\text{parameter_172} \cdot [\text{species_96}] \cdot [\text{species_95}] - \text{parameter_173} \cdot [\text{species_103}]) \quad (213)$$

8.93 Reaction `reaction_79`

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

Name reaction-v3

Reaction equation



Reactant

Table 274: Properties of each reactant.

Id	Name	SBO
species_80	IFN-R-JAK	

Modifiers

Table 275: Properties of each modifier.

Id	Name	SBO
species_80	IFN-R-JAK	
species_81	(IFN-R-JAK)2	

Product

Table 276: Properties of each product.

Id	Name	SBO
species_81	(IFN-R-JAK)2	

Kinetic Law

Derived unit contains undeclared units

$$v_{93} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{133} \cdot [\text{species}_{80}]^2 - \text{parameter}_{134} \cdot [\text{species}_{81}]) \quad (215)$$

8.94 Reaction [reaction_107](#)

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

Name reaction-v30

Reaction equation



Reactants

Table 277: Properties of each reactant.

Id	Name	SBO
species_84	STAT1C	
species_100	(IFN-R-JAK)2*-SOCS1	

Modifiers

Table 278: Properties of each modifier.

Id	Name	SBO
species_84	STAT1C	
species_100	(IFN-R-JAK)2*-SOCS1	
species_104	(IFN-R-JAK)2*-STAT1C-SOCS1	

Product

Table 279: Properties of each product.

Id	Name	SBO
species_104	(IFN-R-JAK)2*-STAT1C-SOCS1	

Kinetic Law

Derived unit contains undeclared units

$$v_{94} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{174} \cdot [\text{species}_{84}] \cdot [\text{species}_{100}] - \text{parameter}_{175} \cdot [\text{species}_{104}]) \quad (217)$$

8.95 Reaction [reaction_110](#)

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

Name reaction-v31

Reaction equation



Reactants

Table 280: Properties of each reactant.

Id	Name	SBO
species_108	SHP2	
species_104	(IFN-R-JAK)2*-STAT1C-SOCS1	

Modifiers

Table 281: Properties of each modifier.

Id	Name	SBO
species_108	SHP2	
species_104	(IFN-R-JAK)2*-STAT1C-SOCS1	
species_105	(IFN-R-JAK)2*-STAT1C-SHP2-SOCS1	

Product

Table 282: Properties of each product.

Id	Name	SBO
species_105	(IFN-R-JAK)2*-STAT1C-SHP2-SOCS1	

Kinetic Law

Derived unit contains undeclared units

$$v_{95} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{176} \cdot [\text{species}_{108}] \cdot [\text{species}_{104}] - \text{parameter}_{177} \cdot [\text{species}_{105}]) \quad (219)$$

8.96 Reaction [reaction_108](#)

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

Name reaction-v32

Reaction equation



Reactant

Table 283: Properties of each reactant.

Id	Name	SBO
species_105	(IFN-R-JAK)2*-STAT1C-SHP2-SOCS1	

Modifier

Table 284: Properties of each modifier.

Id	Name	SBO
species_105	(IFN-R-JAK)2*-STAT1C-SHP2-SOCS1	

Products

Table 285: Properties of each product.

Id	Name	SBO
species_99	SOCS1	
species_81	(IFN-R-JAK)2	
species_84	STAT1C	
species_108	SHP2	

Kinetic Law

Derived unit contains undeclared units

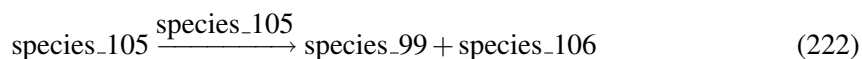
$$v_{96} = \text{vol}(\text{compartment}_1) \cdot \text{parameter}_{178} \cdot [\text{species}_{105}] \quad (221)$$

8.97 Reaction [reaction_109](#)

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

Name reaction-v33

Reaction equation



Reactant

Table 286: Properties of each reactant.

Id	Name	SBO
species_105	(IFN-R-JAK)2*-STAT1C-SHP2-SOCS1	

Modifier

Table 287: Properties of each modifier.

Id	Name	SBO
species_105	(IFN-R-JAK)2*-STAT1C-SHP2-SOCS1	

Products

Table 288: Properties of each product.

Id	Name	SBO
species_99	SOCS1	
species_106	(IFN-R-JAK)2*-STAT1C-SHP2	

Kinetic Law**Derived unit** contains undeclared units

$$v_{97} = \text{vol}(\text{compartment}_1) \cdot \text{parameter}_{179} \cdot [\text{species}_{105}] \quad (223)$$

8.98 Reaction [reaction_81](#)

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

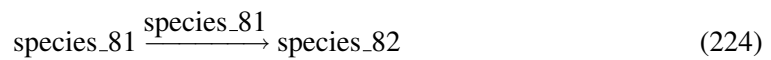
Name reaction-v4**Reaction equation****Reactant**

Table 289: Properties of each reactant.

Id	Name	SBO
species_81	(IFN-R-JAK)2	

Modifier

Table 290: Properties of each modifier.

Id	Name	SBO
species_81	(IFN-R-JAK)2	

Product

Table 291: Properties of each product.

Id	Name	SBO
species_82	(IFN-R-JAK)2*	

Kinetic Law

Derived unit contains undeclared units

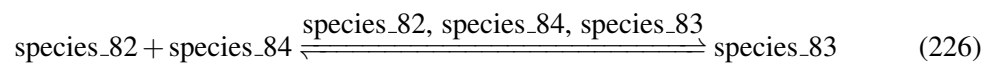
$$v_{98} = \text{vol}(\text{compartment}_1) \cdot \text{parameter}_{135} \cdot [\text{species}_{81}] \quad (225)$$

8.99 Reaction [reaction_82](#)

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

Name reaction-v5

Reaction equation



Reactants

Table 292: Properties of each reactant.

Id	Name	SBO
species_82	(IFN-R-JAK)2*	
species_84	STAT1C	

Modifiers

Table 293: Properties of each modifier.

Id	Name	SBO
species_82	(IFN-R-JAK)2*	
species_84	STAT1C	
species_83	(IFN-R-JAK)2*-STAT1C	

Product

Table 294: Properties of each product.

Id	Name	SBO
species_83	(IFN-R-JAK)2*-STAT1C	

Kinetic Law

Derived unit contains undeclared units

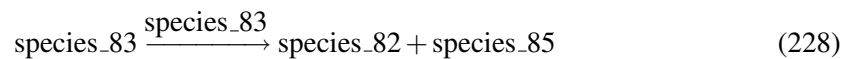
$$v_{99} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{136} \cdot [\text{species}_{82}] \cdot [\text{species}_{84}] - \text{parameter}_{137} \cdot [\text{species}_{83}]) \quad (227)$$

8.100 Reaction [reaction_83](#)

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

Name reaction-v6

Reaction equation



Reactant

Table 295: Properties of each reactant.

Id	Name	SBO
species_83	(IFN-R-JAK)2*-STAT1C	

Modifier

Table 296: Properties of each modifier.

Id	Name	SBO
species_83	(IFN-R-JAK)2*-STAT1C	

Products

Table 297: Properties of each product.

Id	Name	SBO
species_82	(IFN-R-JAK)2*	
species_85	STAT1C*	

Kinetic Law

Derived unit contains undeclared units

$$v_{100} = \text{vol}(\text{compartment_1}) \cdot \text{parameter_138} \cdot [\text{species_83}] \quad (229)$$

8.101 Reaction [reaction_84](#)

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

Name reaction-v7

Reaction equation



Reactants

Table 298: Properties of each reactant.

Id	Name	SBO
species_82	(IFN-R-JAK)2*	
species_85	STAT1C*	

Modifiers

Table 299: Properties of each modifier.

Id	Name	SBO
species_82	(IFN-R-JAK)2*	
species_85	STAT1C*	
species_86	(IFN-R-JAK)2*-STAT1C*	

Product

Table 300: Properties of each product.

