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-Schrijver[1] and Yun-Feng Qi[2] 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 signallingdysfunction.

To account for the possibility of different IFNR and gp130binding sites for STAT1 and STAT3, model 1 [BIOMD0000000543]assumes that there is no competition between STAT1 and STAT3 forthe 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 betweenSTAT1 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.

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 m^2

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	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☑	☑
species_79	IFN	default	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☑	☑
s118	(IFN-R-JAK)2*-STAT3C	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
s119	(IFN-R-JAK)2*-STAT3C*	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
s120	STAT1C*-STAT3C*	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
s122	STAT1N*-STAT3N*	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
species_2	gp80	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☑	☑
species_3	IL6-gp80	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
species_4	gp130	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☑	☑
species_5	JAK(IFN)	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
species_6	gp130-JAK	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
species_7	IL6-gp80-gp130-JAK	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
species_8	(IL6-gp80-gp130-JAK)2	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
species_9	(IL6-gp80-gp130-JAK)2*	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
species_10	(IL6-gp80-gp130-JAK)2*-STAT3C	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
species_11	STAT3C	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
species_12	STAT3C*	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
species_13	(IL6-gp80-gp130-JAK)2*-STAT3C*	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
species_14	(STAT3C*)2	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
species_15	(IL6-gp80-gp130-JAK)2*-SOCS3	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
species_16	(IL6-gp80-gp130-JAK)2*-SHP2	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐

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

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

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

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
species_103	STAT1N-STAT1N*	c2	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
species_23	(STAT3N*)2	c3	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
species_24	PP2	c3	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
species_25	PP2-(STAT3N*)2	c3	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
species_26	STAT3N*	c3	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
species_27	PP2-STAT3N*	c3	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
species_28	STAT3N	c3	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
species_29	STAT3N-STAT3N*	c3	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
species_30	mRNA-SOCS3N	c3	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟

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

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

$$\frac{\mathrm{V} \cdot \mathrm{substrate}}{\mathrm{Km} + \mathrm{substrate}} \tag{1}$$

6.2 Function definition function_2

Name function_4_reaction-34

Arguments parameter_55, [species_31]

Mathematical Expression

$$\mathrm{parameter\_55} \cdot [\mathrm{species\_31}] \tag{2}$$

6.3 Function definition function_1

Name function_4_reaction-32

Arguments parameter_52, parameter_53, [species_23]

Mathematical Expression

$$\frac{\mathrm{parameter\_52} \cdot [\mathrm{species\_23}]}{\mathrm{parameter\_53} + [\mathrm{species\_23}]} \tag{3}$$

6.4 Function definition function_4

Name function_4_reaction-v15

Arguments vol(c2), parameter_152, parameter_153, [species_24], [species_94], [species_95]

Mathematical Expression

$$\mathrm{vol}(c2) \cdot (\mathrm{parameter\_152} \cdot [\mathrm{species\_24}] \cdot [\mathrm{species\_95}] - \mathrm{parameter\_153} \cdot [\mathrm{species\_94}]) \quad (4)$$

6.5 Function definition function_5

Name function_4_reaction-v16

Arguments vol(c2), parameter_155, [species_94]

Mathematical Expression

$$\mathrm{vol}(c2) \cdot \mathrm{parameter\_155} \cdot [\mathrm{species\_94}] \quad (5)$$

6.6 Function definition function_6

Name function_4_reaction-v18

Arguments parameter_156, parameter_157, [species_92]

Mathematical Expression

$$\frac{\mathrm{parameter\_156} \cdot [\mathrm{species\_92}]}{\mathrm{parameter\_157} + [\mathrm{species\_92}]} \quad (6)$$

6.7 Function definition function_7

Name function_4_reaction-v20

Arguments parameter_159, [species_98]

Mathematical Expression

$$\mathrm{parameter\_159} \cdot [\mathrm{species\_98}] \quad (7)$$

6.8 Function definition function_8

Name function_4_reaction-v27

Arguments vol(c2), parameter_169, parameter_170, [species_102], [species_24], [species_92]

Mathematical Expression

$$\mathrm{vol}(c2) \cdot (\mathrm{parameter\_169} \cdot [\mathrm{species\_24}] \cdot [\mathrm{species\_92}] - \mathrm{parameter\_170} \cdot [\mathrm{species\_102}]) \quad (8)$$