Id	Name	SBO
species_86	(IFN-R-JAK)2*-STAT1C*	

Kinetic Law

Derived unit contains undeclared units

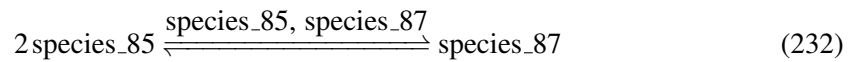
$$v_{101} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{139} \cdot [\text{species}_{82}] \cdot [\text{species}_{85}] - \text{parameter}_{140} \cdot [\text{species}_{86}]) \quad (231)$$

8.102 Reaction `reaction_85`

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

Name reaction-v8

Reaction equation



Reactant

Table 301: Properties of each reactant.

Id	Name	SBO
species_85	STAT1C*	

Modifiers

Table 302: Properties of each modifier.

Id	Name	SBO
species_85	STAT1C*	
species_87	(STAT1C*)2	

Product

Table 303: Properties of each product.

Id	Name	SBO
species_87	(STAT1C*)2	

Kinetic Law

Derived unit contains undeclared units

$$v_{102} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{141} \cdot [\text{species}_{85}]^2 - \text{parameter}_{142} \cdot [\text{species}_{87}]) \quad (233)$$

8.103 Reaction [reaction_86](#)

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

Name reaction-v9

Reaction equation



Reactants

Table 304: Properties of each reactant.

Id	Name	SBO
species_82	(IFN-R-JAK)2*	
species_108	SHP2	

Modifiers

Table 305: Properties of each modifier.

Id	Name	SBO
species_82	(IFN-R-JAK)2*	
species_108	SHP2	
species_88	(IFN-R-JAK)2*-SHP2	

Product

Table 306: Properties of each product.

Id	Name	SBO
species_88	(IFN-R-JAK)2*-SHP2	

Kinetic Law

Derived unit contains undeclared units

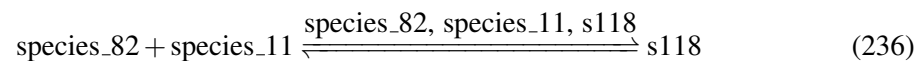
$$v_{103} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{143} \cdot [\text{species}_{82}] \cdot [\text{species}_{108}] - \text{parameter}_{144} \cdot [\text{species}_{88}]) \quad (235)$$

8.104 Reaction re112

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

Name reaction_n1

Reaction equation



Reactants

Table 307: Properties of each reactant.

Id	Name	SBO
species_82	(IFN-R-JAK)2*	
species_11	STAT3C	

Modifiers

Table 308: Properties of each modifier.

Id	Name	SBO
species_82	(IFN-R-JAK)2*	
species_11	STAT3C	
s118	(IFN-R-JAK)2*-STAT3C	

Product

Table 309: Properties of each product.

Id	Name	SBO
s118	(IFN-R-JAK)2*-STAT3C	

Kinetic Law

Derived unit contains undeclared units

$$v_{104} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{221} \cdot [\text{species}_{82}] \cdot [\text{species}_{11}] - \text{parameter}_{222} \cdot [\text{s118}]) \quad (237)$$

8.105 Reaction re117

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

Name reaction_n10

Reaction equation



Reactant

Table 310: Properties of each reactant.

Id	Name	SBO
s120	STAT1C*-STAT3C*	

Modifier

Table 311: Properties of each modifier.

Id	Name	SBO
s120	STAT1C*.-STAT3C*	

Product

Table 312: Properties of each product.

Id	Name	SBO
s122	STAT1N*.-STAT3N*	

Kinetic Law

Derived unit contains undeclared units

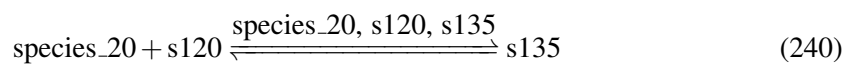
$$v_{105} = \text{vol}(\text{compartment_1}) \cdot \text{parameter_237} \cdot [\text{s120}] \quad (239)$$

8.106 Reaction re153

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

Name reaction_n11

Reaction equation



Reactants

Table 313: Properties of each reactant.

Id	Name	SBO
species_20	PP1	
s120	STAT1C*.-STAT3C*	

Modifiers

Table 314: Properties of each modifier.

Id	Name	SBO
species_20	PP1	
s120	STAT1C*-STAT3C*	
s135	PP1-STAT1C*-STAT3C*	

Product

Table 315: Properties of each product.

Id	Name	SBO
s135	PP1-STAT1C*-STAT3C*	

Kinetic Law

Derived unit contains undeclared units

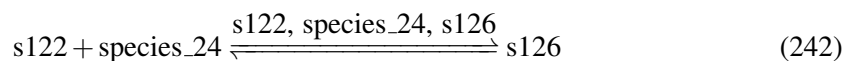
$$v_{106} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{238} \cdot [\text{species}_{20}] \cdot [\text{s120}] - \text{parameter}_{239} \cdot [\text{s135}]) \quad (241)$$

8.107 Reaction re126

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

Name reaction_n12

Reaction equation



Reactants

Table 316: Properties of each reactant.

Id	Name	SBO
s122	STAT1N*-STAT3N*	
species_24	PP2	

Modifiers

Table 317: Properties of each modifier.

Id	Name	SBO
s122	STAT1N*-STAT3N*	
species_24	PP2	
s126	PP2-STAT1N*-STAT3N*	

Product

Table 318: Properties of each product.

Id	Name	SBO
s126	PP2-STAT1N*-STAT3N*	

Kinetic Law

Derived unit contains undeclared units

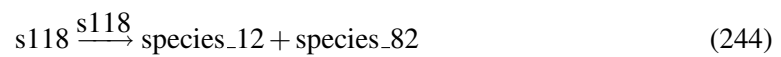
$$v_{107} = \text{parameter_240} \cdot [s122] \cdot [\text{species_24}] - \text{parameter_241} \cdot [s126] \quad (243)$$

8.108 Reaction re113

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

Name reaction_n2

Reaction equation



Reactant

Table 319: Properties of each reactant.

Id	Name	SBO
s118	(IFN-R-JAK)2*-STAT3C	

Modifier

Table 320: Properties of each modifier.

Id	Name	SBO
s118	(IFN-R-JAK)2*-STAT3C	

Products

Table 321: Properties of each product.

Id	Name	SBO
species_12	STAT3C*	
species_82	(IFN-R-JAK)2*	

Kinetic Law

Derived unit contains undeclared units

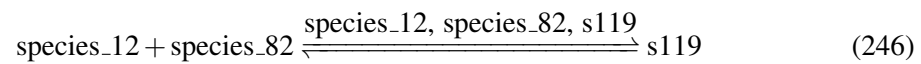
$$v_{108} = \text{vol}(\text{compartment_1}) \cdot \text{parameter_223} \cdot [\text{s118}] \quad (245)$$

8.109 Reaction re114

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

Name reaction_n3

Reaction equation



Reactants

Table 322: Properties of each reactant.

Id	Name	SBO
species_12	STAT3C*	
species_82	(IFN-R-JAK)2*	

Modifiers

Table 323: Properties of each modifier.

Id	Name	SBO
species_12	STAT3C*	
species_82	(IFN-R-JAK)2*	
s119	(IFN-R-JAK)2*-STAT3C*	

Product

Table 324: Properties of each product.

Id	Name	SBO
s119	(IFN-R-JAK)2*-STAT3C*	

Kinetic Law

Derived unit contains undeclared units

$$v_{109} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{224} \cdot [\text{species}_{12}] \cdot [\text{species}_{82}] - \text{parameter}_{225} \cdot [\text{s119}]) \quad (247)$$

8.110 Reaction re157

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

Name reaction_n4

Reaction equation



Reactants

Table 325: Properties of each reactant.

Id	Name	SBO
species_9	(IL6-gp80-gp130-JAK)2*	
species_84	STAT1C	

Modifiers

Table 326: Properties of each modifier.

Id	Name	SBO
species_9	(IL6-gp80-gp130-JAK)2*	
species_84	STAT1C	
s138	(IL6-gp80-gp130-JAK)2*-STAT1	

Product

Table 327: Properties of each product.

Id	Name	SBO
s138	(IL6-gp80-gp130-JAK)2*-STAT1	

Kinetic Law

Derived unit contains undeclared units

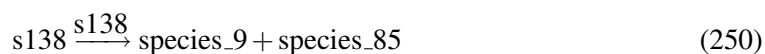
$$v_{110} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{226} \cdot [\text{species}_9] \cdot [\text{species}_{84}] - \text{parameter}_{227} \cdot [\text{s138}]) \quad (249)$$

8.111 Reaction re158

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

Name reaction_n5

Reaction equation



Reactant

Table 328: Properties of each reactant.

Id	Name	SBO
s138	(IL6-gp80-gp130-JAK)2*-STAT1	

Modifier

Table 329: Properties of each modifier.

Id	Name	SBO
s138	(IL6-gp80-gp130-JAK)2*-STAT1	

Products

Table 330: Properties of each product.

Id	Name	SBO
species_9	(IL6-gp80-gp130-JAK)2*	
species_85	STAT1C*	

Kinetic Law

Derived unit contains undeclared units

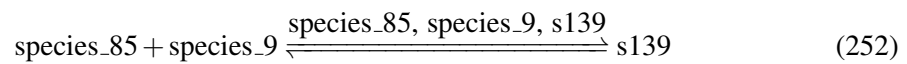
$$v_{111} = \text{vol}(\text{compartment_1}) \cdot \text{parameter_228} \cdot [\text{s138}] \quad (251)$$

8.112 Reaction re159

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

Name reaction_n6

Reaction equation



Reactants

Table 331: Properties of each reactant.

Id	Name	SBO
species_85	STAT1C*	
species_9	(IL6-gp80-gp130-JAK)2*	

Modifiers

Table 332: Properties of each modifier.

Id	Name	SBO
species_85	STAT1C*	
species_9	(IL6-gp80-gp130-JAK)2*	
s139	(IL6-gp80-gp130-JAK)2*-STAT1*	

Product

Table 333: Properties of each product.

Id	Name	SBO
s139	(IL6-gp80-gp130-JAK)2*-STAT1*	

Kinetic Law

Derived unit contains undeclared units

$$v_{112} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{229} \cdot [\text{species}_{85}] \cdot [\text{species}_9] - \text{parameter}_{230} \cdot [\text{s139}]) \quad (253)$$

8.113 Reaction re116

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

Name reaction_n7

Reaction equation



Modifiers

Table 334: Properties of each modifier.

Id	Name	SBO
species_92	(STAT1N*)2	
species_92	(STAT1N*)2	

Product

Table 335: Properties of each product.

Id	Name	SBO
species_30	mRNA-SOCS3N	

Kinetic Law

Derived unit contains undeclared units

$$v_{113} = \text{vol}(c3) \cdot \text{function_4_reaction_n7_1}(\text{parameter_231}, \text{parameter_232}, [\text{species_92}]) \quad (255)$$

$$\begin{aligned} & \text{function_4_reaction_n7_1}(\text{parameter_231}, \text{parameter_232}, [\text{species_92}]) \\ &= \frac{\text{parameter_231} \cdot [\text{species_92}]}{\text{parameter_232} + [\text{species_92}]} \end{aligned} \quad (256)$$

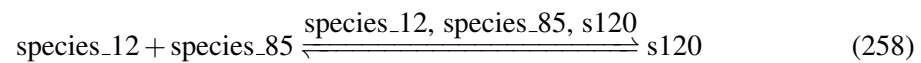
$$\begin{aligned} & \text{function_4_reaction_n7_1}(\text{parameter_231}, \text{parameter_232}, [\text{species_92}]) \\ &= \frac{\text{parameter_231} \cdot [\text{species_92}]}{\text{parameter_232} + [\text{species_92}]} \end{aligned} \quad (257)$$

8.114 Reaction re115

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

Name reaction_n8

Reaction equation



Reactants

Table 336: Properties of each reactant.

Id	Name	SBO
species_12	STAT3C*	
species_85	STAT1C*	

Modifiers

Table 337: Properties of each modifier.

Id	Name	SBO
species_12	STAT3C*	
species_85	STAT1C*	
s120	STAT1C*-STAT3C*	

Product

Table 338: Properties of each product.

Id	Name	SBO
s120	STAT1C*-STAT3C*	

Kinetic Law

Derived unit contains undeclared units

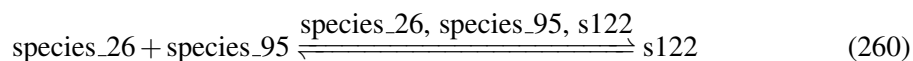
$$v_{114} = \text{vol}(\text{compartment}_1) \cdot (\text{parameter}_{233} \cdot [\text{species}_{12}] \cdot [\text{species}_{85}] - \text{parameter}_{234} \cdot [\text{s120}]) \quad (259)$$

8.115 Reaction re121

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

Name reaction_n9

Reaction equation



Reactants

Table 339: Properties of each reactant.

Id	Name	SBO
species_26	STAT3N*	
species_95	STAT1N*	

Modifiers

Table 340: Properties of each modifier.

Id	Name	SBO
species_26	STAT3N*	
species_95	STAT1N*	
s122	STAT1N*-STAT3N*	

Product

Table 341: Properties of each product.

Id	Name	SBO
s122	STAT1N*-STAT3N*	

Kinetic Law

Derived unit contains undeclared units

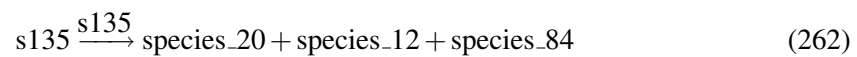
$$v_{115} = \text{parameter_235} \cdot [\text{species_26}] \cdot [\text{species_95}] - \text{parameter_236} \cdot [\text{s122}] \quad (261)$$

8.116 Reaction re161

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

Name reaction_n13

Reaction equation



Reactant

Table 342: Properties of each reactant.

Id	Name	SBO
s135	PP1-STAT1C*-STAT3C*	

Modifier

Table 343: Properties of each modifier.

Id	Name	SBO
s135	PP1-STATIC*-STAT3C*	

Products

Table 344: Properties of each product.

Id	Name	SBO
species_20	PP1	
species_12	STAT3C*	
species_84	STATIC	

Kinetic Law

Derived unit contains undeclared units

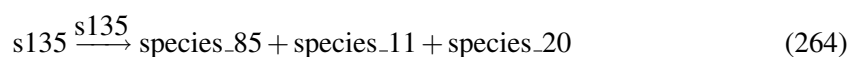
$$v_{116} = \text{vol}(\text{compartment_1}) \cdot \text{parameter_242} \cdot [\text{s135}] \quad (263)$$

8.117 Reaction re162

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

Name reaction_n14

Reaction equation



Reactant

Table 345: Properties of each reactant.

Id	Name	SBO
s135	PP1-STATIC*-STAT3C*	

Modifier

Table 346: Properties of each modifier.

Id	Name	SBO
s135	PP1-STAT1C*-STAT3C*	

Products

Table 347: Properties of each product.

Id	Name	SBO
species_85	STAT1C*	
species_11	STAT3C	
species_20	PP1	

Kinetic Law

Derived unit contains undeclared units

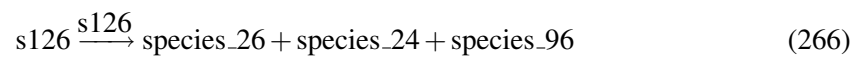
$$v_{117} = \text{vol}(\text{compartment_1}) \cdot \text{parameter_243} \cdot [\text{s135}] \quad (265)$$

8.118 Reaction re163

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

Name reaction_n15

Reaction equation



Reactant

Table 348: Properties of each reactant.

Id	Name	SBO
s126	PP2-STAT1N*-STAT3N*	

Modifier

Table 349: Properties of each modifier.

Id	Name	SBO
s126	PP2-STAT1N*-STAT3N*	

Products

Table 350: Properties of each product.