6.9 Function definition function_9

Name function_4_reaction-v28

Arguments vol(c2), parameter_171, [species_102]

Mathematical Expression

$$\mathrm{vol}(\mathrm{c2}) \cdot \mathrm{parameter\_171} \cdot [\mathrm{species\_102}] \tag{9}$$

6.10 Function definition function_4_reaction_n7_1

Name function_4_reaction_n7_1

Arguments parameter_231, parameter_232, [species_92]

Mathematical Expression

$$\frac{\mathrm{parameter\_231} \cdot [\mathrm{species\_92}]}{\mathrm{parameter\_232} + [\mathrm{species\_92}]} \tag{10}$$

6.11 Function definition function_activation

Name function_activation

Arguments v, a, b, k

Mathematical Expression

$$\frac{\mathrm{v} \cdot \mathrm{a} \cdot \mathrm{b}}{\mathrm{b} + \mathrm{k}} \tag{11}$$

7 Rules

This is an overview of two rules.

7.1 Rule s137

Rule s137 is an assignment rule for species s137:

$$\begin{aligned} \mathrm{s137} = {} & [\mathrm{s119}] + [\mathrm{species\_13}] + [\mathrm{s135}] + 2 \cdot [\mathrm{species\_22}] + [\mathrm{species\_21}] + [\mathrm{s126}] \\ & + 2 \cdot [\mathrm{species\_25}] + [\mathrm{species\_27}] + [\mathrm{s120}] + [\mathrm{s122}] + 2 \cdot [\mathrm{species\_14}] \\ & + [\mathrm{species\_12}] + [\mathrm{species\_18}] + 2 \cdot [\mathrm{species\_23}] + [\mathrm{species\_26}] + [\mathrm{species\_29}] \end{aligned} \tag{12}$$

7.2 Rule `s136`

Rule `s136` is an assignment rule for species `s136`:

$$\begin{aligned} \text{s136} = {} & [\text{species\_86}] + 2 \cdot [\text{species\_101}] + [\text{s135}] + [\text{species\_90}] + 2 \cdot [\text{species\_102}] + [\text{s126}] \\ & + [\text{species\_94}] + 2 \cdot [\text{species\_87}] + [\text{s120}] + [\text{species\_85}] + [\text{species\_91}] \\ & + 2 \cdot [\text{species\_92}] + [\text{s122}] + [\text{species\_95}] + [\text{species\_103}] + [\text{s139}] \end{aligned} \tag{13}$$

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

№	Id	Name	Reaction Equation	SBO
1	re160	reaciton-2	$s140 + species\_4 \xrightleftharpoons{s140,\ species\_4,\ species\_6} species\_6$	
2	reaction_1	reaction-1	$species\_2 + species\_1 \xrightleftharpoons{species\_2,\ species\_1,\ species\_3} species\_3$	
3	reaction_8	reaction-10	$species\_9 + species\_12 \xrightleftharpoons{species\_9,\ species\_12,\ species\_13} species\_13$	
4	reaction_9	reaction-16	$2\, species\_12 \xrightleftharpoons{species\_12,\ species\_14} species\_14$	
5	re138	reaction-17	$species\_9 + species\_108 \xrightleftharpoons{species\_9,\ species\_108,\ species\_16} species\_16$	
6	re137	reaction-18	$species\_16 \xrightarrow{species\_16} species\_8 + species\_108$	
7	reaction_12	reaction-19	$species\_12 + species\_20 \xrightleftharpoons{species\_12,\ species\_20,\ species\_21} species\_21$	
8	reaction_14	reaction-20	$species\_21 \xrightarrow{species\_21} species\_11 + species\_20$	
9	reaction_13	reaction-21	$species\_14 + species\_20 \xrightleftharpoons{species\_14,\ species\_20,\ species\_22} species\_22$	
10	reaction_15	reaction-22	$species\_22 \xrightarrow{species\_22} species\_18 + species\_20$	
11	reaction_16	reaction-23	$species\_11 + species\_12 \xrightleftharpoons{species\_11,\ species\_12,\ species\_18} species\_18$	
12	reaction_17	reaction-24	$species\_14 \xrightarrow{species\_14} species\_23$	
13	reaction_65	reaction-25	$species\_23 \xrightleftharpoons{species\_23,\ species\_26} 2\, species\_26$	
14	reaction_19	reaction-26	$species\_24 + species\_26 \xrightleftharpoons{species\_24,\ species\_26,\ species\_27} species\_27$	
15	reaction_20	reaction-27	$species\_27 \xrightarrow{species\_27} species\_28 + species\_24$	

№	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	$\text{species\_39} \xrightleftharpoons{\text{species\_39, species\_40, species\_37}} \text{species\_40} + \text{species\_37}$	

№	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	$\text{species\_49} + \text{species\_44} \xrightleftharpoons{\text{species\_49, species\_44, species\_50}} \text{species\_50}$	

№	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	$\text{species\_66} \xrightarrow{\text{species\_66}} \text{species\_64} + \text{species\_59}$	

№	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	$\text{species\_99} + \text{species\_82} \xrightleftharpoons{\text{species\_99, species\_82, species\_100}} \text{species\_100}$	

№	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	$2\,\text{species\_85} \xrightleftharpoons{\text{species\_85, species\_87}} \text{species\_87}$	

№	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

$$\text{s140} + \text{species\_4} \xrightleftharpoons{\text{s140, species\_4, species\_6}} \text{species\_6} \tag{14}$$

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

$$v_1 = \text{vol}(\text{compartment\_1}) \cdot (\text{parameter\_3} \cdot [\text{s140}] \cdot [\text{species\_4}] - \text{parameter\_4} \cdot [\text{species\_6}]) \tag{15}$$

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

$$\text{species\_2} + \text{species\_1} \underset{\text{species\_2, species\_1, species\_3}}{\rightleftharpoons} \text{species\_3} \tag{16}$$

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

$$v_2 = \text{parameter\_1} \cdot [\text{species\_2}] \cdot [\text{species\_1}] - \text{parameter\_2} \cdot [\text{species\_3}] \tag{17}$$

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

$$\text{species\_9} + \text{species\_12} \xrightleftharpoons{\text{species\_9, species\_12, species\_13}} \text{species\_13} \tag{18}$$

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

$$v_3 = \text{vol}(\text{compartment\_1}) \cdot (\text{parameter\_17} \cdot [\text{species\_9}] \cdot [\text{species\_12}] - \text{parameter\_18} \cdot [\text{species\_13}]) \tag{19}$$

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

$$2\,\text{species\_12} \xrightleftharpoons{\text{species\_12, species\_14}} \text{species\_14} \tag{20}$$

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

$$v_4 = \text{vol}\,(\text{compartment\_1}) \cdot \left(\text{parameter\_27} \cdot [\text{species\_12}]^2 - \text{parameter\_28} \cdot [\text{species\_14}]\right) \tag{21}$$

8.5 Reaction re138

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

Name reaction-17

Reaction equation

$$\text{species\_9} + \text{species\_108} \xrightleftharpoons{\text{species\_9, species\_108, species\_16}} \text{species\_16} \tag{22}$$

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

$$v_5 = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_29} \cdot [\mathrm{species\_9}] \cdot [\mathrm{species\_108}] - \mathrm{parameter\_30} \cdot [\mathrm{species\_16}]) \tag{23}$$

8.6 Reaction re137

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

Name reaction-18

Reaction equation

$$\mathrm{species\_16} \xrightarrow{\mathrm{species\_16}} \mathrm{species\_8} + \mathrm{species\_108} \tag{24}$$

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

$$v_6 = \mathrm{vol}(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_31} \cdot [\mathrm{species\_16}] \tag{25}$$

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

$$\mathrm{species\_12} + \mathrm{species\_20} \xrightleftharpoons{\mathrm{species\_12},\ \mathrm{species\_20},\ \mathrm{species\_21}} \mathrm{species\_21} \tag{26}$$

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

$$v_7 = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_32} \cdot [\mathrm{species\_12}] \cdot [\mathrm{species\_20}] - \mathrm{parameter\_33} \cdot [\mathrm{species\_21}]) \tag{27}$$

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

$$\mathrm{species\_21} \xrightarrow{\mathrm{species\_21}} \mathrm{species\_11} + \mathrm{species\_20} \tag{28}$$

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

$$v_8 = \mathrm{vol}(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_34} \cdot [\mathrm{species\_21}] \tag{29}$$