Id	Name	SBO
species_26	STAT3N*	
species_24	PP2	
species_96	STAT1N	

Kinetic Law

Derived unit contains undeclared units

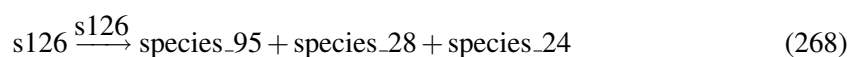
$$v_{118} = \text{parameter_244} \cdot [\text{s126}] \quad (267)$$

8.119 Reaction re164

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

Name reaction_n16

Reaction equation



Reactant

Table 351: Properties of each reactant.

Id	Name	SBO
s126	PP2-STAT1N*-STAT3N*	

Modifier

Table 352: Properties of each modifier.

Id	Name	SBO
s126	PP2-STAT1N*-STAT3N*	

Products

Table 353: Properties of each product.

Id	Name	SBO
species_95	STAT1N*	
species_28	STAT3N	
species_24	PP2	

Kinetic Law

Derived unit contains undeclared units

$$v_{119} = \text{parameter_245} \cdot [\text{s126}] \quad (269)$$

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 IL6

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in [reaction_1](#) and as a modifier in [reaction_1](#)), which do not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{d}{dt} \text{species_1} = 0 \quad (270)$$

9.2 Species `species_79`

Name IFN

Initial concentration $0.1 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in two reactions (as a reactant in [reaction_80](#) and as a modifier in [reaction_80](#)), which do not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{d}{dt}\text{species_79} = 0 \quad (271)$$

9.3 Species `s118`

Name (IFN-R-JAK)2*-STAT3C

Initial concentration $0 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in [re113](#) and as a product in [re112](#) and as a modifier in [re112](#), [re113](#)).

$$\frac{d}{dt}s118 = v_{104} - v_{108} \quad (272)$$

9.4 Species `s119`

Name (IFN-R-JAK)2*-STAT3C*

Initial concentration $0 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in two reactions (as a product in [re114](#) and as a modifier in [re114](#)).

$$\frac{d}{dt}s119 = v_{109} \quad (273)$$

9.5 Species `s120`

Name STAT1C*-STAT3C*

Initial concentration $0 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in [re117](#), [re153](#) and as a product in [re115](#) and as a modifier in [re117](#), [re153](#), [re115](#)).

$$\frac{d}{dt}s120 = v_{114} - v_{105} - v_{106} \quad (274)$$

9.6 Species `s122`

Name STAT1N*-STAT3N*

Initial concentration 0 nmol · l⁻¹

This species takes part in five reactions (as a reactant in [re126](#) and as a product in [re117](#), [re121](#) and as a modifier in [re126](#), [re121](#)).

$$\frac{d}{dt}s122 = v_{105} + v_{115} - v_{107} \quad (275)$$

9.7 Species `species_2`

Name gp80

Initial concentration 8 nmol · l⁻¹

This species takes part in two reactions (as a reactant in [reaction_1](#) and as a modifier in [reaction_1](#)), which do not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{d}{dt}species_2 = 0 \quad (276)$$

9.8 Species `species_3`

Name IL6-gp80

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_3](#) and as a product in [reaction_1](#) and as a modifier in [reaction_1](#), [reaction_3](#)).

$$\frac{d}{dt}species_3 = v_2 - v_{18} \quad (277)$$

9.9 Species `species_4`

Name gp130

Initial concentration 0.8 nmol · l⁻¹

This species takes part in two reactions (as a reactant in [re160](#) and as a modifier in [re160](#)), which do not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{d}{dt}species_4 = 0 \quad (278)$$

9.10 Species `species_5`

Name JAK(IFN)

Initial concentration $12 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in two reactions (as a reactant in [re135](#) and as a modifier in [re135](#)).

$$\frac{d}{dt}\text{species_5} = -v_{71} \quad (279)$$

9.11 Species `species_6`

Name gp130-JAK

Initial concentration $0 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in [reaction_3](#) and as a product in [re160](#) and as a modifier in [re160](#), [reaction_3](#)).

$$\frac{d}{dt}\text{species_6} = v_1 - v_{18} \quad (280)$$

9.12 Species `species_7`

Name IL6-gp80-gp130-JAK

Initial concentration $0 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in [reaction_5](#) and as a product in [reaction_3](#) and as a modifier in [reaction_3](#), [reaction_5](#)).

$$\frac{d}{dt}\text{species_7} = v_{18} - 2v_{49} \quad (281)$$

9.13 Species `species_8`

Name (IL6-gp80-gp130-JAK)₂

Initial concentration $0 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in [reaction_6](#) and as a product in [re137](#), [reaction_73](#), [reaction_5](#) and as a modifier in [reaction_5](#), [reaction_6](#)).

$$\frac{d}{dt}\text{species_8} = v_6 + v_{27} + v_{49} - v_{60} \quad (282)$$

9.14 Species `species_9`

Name (IL6-gp80-gp130-JAK)2*

Initial concentration 0 nmol · l⁻¹

This species takes part in 21 reactions (as a reactant in [reaction_8](#), [re138](#), [reaction_26](#), [reaction_4](#), [re157](#), [re159](#) and as a product in [reaction_37](#), [reaction_42](#), [reaction_44](#), [reaction_6](#), [reaction_7](#), [re158](#) and as a modifier in [reaction_8](#), [re138](#), [reaction_26](#), [reaction_37](#), [reaction_42](#), [reaction_44](#), [reaction_4](#), [re157](#), [re159](#)).

$$\frac{d}{dt}\text{species_9} = v_{37} + v_{41} + v_{43} + v_{60} + v_{70} + v_{111} - v_3 - v_5 - v_{24} - v_{69} - v_{110} - v_{112} \quad (283)$$

9.15 Species `species_10`

Name (IL6-gp80-gp130-JAK)2*-STAT3C

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_7](#) and as a product in [reaction_4](#) and as a modifier in [reaction_4](#), [reaction_7](#)).

$$\frac{d}{dt}\text{species_10} = v_{69} - v_{70} \quad (284)$$

9.16 Species `species_11`

Name STAT3C

Initial concentration 1000 nmol · l⁻¹

This species takes part in nine reactions (as a reactant in [reaction_16](#), [reaction_4](#), [re112](#) and as a product in [reaction_14](#), [reaction_22](#), [re162](#) and as a modifier in [reaction_16](#), [reaction_4](#), [re112](#)).

$$\frac{d}{dt}\text{species_11} = v_8 + v_{20} + v_{117} - v_{11} - v_{69} - v_{104} \quad (285)$$

9.17 Species `species_12`

Name STAT3C*

Initial concentration 0 nmol · l⁻¹

This species takes part in 15 reactions (as a reactant in [reaction_8](#), [reaction_9](#), [reaction_12](#), [reaction_16](#), [re114](#), [re115](#) and as a product in [reaction_7](#), [re113](#), [re161](#) and as a modifier in [reaction_8](#), [reaction_9](#), [reaction_12](#), [reaction_16](#), [re114](#), [re115](#)).

$$\frac{d}{dt}\text{species_12} = v_{70} + v_{108} + v_{116} - v_3 - 2 v_4 - v_7 - v_{11} - v_{109} - v_{114} \quad (286)$$

9.18 Species `species_13`

Name (IL6-gp80-gp130-JAK)2*-STAT3C*

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a product in [reaction_8](#) and as a modifier in [reaction_8](#)).

$$\frac{d}{dt}\text{species_13} = v_3 \quad (287)$$

9.19 Species `species_14`

Name (STAT3C*)₂

Initial concentration 0 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [reaction_13](#), [reaction_17](#) and as a product in [reaction_9](#) and as a modifier in [reaction_9](#), [reaction_13](#), [reaction_17](#)).

$$\frac{d}{dt}\text{species_14} = v_4 - v_9 - v_{12} \quad (288)$$

9.20 Species `species_15`

Name (IL6-gp80-gp130-JAK)2*-SOCS3

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_73](#) and as a product in [reaction_26](#) and as a modifier in [reaction_26](#), [reaction_73](#)).