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

$$\mathrm{species\_14} + \mathrm{species\_20} \xrightleftharpoons{\mathrm{species\_14,\ species\_20,\ species\_22}} \mathrm{species\_22} \tag{30}$$

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

$$v_9 = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_35} \cdot [\mathrm{species\_14}] \cdot [\mathrm{species\_20}] - \mathrm{parameter\_36} \cdot [\mathrm{species\_22}]) \tag{31}$$

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

$$\mathrm{species\_22} \xrightarrow{\mathrm{species\_22}} \mathrm{species\_18} + \mathrm{species\_20} \tag{32}$$

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

$$v_{10} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{parameter\_37} \cdot [\mathrm{species\_22}] \tag{33}$$

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

$$\mathrm{species\_11} + \mathrm{species\_12} \xrightleftharpoons{\mathrm{species\_11},\ \mathrm{species\_12},\ \mathrm{species\_18}} \mathrm{species\_18} \tag{34}$$

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

$$v_{11} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_38} \cdot [\mathrm{species\_11}] \cdot [\mathrm{species\_12}] - \mathrm{parameter\_39} \cdot [\mathrm{species\_18}]) \tag{35}$$

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

$$\mathrm{species\_14} \xrightarrow{\mathrm{species\_14}} \mathrm{species\_23} \tag{36}$$

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

$$v_{12} = \text{parameter\_40} \cdot [\text{species\_14}] \tag{37}$$

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

$$\text{species\_23} \xrightleftharpoons{\text{species\_23, species\_26}} 2\,\text{species\_26} \tag{38}$$

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

$$v_{13} = \mathrm{vol}(\mathrm{c3}) \cdot \left(\mathrm{parameter\_41} \cdot [\mathrm{species\_23}] - \mathrm{parameter\_42} \cdot [\mathrm{species\_26}]^2\right) \tag{39}$$

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

$$\mathrm{species\_24} + \mathrm{species\_26} \xrightleftharpoons{\mathrm{species\_24,\ species\_26,\ species\_27}} \mathrm{species\_27} \tag{40}$$

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

$$v_{14} = \mathrm{vol}\,(\mathrm{c3}) \cdot (\mathrm{parameter\_43} \cdot [\mathrm{species\_24}] \cdot [\mathrm{species\_26}] - \mathrm{parameter\_44} \cdot [\mathrm{species\_27}]) \quad (41)$$

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

$$\mathrm{species\_27} \xrightarrow{\mathrm{species\_27}} \mathrm{species\_28} + \mathrm{species\_24} \quad (42)$$

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

$$v_{15} = \mathrm{vol}\,(\mathrm{c3}) \cdot \mathrm{parameter\_45} \cdot [\mathrm{species\_27}] \tag{43}$$

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

$$\mathrm{species\_24} + \mathrm{species\_23} \xrightleftharpoons{\mathrm{species\_24,\ species\_23,\ species\_25}} \mathrm{species\_25} \tag{44}$$

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

$$v_{16} = \mathrm{vol}\,(\mathrm{c3}) \cdot (\mathrm{parameter\_46} \cdot [\mathrm{species\_24}] \cdot [\mathrm{species\_23}] - \mathrm{parameter\_47} \cdot [\mathrm{species\_25}]) \quad (45)$$

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

$$\mathrm{species\_25} \xrightarrow{\mathrm{species\_25}} \mathrm{species\_24} + \mathrm{species\_29} \quad (46)$$

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

$$v_{17} = \mathrm{vol}\,(\mathrm{c3}) \cdot \mathrm{parameter\_48} \cdot [\mathrm{species\_25}] \tag{47}$$

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

$$\mathrm{species\_3} + \mathrm{species\_6} \xrightleftharpoons{\mathrm{species\_3,\ species\_6,\ species\_7}} \mathrm{species\_7} \tag{48}$$

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

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

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

$$\mathrm{species\_29} \xrightleftharpoons{\mathrm{species\_29},\ \mathrm{species\_26},\ \mathrm{species\_28}} \mathrm{species\_26} + \mathrm{species\_28} \tag{50}$$

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

$$v_{19} = \mathrm{vol}\,(\mathrm{c3}) \cdot (\mathrm{parameter\_49} \cdot [\mathrm{species\_29}] - \mathrm{parameter\_50} \cdot [\mathrm{species\_26}] \cdot [\mathrm{species\_28}]) \quad (51)$$

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

$$\mathrm{species\_28} \xrightarrow{\mathrm{species\_28}} \mathrm{species\_11} \quad (52)$$

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

$$v_{20} = \text{parameter\_51} \cdot [\text{species\_28}] \tag{53}$$

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

$$\emptyset \xrightarrow{\text{species\_23, species\_23}} \text{species\_30} \tag{54}$$

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

$$v_{21} = \mathrm{vol}\,(\mathrm{c3}) \cdot \mathrm{function\_1}\,(\mathrm{parameter\_52}, \mathrm{parameter\_53}, [\mathrm{species\_23}]) \tag{55}$$

$$\mathrm{function\_1}\,(\mathrm{parameter\_52}, \mathrm{parameter\_53}, [\mathrm{species\_23}]) = \frac{\mathrm{parameter\_52} \cdot [\mathrm{species\_23}]}{\mathrm{parameter\_53} + [\mathrm{species\_23}]} \tag{56}$$

$$\mathrm{function\_1}\,(\mathrm{parameter\_52}, \mathrm{parameter\_53}, [\mathrm{species\_23}]) = \frac{\mathrm{parameter\_52} \cdot [\mathrm{species\_23}]}{\mathrm{parameter\_53} + [\mathrm{species\_23}]} \tag{57}$$

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

$$\mathrm{species\_30} \xrightarrow{\mathrm{species\_30}} \mathrm{species\_31} \tag{58}$$

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

$$v_{22} = \text{parameter\_54} \cdot [\text{species\_30}] \tag{59}$$

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

$$\emptyset \xrightarrow{\text{species\_31, species\_31}} \text{species\_19} \tag{60}$$

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

$$v_{23} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{function\_2}\,(\mathrm{parameter\_55}, [\mathrm{species\_31}]) \tag{61}$$

$$\mathrm{function\_2}\,(\mathrm{parameter\_55}, [\mathrm{species\_31}]) = \mathrm{parameter\_55} \cdot [\mathrm{species\_31}] \tag{62}$$

$$\mathrm{function\_2}\,(\mathrm{parameter\_55}, [\mathrm{species\_31}]) = \mathrm{parameter\_55} \cdot [\mathrm{species\_31}] \tag{63}$$

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

$$\mathrm{species\_9} + \mathrm{species\_19} \xrightleftharpoons{\mathrm{species\_9},\ \mathrm{species\_19},\ \mathrm{species\_15}} \mathrm{species\_15} \tag{64}$$

Reactants

Table 73: Properties of each reactant.

Id	Name	SBO
`species_9`	(IL6-gp80-gp130-JAK)2*	
`species_19`	SOCS3	

Modifiers

Table 74: Properties of each modifier.

Id	Name	SBO
`species_9`	(IL6-gp80-gp130-JAK)2*	
`species_19`	SOCS3	
`species_15`	(IL6-gp80-gp130-JAK)2*-SOCS3	

Product

Table 75: Properties of each product.

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

Kinetic Law

Derived unit contains undeclared units

$$v_{24} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_56} \cdot [\mathrm{species\_9}] \cdot [\mathrm{species\_19}] - \mathrm{parameter\_57} \cdot [\mathrm{species\_15}]) \tag{65}$$

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

$$\mathrm{species\_31} \xrightarrow{\mathrm{species\_31}} \emptyset \tag{66}$$

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

$$v_{25} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_58} \cdot [\mathrm{species\_31}] \tag{67}$$

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

$$\text{species\_19} \xrightarrow{\text{species\_19}} \emptyset \tag{68}$$

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

$$v_{26} = \text{vol}\left(\text{compartment\_1}\right) \cdot \text{parameter\_59} \cdot [\text{species\_19}] \tag{69}$$

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

$$\text{species\_15} \xrightarrow{\text{species\_15}} \text{species\_8} + \text{species\_19} \tag{70}$$

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

$$v_{27} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{parameter\_60} \cdot [\mathrm{species\_15}] \tag{71}$$

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

$$\mathrm{species\_16} \xrightleftharpoons{\mathrm{species\_16,\ species\_33}} \mathrm{species\_33} \tag{72}$$

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

$$v_{28} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_61} \cdot [\mathrm{species\_16}] - \mathrm{parameter\_62} \cdot [\mathrm{species\_33}]) \quad (73)$$