$$\frac{d}{dt}\text{species_15} = v_{24} - v_{27} \quad (289)$$

9.21 Species `species_16`

Name (IL6-gp80-gp130-JAK)2*-SHP2

Initial concentration 0 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [re137](#), [reaction_39](#) and as a product in [re138](#) and as a modifier in [re137](#), [re137](#), [reaction_39](#)).

$$\frac{d}{dt}\text{species_16} = v_5 - v_6 - v_{28} \quad (290)$$

9.22 Species `species_18`

Name STAT3C-STAT3C*

Initial concentration 0 nmol · l⁻¹

This species takes part in three reactions (as a product in [reaction_15](#), [reaction_16](#) and as a modifier in [reaction_16](#)).

$$\frac{d}{dt}\text{species_18} = v_{10} + v_{11} \quad (291)$$

9.23 Species `species_19`

Name SOCS3

Initial concentration 0 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [reaction_26](#), [reaction_28](#) and as a product in [reaction_25](#), [reaction_73](#) and as a modifier in [reaction_26](#), [reaction_28](#)).

$$\frac{d}{dt}\text{species_19} = v_{23} + v_{27} - v_{24} - v_{26} \quad (292)$$

9.24 Species `species_20`

Name PP1

Initial concentration 50 nmol · l⁻¹

This species takes part in 16 reactions (as a reactant in [reaction_12](#), [reaction_13](#), [re140](#), [re142](#), [re153](#) and as a product in [reaction_14](#), [reaction_15](#), [re141](#), [re143](#), [re161](#), [re162](#) and as a modifier in [reaction_12](#), [reaction_13](#), [re140](#), [re142](#), [re153](#)).

$$\frac{d}{dt}\text{species_20} = v_8 + v_{10} + v_{74} + v_{88} + v_{116} + v_{117} - v_7 - v_9 - v_{73} - v_{87} - v_{106} \quad (293)$$

9.25 Species `species_21`

Name PP1-STAT3C*

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_14](#) and as a product in [reaction_12](#) and as a modifier in [reaction_12](#), [reaction_14](#)).

$$\frac{d}{dt}\text{species_21} = v_7 - v_8 \quad (294)$$

9.26 Species `species_22`

Name PP1-(STAT3C*)2

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_15](#) and as a product in [reaction_13](#) and as a modifier in [reaction_13](#), [reaction_15](#)).

$$\frac{d}{dt}\text{species_22} = v_9 - v_{10} \quad (295)$$

9.27 Species `species_31`

Name mRNA-SOCS3C

Initial concentration 0 nmol · l⁻¹

This species takes part in five reactions (as a reactant in [reaction_27](#) and as a product in [reaction_24](#) and as a modifier in [reaction_25](#), [reaction_25](#), [reaction_27](#)).

$$\frac{d}{dt}\text{species_31} = v_{22} - v_{25} \quad (296)$$

9.28 Species `species_32`

Name Grb2

Initial concentration 85 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [reaction_29](#), [reaction_43](#) and as a product in [reaction_40](#) and as a modifier in [reaction_29](#), [reaction_40](#), [reaction_43](#)).

$$\frac{d}{dt}\text{species_32} = v_{39} - v_{29} - v_{42} \quad (297)$$

9.29 Species `species_33`

Name (IL6-gp80-gp130-JAK)2*-SHP2*

Initial concentration 0 nmol · l⁻¹

This species takes part in eight reactions (as a reactant in [reaction_29](#), [reaction_42](#), [reaction_46](#) and as a product in [reaction_39](#) and as a modifier in [reaction_39](#), [reaction_29](#), [reaction_42](#), [reaction_46](#)).

$$\frac{d}{dt}\text{species_33} = v_{28} - v_{29} - v_{41} - v_{45} \quad (298)$$

9.30 Species [species_34](#)

Name (IL6-gp80-gp130-JAK)2*-SHP2*-Grb2

Initial concentration 0 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [reaction_30](#), [reaction_44](#) and as a product in [reaction_29](#) and as a modifier in [reaction_29](#), [reaction_30](#), [reaction_44](#)).

$$\frac{d}{dt}\text{species_34} = v_{29} - v_{30} - v_{43} \quad (299)$$

9.31 Species [species_35](#)

Name SOS

Initial concentration 34 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [reaction_30](#), [reaction_45](#) and as a product in [reaction_40](#) and as a modifier in [reaction_30](#), [reaction_40](#), [reaction_45](#)).

$$\frac{d}{dt}\text{species_35} = v_{39} - v_{30} - v_{44} \quad (300)$$

9.32 Species [species_36](#)

Name SHP2*-Grb2

Initial concentration 0 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [reaction_45](#) and as a product in [reaction_43](#), [reaction_44](#) and as a modifier in [reaction_43](#), [reaction_44](#), [reaction_45](#)).

$$\frac{d}{dt}\text{species_36} = v_{42} + v_{43} - v_{44} \quad (301)$$

9.33 Species [species_37](#)

Name (IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS

Initial concentration 0 nmol · l⁻¹

This species takes part in 14 reactions (as a reactant in [reaction_31](#), [reaction_35](#), [reaction_37](#) and as a product in [reaction_30](#), [reaction_32](#), [reaction_36](#), [reaction_46](#) and as a modifier in [reaction_30](#), [reaction_31](#), [reaction_32](#), [reaction_35](#), [reaction_36](#), [reaction_37](#), [reaction_46](#)).

$$\frac{d}{dt}\text{species_37} = v_{30} + v_{32} + v_{36} + v_{45} - v_{31} - v_{35} - v_{37} \quad (302)$$

9.34 Species `species_38`

Name Ras-GDP

Initial concentration 19000 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_31](#) and as a product in [reaction_36](#) and as a modifier in [reaction_31](#), [reaction_36](#)).

$$\frac{d}{dt}\text{species_38} = v_{36} - v_{31} \quad (303)$$

9.35 Species `species_39`

Name (IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS-Ras-GDP

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_32](#) and as a product in [reaction_31](#) and as a modifier in [reaction_31](#), [reaction_32](#)).

$$\frac{d}{dt}\text{species_39} = v_{31} - v_{32} \quad (304)$$

9.36 Species `species_40`

Name Ras-GTP

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_33](#) and as a product in [reaction_32](#) and as a modifier in [reaction_32](#), [reaction_33](#)).

$$\frac{d}{dt}\text{species_40} = v_{32} - v_{33} \quad (305)$$

9.37 Species `species_41`

Name Raf

Initial concentration 67 nmol · l⁻¹

This species takes part in three reactions (as a reactant in [reaction_33](#) and as a product in [reaction_48](#) and as a modifier in [reaction_33](#)).

$$\frac{d}{dt}\text{species_41} = v_{47} - v_{33} \quad (306)$$

9.38 Species `species_42`

Name Raf-Ras-GTP

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_34](#) and as a product in [reaction_33](#) and as a modifier in [reaction_33](#), [reaction_34](#)).

$$\frac{d}{dt}\text{species_42} = v_{33} - v_{34} \quad (307)$$

9.39 Species `species_43`

Name Ras-GTP*

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_35](#) and as a product in [reaction_34](#) and as a modifier in [reaction_34](#), [reaction_35](#)).

$$\frac{d}{dt}\text{species_43} = v_{34} - v_{35} \quad (308)$$

9.40 Species `species_44`

Name Raf*

Initial concentration 0 nmol · l⁻¹

This species takes part in ten reactions (as a reactant in [reaction_47](#), [reaction_49](#), [reaction_51](#) and as a product in [reaction_34](#), [reaction_50](#), [reaction_52](#) and as a modifier in [reaction_34](#), [reaction_47](#), [reaction_49](#), [reaction_51](#)).

$$\frac{d}{dt}\text{species_44} = v_{34} + v_{50} + v_{52} - v_{46} - v_{48} - v_{51} \quad (309)$$