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

$$\mathrm{species\_33} + \mathrm{species\_32} \xrightleftharpoons{\mathrm{species\_33},\ \mathrm{species\_32},\ \mathrm{species\_34}} \mathrm{species\_34} \quad (74)$$

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

$$v_{29} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_63} \cdot [\mathrm{species\_33}] \cdot [\mathrm{species\_32}] - \mathrm{parameter\_64} \cdot [\mathrm{species\_34}]) \tag{75}$$

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

$$\mathrm{species\_35} + \mathrm{species\_34} \underset{}{\overset{\mathrm{species\_35,\ species\_34,\ species\_37}}{\rightleftharpoons}} \mathrm{species\_37} \tag{76}$$

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

$$v_{30} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_65} \cdot [\mathrm{species\_35}] \cdot [\mathrm{species\_34}] - \mathrm{parameter\_66} \cdot [\mathrm{species\_37}]) \tag{77}$$

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

$$\mathrm{species\_38} + \mathrm{species\_37} \xrightleftharpoons{\mathrm{species\_38,\ species\_37,\ species\_39}} \mathrm{species\_39} \tag{78}$$

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

$$v_{31} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_67} \cdot [\mathrm{species\_38}] \cdot [\mathrm{species\_37}] - \mathrm{parameter\_68} \cdot [\mathrm{species\_39}]) \tag{79}$$

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

$$\mathrm{species\_39} \xrightleftharpoons{\mathrm{species\_39,\ species\_40,\ species\_37}} \mathrm{species\_40} + \mathrm{species\_37} \tag{80}$$

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

$$v_{32} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_69} \cdot [\mathrm{species\_39}] - \mathrm{parameter\_70} \cdot [\mathrm{species\_40}] \cdot [\mathrm{species\_37}]) \tag{81}$$

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

$$\mathrm{species\_40} + \mathrm{species\_41} \xrightleftharpoons{\mathrm{species\_40},\ \mathrm{species\_41},\ \mathrm{species\_42}} \mathrm{species\_42} \tag{82}$$

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

$$\begin{aligned} v_{33} = {} & \mathrm{vol}\left(\mathrm{compartment\_1}\right) \\ & \cdot \left(\mathrm{parameter\_71} \cdot [\mathrm{species\_40}] \cdot [\mathrm{species\_41}] - \mathrm{parameter\_72} \cdot [\mathrm{species\_42}]\right) \end{aligned} \tag{83}$$

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

$$\mathrm{species\_42} \xrightleftharpoons{\mathrm{species\_42},\ \mathrm{species\_43},\ \mathrm{species\_44}} \mathrm{species\_43} + \mathrm{species\_44} \tag{84}$$

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

$$v_{34} = \mathrm{vol}(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_73} \cdot [\mathrm{species\_42}] - \mathrm{parameter\_74} \cdot [\mathrm{species\_43}] \cdot [\mathrm{species\_44}]) \tag{85}$$

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

$$\mathrm{species\_37} + \mathrm{species\_43} \xrightleftharpoons{\mathrm{species\_37,\ species\_43,\ species\_45}} \mathrm{species\_45} \tag{86}$$

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

$$v_{35} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_75} \cdot [\mathrm{species\_37}] \cdot [\mathrm{species\_43}] - \mathrm{parameter\_76} \cdot [\mathrm{species\_45}]) \tag{87}$$

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

$$\mathrm{species\_45} \xrightleftharpoons{\mathrm{species\_45,\ species\_37,\ species\_38}} \mathrm{species\_37} + \mathrm{species\_38} \tag{88}$$

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

$$v_{36} = \mathrm{vol}(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_77} \cdot [\mathrm{species\_45}] - \mathrm{parameter\_78} \cdot [\mathrm{species\_37}] \cdot [\mathrm{species\_38}]) \tag{89}$$

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

$$\mathrm{species\_37} \xrightleftharpoons{\mathrm{species\_37,\ species\_46,\ species\_9}} \mathrm{species\_46} + \mathrm{species\_9} \tag{90}$$

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

$$v_{37} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_79} \cdot [\mathrm{species\_37}] - \mathrm{parameter\_80} \cdot [\mathrm{species\_46}] \cdot [\mathrm{species\_9}]) \tag{91}$$

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

$$\mathrm{species\_46} \xrightleftharpoons{\mathrm{species\_46,\ species\_47,\ species\_48}} \mathrm{species\_47} + \mathrm{species\_48} \tag{92}$$

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

$$v_{38} = \mathrm{vol}(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_81} \cdot [\mathrm{species\_46}] - \mathrm{parameter\_82} \cdot [\mathrm{species\_47}] \cdot [\mathrm{species\_48}]) \tag{93}$$

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

$$\mathrm{species\_47} \xrightleftharpoons{\mathrm{species\_47},\ \mathrm{species\_32},\ \mathrm{species\_35}} \mathrm{species\_32} + \mathrm{species\_35} \tag{94}$$

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

$$v_{39} = \mathrm{vol}(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_83} \cdot [\mathrm{species\_47}] - \mathrm{parameter\_84} \cdot [\mathrm{species\_32}] \cdot [\mathrm{species\_35}]) \tag{95}$$

8.40 Reaction re136

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

Name reaction-51

Reaction equation

$$\mathrm{species\_48} \xrightarrow{\mathrm{species\_48}} \mathrm{species\_108} \tag{96}$$

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

$$v_{40} = \text{vol}\left(\text{compartment\_1}\right) \cdot \text{function\_3}\left(\left[\text{species\_48}\right], \text{parameter\_86}, \text{parameter\_85}\right) \quad (97)$$

$$\text{function\_3}\left(\text{substrate}, \text{Km}, \text{V}\right) = \frac{\text{V} \cdot \text{substrate}}{\text{Km} + \text{substrate}} \quad (98)$$

$$\text{function\_3}\left(\text{substrate}, \text{Km}, \text{V}\right) = \frac{\text{V} \cdot \text{substrate}}{\text{Km} + \text{substrate}} \quad (99)$$

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

$$\text{species\_33} \xrightleftharpoons{\text{species\_33, species\_9, species\_48}} \text{species\_9} + \text{species\_48} \quad (100)$$

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

$$v_{41} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_87} \cdot [\mathrm{species\_33}] - \mathrm{parameter\_88} \cdot [\mathrm{species\_9}] \cdot [\mathrm{species\_48}]) \tag{101}$$

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

$$\mathrm{species\_32} + \mathrm{species\_48} \xrightleftharpoons{\mathrm{species\_32},\ \mathrm{species\_48},\ \mathrm{species\_36}} \mathrm{species\_36} \tag{102}$$

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

$$v_{42} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_89} \cdot [\mathrm{species\_32}] \cdot [\mathrm{species\_48}] - \mathrm{parameter\_90} \cdot [\mathrm{species\_36}]) \tag{103}$$

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

$$\mathrm{species\_34} \xrightleftharpoons{\mathrm{species\_34},\ \mathrm{species\_9},\ \mathrm{species\_36}} \mathrm{species\_9} + \mathrm{species\_36} \tag{104}$$

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

$$v_{43} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_91} \cdot [\mathrm{species\_34}] - \mathrm{parameter\_92} \cdot [\mathrm{species\_9}] \cdot [\mathrm{species\_36}]) \tag{105}$$

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

$$\mathrm{species\_35} + \mathrm{species\_36} \xrightleftharpoons{\mathrm{species\_35},\ \mathrm{species\_36},\ \mathrm{species\_46}} \mathrm{species\_46} \tag{106}$$

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

$$v_{44} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_93} \cdot [\mathrm{species\_35}] \cdot [\mathrm{species\_36}] - \mathrm{parameter\_94} \cdot [\mathrm{species\_46}]) \tag{107}$$

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

$$\mathrm{species\_33} + \mathrm{species\_47} \xrightleftharpoons{\mathrm{species\_33},\ \mathrm{species\_47},\ \mathrm{species\_37}} \mathrm{species\_37} \tag{108}$$

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

$$v_{45} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_95} \cdot [\mathrm{species\_33}] \cdot [\mathrm{species\_47}] - \mathrm{parameter\_96} \cdot [\mathrm{species\_37}]) \tag{109}$$

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

$$\mathrm{species\_49} + \mathrm{species\_44} \xrightleftharpoons{\mathrm{species\_49},\ \mathrm{species\_44},\ \mathrm{species\_50}} \mathrm{species\_50} \tag{110}$$