9.41 Species `species_45`

Name (IL6-gp80-gp130-JAK)2*-SHP2*-Grb2-SOS-Ras-GTP

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_36](#) and as a product in [reaction_35](#) and as a modifier in [reaction_35](#), [reaction_36](#)).

$$\frac{d}{dt}\text{species_45} = v_{35} - v_{36} \quad (310)$$

9.42 Species `species_46`

Name SHP2*-Grb2-SOS

Initial concentration 0 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [reaction_38](#) and as a product in [reaction_37](#), [reaction_45](#) and as a modifier in [reaction_37](#), [reaction_38](#), [reaction_45](#)).

$$\frac{d}{dt}\text{species_46} = v_{37} + v_{44} - v_{38} \quad (311)$$

9.43 Species `species_47`

Name Grb2-SOS

Initial concentration 0 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [reaction_40](#), [reaction_46](#) and as a product in [reaction_38](#) and as a modifier in [reaction_38](#), [reaction_40](#), [reaction_46](#)).

$$\frac{d}{dt}\text{species_47} = v_{38} - v_{39} - v_{45} \quad (312)$$

9.44 Species `species_48`

Name SHP2*

Initial concentration 0 nmol · l⁻¹

This species takes part in eight reactions (as a reactant in [re136](#), [reaction_43](#) and as a product in [reaction_38](#), [reaction_42](#) and as a modifier in [reaction_38](#), [re136](#), [reaction_42](#), [reaction_43](#)).

$$\frac{d}{dt}\text{species_48} = v_{38} + v_{41} - v_{40} - v_{42} \quad (313)$$

9.45 Species `species_49`

Name Phosp1

Initial concentration 67 nmol · l⁻¹

This species takes part in three reactions (as a reactant in [reaction_47](#) and as a product in [reaction_48](#) and as a modifier in [reaction_47](#)).

$$\frac{d}{dt}\text{species_49} = v_{47} - v_{46} \quad (314)$$

9.46 Species `species_50`

Name Raf*-Phosp1

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_48](#) and as a product in [reaction_47](#) and as a modifier in [reaction_47](#), [reaction_48](#)).

$$\frac{d}{dt}\text{species_50} = v_{46} - v_{47} \quad (315)$$

9.47 Species `species_51`

Name MEK

Initial concentration 41667 nmol · l⁻¹

This species takes part in three reactions (as a reactant in [reaction_49](#) and as a product in [reaction_56](#) and as a modifier in [reaction_49](#)).

$$\frac{d}{dt}\text{species_51} = v_{56} - v_{48} \quad (316)$$

9.48 Species `species_52`

Name MEK-Raf*

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_50](#) and as a product in [reaction_49](#) and as a modifier in [reaction_49](#), [reaction_50](#)).

$$\frac{d}{dt}\text{species_52} = v_{48} - v_{50} \quad (317)$$

9.49 Species `species_53`

Name MEK-P

Initial concentration 0 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [reaction_51](#), [reaction_55](#) and as a product in [reaction_50](#), [reaction_54](#) and as a modifier in [reaction_51](#), [reaction_55](#)).

$$\frac{d}{dt}\text{species_53} = v_{50} + v_{54} - v_{51} - v_{55} \quad (318)$$

9.50 Species `species_54`

Name MEK-P-Raf*

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_52](#) and as a product in [reaction_51](#) and as a modifier in [reaction_51](#), [reaction_52](#)).

$$\frac{d}{dt}\text{species_54} = v_{51} - v_{52} \quad (319)$$

9.51 Species `species_55`

Name MEK-PP

Initial concentration 0 nmol · l⁻¹

This species takes part in nine reactions (as a reactant in [reaction_53](#), [reaction_57](#), [reaction_59](#) and as a product in [reaction_52](#), [reaction_58](#), [reaction_60](#) and as a modifier in [reaction_53](#), [reaction_57](#), [reaction_59](#)).

$$\frac{d}{dt}\text{species_55} = v_{52} + v_{58} + v_{61} - v_{53} - v_{57} - v_{59} \quad (320)$$

9.52 Species `species_56`

Name MEK-PP-Phosp2

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_54](#) and as a product in [reaction_53](#) and as a modifier in [reaction_53](#), [reaction_54](#)).

$$\frac{d}{dt}\text{species_56} = v_{53} - v_{54} \quad (321)$$

9.53 Species `species_57`

Name Phosp2

Initial concentration 67 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [reaction_53](#), [reaction_55](#) and as a product in [reaction_54](#), [reaction_56](#) and as a modifier in [reaction_53](#), [reaction_55](#)).

$$\frac{d}{dt}\text{species_57} = v_{54} + v_{56} - v_{53} - v_{55} \quad (322)$$

9.54 Species `species_58`

Name MEK-P-Phosp2

Initial concentration $0 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in [reaction_56](#) and as a product in [reaction_55](#) and as a modifier in [reaction_55](#), [reaction_56](#)).

$$\frac{d}{dt}\text{species_58} = v_{55} - v_{56} \quad (323)$$

9.55 Species `species_59`

Name ERK

Initial concentration $35000 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in three reactions (as a reactant in [reaction_57](#) and as a product in [reaction_63](#) and as a modifier in [reaction_57](#)).

$$\frac{d}{dt}\text{species_59} = v_{65} - v_{57} \quad (324)$$

9.56 Species `species_60`

Name ERK-MEK-PP

Initial concentration $0 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in [reaction_58](#) and as a product in [reaction_57](#) and as a modifier in [reaction_57](#), [reaction_58](#)).

$$\frac{d}{dt}\text{species_60} = v_{57} - v_{58} \quad (325)$$

9.57 Species `species_61`

Name ERK-P

Initial concentration $0 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in [reaction_59](#), [reaction_62](#) and as a product in [reaction_58](#), [reaction_61](#) and as a modifier in [reaction_59](#), [reaction_62](#)).

$$\frac{d}{dt}\text{species_61} = v_{58} + v_{63} - v_{59} - v_{64} \quad (326)$$

9.58 Species `species_62`

Name ERK-P-MEK-PP

Initial concentration $0 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in [reaction_60](#) and as a product in [reaction_59](#) and as a modifier in [reaction_59](#), [reaction_60](#)).

$$\frac{d}{dt}\text{species_62} = v_{59} - v_{61} \quad (327)$$

9.59 Species `species_63`

Name ERK-PP

Initial concentration $0 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in five reactions (as a reactant in [reaction_64](#) and as a product in [reaction_60](#) and as a modifier in [reaction_64](#), [reaction_74](#), [reaction_74](#)).

$$\frac{d}{dt}\text{species_63} = v_{61} - v_{62} \quad (328)$$

9.60 Species `species_64`

Name Phosp3

Initial concentration $16667 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in [reaction_64](#), [reaction_62](#) and as a product in [reaction_61](#), [reaction_63](#) and as a modifier in [reaction_64](#), [reaction_62](#)).

$$\frac{d}{dt}\text{species_64} = v_{63} + v_{65} - v_{62} - v_{64} \quad (329)$$

9.61 Species `species_65`

Name ERK-PP-Phosp3

Initial concentration $0 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in [reaction_61](#) and as a product in [reaction_64](#) and as a modifier in [reaction_64](#), [reaction_61](#)).

$$\frac{d}{dt}\text{species_65} = v_{62} - v_{63} \quad (330)$$

9.62 Species `species_66`

Name ERK-P-Phosp3

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_63](#) and as a product in [reaction_62](#) and as a modifier in [reaction_62](#), [reaction_63](#)).

$$\frac{d}{dt}\text{species_66} = v_{64} - v_{65} \quad (331)$$

9.63 Species `s126`

Name PP2-STAT1N*-STAT3N*

Initial concentration 0 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [re163](#), [re164](#) and as a product in [re126](#) and as a modifier in [re126](#), [re163](#), [re164](#)).

$$\frac{d}{dt}s126 = v_{107} - v_{118} - v_{119} \quad (332)$$

9.64 Species `s135`

Name PP1-STAT1C*-STAT3C*

Initial concentration 0 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [re161](#), [re162](#) and as a product in [re153](#) and as a modifier in [re153](#), [re161](#), [re162](#)).

$$\frac{d}{dt}s135 = v_{106} - v_{116} - v_{117} \quad (333)$$

9.65 Species `species_74`

Name CEBPi

Initial concentration 40493 nmol · l⁻¹

This species takes part in three reactions (as a reactant in [reaction_74](#) and as a product in [reaction_75](#) and as a modifier in [reaction_74](#)).

$$\frac{d}{dt}\text{species_74} = v_{67} - v_{66} \quad (334)$$

9.66 Species `species_75`

Name CEBP

Initial concentration 0 nmol · l⁻¹

This species takes part in five reactions (as a reactant in [reaction_75](#), [reaction_76](#) and as a product in [reaction_74](#) and as a modifier in [reaction_75](#), [reaction_76](#)).

$$\frac{d}{dt}\text{species_75} = v_{66} - v_{67} - 2 v_{68} \quad (335)$$

9.67 Species `species_76`

Name CEBPn

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a product in [reaction_76](#) and as a modifier in [reaction_76](#)).

$$\frac{d}{dt}\text{species_76} = v_{68} \quad (336)$$

9.68 Species `species_78`

Name R-JAK

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_80](#) and as a product in [re135](#) and as a modifier in [re135](#), [reaction_80](#)).

$$\frac{d}{dt}\text{species_78} = v_{71} - v_{82} \quad (337)$$

9.69 Species `species_80`

Name IFN-R-JAK

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_79](#) and as a product in [reaction_80](#) and as a modifier in [reaction_80](#), [reaction_79](#)).

$$\frac{d}{dt}\text{species_80} = v_{82} - 2 v_{93} \quad (338)$$

9.70 Species `species_81`

Name (IFN-R-JAK)2

Initial concentration 0 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [reaction_81](#) and as a product in [reaction_87](#), [reaction_79](#), [reaction_108](#) and as a modifier in [reaction_79](#), [reaction_81](#)).

$$\frac{d}{dt}\text{species_81} = v_{72} + v_{93} + v_{96} - v_{98} \quad (339)$$

9.71 Species `species_82`

Name (IFN-R-JAK)2*

Initial concentration 0 nmol · l⁻¹

This species takes part in 15 reactions (as a reactant in [reaction_98](#), [reaction_82](#), [reaction_84](#), [reaction_86](#), [re112](#), [re114](#) and as a product in [reaction_81](#), [reaction_83](#), [re113](#) and as a modifier in [reaction_98](#), [reaction_82](#), [reaction_84](#), [reaction_86](#), [re112](#), [re114](#)).

$$\frac{d}{dt}\text{species_82} = v_{98} + v_{100} + v_{108} - v_{84} - v_{99} - v_{101} - v_{103} - v_{104} - v_{109} \quad (340)$$

9.72 Species `species_83`

Name (IFN-R-JAK)2*-STAT1C

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_83](#) and as a product in [reaction_82](#) and as a modifier in [reaction_82](#), [reaction_83](#)).

$$\frac{d}{dt}\text{species_83} = v_{99} - v_{100} \quad (341)$$

9.73 Species `species_84`

Name STAT1C

Initial concentration 1000 nmol · l⁻¹

This species takes part in twelve reactions (as a reactant in [reaction_90](#), [reaction_107](#), [reaction_82](#), [re157](#) and as a product in [re141](#), [reaction_94](#), [reaction_108](#), [re161](#) and as a modifier in [reaction_90](#), [reaction_107](#), [reaction_82](#), [re157](#)).

$$\frac{d}{dt}\text{species_84} = v_{74} + v_{79} + v_{96} + v_{116} - v_{75} - v_{94} - v_{99} - v_{110} \quad (342)$$

9.74 Species [species_85](#)

Name STAT1C*

Initial concentration 0 nmol · l⁻¹

This species takes part in 15 reactions (as a reactant in [re140](#), [reaction_90](#), [reaction_84](#), [reaction_85](#), [re159](#), [re115](#) and as a product in [reaction_83](#), [re158](#), [re162](#) and as a modifier in [re140](#), [reaction_90](#), [reaction_84](#), [reaction_85](#), [re159](#), [re115](#)).

$$\frac{d}{dt}\text{species_85} = v_{100} + v_{111} + v_{117} - v_{73} - v_{75} - v_{101} - 2 v_{102} - v_{112} - v_{114} \quad (343)$$

9.75 Species [species_86](#)

Name (IFN-R-JAK)2*-STAT1C*

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a product in [reaction_84](#) and as a modifier in [reaction_84](#)).

$$\frac{d}{dt}\text{species_86} = v_{101} \quad (344)$$

9.76 Species [species_87](#)

Name (STAT1C*)2

Initial concentration 0 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [reaction_91](#), [re142](#) and as a product in [reaction_85](#) and as a modifier in [reaction_91](#), [re142](#), [reaction_85](#)).

$$\frac{d}{dt}\text{species_87} = v_{102} - v_{76} - v_{87} \quad (345)$$

9.77 Species [species_88](#)

Name (IFN-R-JAK)2*-SHP2

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_87](#) and as a product in [reaction_86](#) and as a modifier in [reaction_87](#), [reaction_86](#)).

$$\frac{d}{dt}\text{species_88} = v_{103} - v_{72} \quad (346)$$

9.78 Species `species_90`

Name PP1-STATIC*

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [re141](#) and as a product in [re140](#) and as a modifier in [re140](#), [re141](#)).

$$\frac{d}{dt}\text{species_90} = v_{73} - v_{74} \quad (347)$$

9.79 Species `species_91`

Name STAT1C-STAT1C*

Initial concentration 0 nmol · l⁻¹

This species takes part in three reactions (as a product in [reaction_90](#), [re143](#) and as a modifier in [reaction_90](#)).

$$\frac{d}{dt}\text{species_91} = v_{75} + v_{88} \quad (348)$$

9.80 Species `species_98`

Name mRNA-SOCS1C

Initial concentration 0 nmol · l⁻¹

This species takes part in five reactions (as a reactant in [reaction_99](#) and as a product in [reaction_96](#) and as a modifier in [reaction_97](#), [reaction_97](#), [reaction_99](#)).

$$\frac{d}{dt}\text{species_98} = v_{81} - v_{85} \quad (349)$$

9.81 Species `species_99`

Name SOCS1

Initial concentration 0 nmol · l⁻¹

This species takes part in seven reactions (as a reactant in [reaction_98](#), [reaction_100](#) and as a product in [reaction_97](#), [reaction_108](#), [reaction_109](#) and as a modifier in [reaction_98](#), [reaction_100](#)).

$$\frac{d}{dt}\text{species_99} = v_{83} + v_{96} + v_{97} - v_{84} - v_{86} \quad (350)$$

9.82 Species `species_100`

Name (IFN-R-JAK)2*-SOCS1

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_107](#) and as a product in [reaction_98](#) and as a modifier in [reaction_98](#), [reaction_107](#)).

$$\frac{d}{dt}\text{species_100} = v_{84} - v_{94} \quad (351)$$

9.83 Species `species_101`

Name PP1-(STAT1C*)2

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [re143](#) and as a product in [re142](#) and as a modifier in [re142](#), [re143](#)).

$$\frac{d}{dt}\text{species_101} = v_{87} - v_{88} \quad (352)$$

9.84 Species `species_104`

Name (IFN-R-JAK)2*-STAT1C-SOCS1

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_110](#) and as a product in [reaction_107](#) and as a modifier in [reaction_107](#), [reaction_110](#)).

$$\frac{d}{dt}\text{species_104} = v_{94} - v_{95} \quad (353)$$

9.85 Species `species_105`

Name (IFN-R-JAK)2*-STAT1C-SHP2-SOCS1

Initial concentration 0 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [reaction_108](#), [reaction_109](#) and as a product in [reaction_110](#) and as a modifier in [reaction_110](#), [reaction_108](#), [reaction_109](#)).

$$\frac{d}{dt}\text{species_105} = v_{95} - v_{96} - v_{97} \quad (354)$$

9.86 Species [species_106](#)

Name (IFN-R-JAK)2*-STAT1C-SHP2

Initial concentration 0 nmol · l⁻¹

This species takes part in one reaction (as a product in [reaction_109](#)).

$$\frac{d}{dt}\text{species_106} = v_{97} \quad (355)$$

9.87 Species [species_107](#)

Name R

Initial concentration 12 nmol · l⁻¹

This species takes part in two reactions (as a reactant in [re135](#) and as a modifier in [re135](#)).

$$\frac{d}{dt}\text{species_107} = -v_{71} \quad (356)$$

9.88 Species [species_108](#)

Name SHP2

Initial concentration 100 nmol · l⁻¹

This species takes part in ten reactions (as a reactant in [re138](#), [reaction_110](#), [reaction_86](#) and as a product in [re137](#), [re136](#), [reaction_87](#), [reaction_108](#) and as a modifier in [re138](#), [reaction_110](#), [reaction_86](#)).

$$\frac{d}{dt}\text{species_108} = v_6 + v_{40} + v_{72} + v_{96} - v_5 - v_{95} - v_{103} \quad (357)$$

9.89 Species [s137](#)

Name STAT3*

Initial concentration 0 nmol · l⁻¹

Involved in rule [s137](#)

One rule determines the species' quantity.

9.90 Species [s136](#)

Name STAT1*

Initial concentration 0 nmol · l⁻¹

Involved in rule [s136](#)

One rule determines the species' quantity.

9.91 Species s138

Name (IL6-gp80-gp130-JAK)2*-STAT1

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [re158](#) and as a product in [re157](#) and as a modifier in [re157](#), [re158](#)).

$$\frac{d}{dt}s138 = v_{110} - v_{111} \quad (358)$$

9.92 Species s139

Name (IL6-gp80-gp130-JAK)2*-STAT1*

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a product in [re159](#) and as a modifier in [re159](#)).

$$\frac{d}{dt}s139 = v_{112} \quad (359)$$

9.93 Species s140

Name JAK(IL-6)

Initial concentration 12 nmol · l⁻¹

This species takes part in two reactions (as a reactant in [re160](#) and as a modifier in [re160](#)).

$$\frac{d}{dt}s140 = -v_1 \quad (360)$$

9.94 Species species_92

Name (STAT1N*)2

Initial concentration 0 nmol · l⁻¹

This species takes part in nine reactions (as a reactant in [re147](#) and as a product in [reaction_91](#), [reaction_103](#) and as a modifier in [reaction_95](#), [reaction_95](#), [reaction_103](#), [re147](#), [re116](#), [re116](#)).

$$\frac{d}{dt}\text{species_92} = v_{76} + v_{89} - v_{90} \quad (361)$$

9.95 Species `species_94`

Name PP2-STAT1N*

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [re145](#) and as a product in [re144](#) and as a modifier in [re144](#), [re145](#)).

$$\frac{d}{dt}\text{species_94} = v_{77} - v_{78} \quad (362)$$

9.96 Species `species_95`

Name STAT1N*

Initial concentration 0 nmol · l⁻¹

This species takes part in nine reactions (as a reactant in [re144](#), [reaction_103](#), [reaction_106](#), [re121](#) and as a product in [re164](#) and as a modifier in [re144](#), [reaction_103](#), [reaction_106](#), [re121](#)).

$$\frac{d}{dt}\text{species_95} = v_{119} - v_{77} - 2 v_{89} - v_{92} - v_{115} \quad (363)$$

9.97 Species `species_96`

Name STAT1N

Initial concentration 0 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [reaction_94](#), [reaction_106](#) and as a product in [re145](#), [re163](#) and as a modifier in [reaction_94](#), [reaction_106](#)).

$$\frac{d}{dt}\text{species_96} = v_{78} + v_{118} - v_{79} - v_{92} \quad (364)$$

9.98 Species `species_97`

Name mRNA-SOCS1N

Initial concentration 0 nmol · l⁻¹

This species takes part in three reactions (as a reactant in [reaction_96](#) and as a product in [reaction_95](#) and as a modifier in [reaction_96](#)).

$$\frac{d}{dt}\text{species_97} = v_{80} - v_{81} \quad (365)$$

9.99 Species [species_102](#)

Name PP2-(STAT1N*)2

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [re148](#) and as a product in [re147](#) and as a modifier in [re147](#), [re148](#)).

$$\frac{d}{dt}\text{species_102} = v_{90} - v_{91} \quad (366)$$

9.100 Species [species_103](#)

Name STAT1N-STAT1N*

Initial concentration 0 nmol · l⁻¹

This species takes part in three reactions (as a product in [re148](#), [reaction_106](#) and as a modifier in [reaction_106](#)).

$$\frac{d}{dt}\text{species_103} = v_{91} + v_{92} \quad (367)$$

9.101 Species [species_23](#)

Name (STAT3N*)2

Initial concentration 0 nmol · l⁻¹

This species takes part in seven reactions (as a reactant in [reaction_65](#), [reaction_18](#) and as a product in [reaction_17](#) and as a modifier in [reaction_65](#), [reaction_18](#), [reaction_23](#), [reaction_23](#)).

$$\frac{d}{dt}\text{species_23} = v_{12} - v_{13} - v_{16} \quad (368)$$

9.102 Species [species_24](#)

Name PP2

Initial concentration 60 nmol · l⁻¹

This species takes part in 16 reactions (as a reactant in [reaction_19](#), [reaction_18](#), [re144](#), [re147](#), [re126](#) and as a product in [reaction_20](#), [reaction_21](#), [re145](#), [re148](#), [re163](#), [re164](#) and as a modifier in [reaction_19](#), [reaction_18](#), [re144](#), [re147](#), [re126](#)).

$$\frac{d}{dt}\text{species_24} = v_{15} + v_{17} + v_{78} + v_{91} + v_{118} + v_{119} - v_{14} - v_{16} - v_{77} - v_{90} - v_{107} \quad (369)$$

9.103 Species `species_25`

Name PP2-(STAT3N*)2

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_21](#) and as a product in [reaction_18](#) and as a modifier in [reaction_18](#), [reaction_21](#)).

$$\frac{d}{dt}\text{species_25} = v_{16} - v_{17} \quad (370)$$

9.104 Species `species_26`

Name STAT3N*

Initial concentration 0 nmol · l⁻¹

This species takes part in nine reactions (as a reactant in [reaction_19](#), [re121](#) and as a product in [reaction_65](#), [reaction_66](#), [re163](#) and as a modifier in [reaction_65](#), [reaction_19](#), [reaction_66](#), [re121](#)).

$$\frac{d}{dt}\text{species_26} = 2 v_{13} + v_{19} + v_{118} - v_{14} - v_{115} \quad (371)$$

9.105 Species `species_27`

Name PP2-STAT3N*

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_20](#) and as a product in [reaction_19](#) and as a modifier in [reaction_19](#), [reaction_20](#)).

$$\frac{d}{dt}\text{species_27} = v_{14} - v_{15} \quad (372)$$

9.106 Species `species_28`

Name STAT3N

Initial concentration 0 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [reaction_22](#) and as a product in [reaction_20](#), [reaction_66](#), [re164](#) and as a modifier in [reaction_66](#), [reaction_22](#)).

$$\frac{d}{dt}\text{species_28} = v_{15} + v_{19} + v_{119} - v_{20} \quad (373)$$

9.107 Species `species_29`

Name STAT3N-STAT3N*

Initial concentration 0 nmol · l⁻¹

This species takes part in three reactions (as a reactant in [reaction_66](#) and as a product in [reaction_21](#) and as a modifier in [reaction_66](#)).

$$\frac{d}{dt}\text{species_29} = v_{17} - v_{19} \quad (374)$$

9.108 Species `species_30`

Name mRNA-SOCS3N

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [reaction_24](#) and as a product in [reaction_23](#), [re116](#) and as a modifier in [reaction_24](#)).

$$\frac{d}{dt}\text{species_30} = v_{21} + v_{113} - v_{22} \quad (375)$$

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