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

$$v_{46} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_97} \cdot [\mathrm{species\_49}] \cdot [\mathrm{species\_44}] - \mathrm{parameter\_98} \cdot [\mathrm{species\_50}]) \tag{111}$$

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

$$\mathrm{species\_50} \xrightarrow{\mathrm{species\_50}} \mathrm{species\_41} + \mathrm{species\_49} \tag{112}$$

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

$$v_{47} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{parameter\_99} \cdot [\mathrm{species\_50}] \tag{113}$$

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

$$\mathrm{species\_44} + \mathrm{species\_51} \xrightleftharpoons{\mathrm{species\_44,\ species\_51,\ species\_52}} \mathrm{species\_52} \tag{114}$$

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

$$v_{48} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_100} \cdot [\mathrm{species\_44}] \cdot [\mathrm{species\_51}] - \mathrm{parameter\_101} \cdot [\mathrm{species\_52}]) \tag{115}$$

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

$$2\,\mathrm{species\_7} \underset{\longleftarrow}{\overset{\mathrm{species\_7,\ species\_8}}{\longrightarrow}} \mathrm{species\_8} \tag{116}$$

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

$$v_{49} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \left(\mathrm{parameter\_11} \cdot [\mathrm{species\_7}]^2 - \mathrm{parameter\_12} \cdot [\mathrm{species\_8}]\right) \quad (117)$$

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

$$\mathrm{species\_52} \xrightarrow{\mathrm{species\_52}} \mathrm{species\_53} + \mathrm{species\_44} \quad (118)$$

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

$$v_{50} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_102} \cdot [\mathrm{species\_52}] \tag{119}$$

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

$$\mathrm{species\_44} + \mathrm{species\_53} \xrightleftharpoons{\mathrm{species\_44,\ species\_53,\ species\_54}} \mathrm{species\_54} \tag{120}$$

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

$$v_{51} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_103} \cdot [\mathrm{species\_44}] \cdot [\mathrm{species\_53}] - \mathrm{parameter\_104} \cdot [\mathrm{species\_54}]) \tag{121}$$

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

$$\mathrm{species\_54} \xrightarrow{\mathrm{species\_54}} \mathrm{species\_55} + \mathrm{species\_44} \tag{122}$$

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

$$v_{52} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_105} \cdot [\mathrm{species\_54}] \tag{123}$$

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

$$\mathrm{species\_55} + \mathrm{species\_57} \xrightleftharpoons{\mathrm{species\_55,\ species\_57,\ species\_56}} \mathrm{species\_56} \tag{124}$$

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

$$v_{53} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_106} \cdot [\mathrm{species\_55}] \cdot [\mathrm{species\_57}] - \mathrm{parameter\_107} \cdot [\mathrm{species\_56}]) \tag{125}$$

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

$$\mathrm{species\_56} \xrightarrow{\mathrm{species\_56}} \mathrm{species\_57} + \mathrm{species\_53} \tag{126}$$

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

$$v_{54} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_108} \cdot [\mathrm{species\_56}] \tag{127}$$

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

$$\mathrm{species\_53} + \mathrm{species\_57} \xrightleftharpoons{\mathrm{species\_53},\ \mathrm{species\_57},\ \mathrm{species\_58}} \mathrm{species\_58} \tag{128}$$

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

$$v_{55} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_109} \cdot [\mathrm{species\_53}] \cdot [\mathrm{species\_57}] - \mathrm{parameter\_110} \cdot [\mathrm{species\_58}]) \tag{129}$$

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

$$\mathrm{species\_58} \xrightarrow{\mathrm{species\_58}} \mathrm{species\_57} + \mathrm{species\_51} \tag{130}$$

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

$$v_{56} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_111} \cdot [\mathrm{species\_58}] \tag{131}$$

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

$$\mathrm{species\_55} + \mathrm{species\_59} \xrightleftharpoons{\mathrm{species\_55},\ \mathrm{species\_59},\ \mathrm{species\_60}} \mathrm{species\_60} \tag{132}$$

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

$$v_{57} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_112} \cdot [\mathrm{species\_55}] \cdot [\mathrm{species\_59}] - \mathrm{parameter\_113} \cdot [\mathrm{species\_60}]) \tag{133}$$

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

$$\mathrm{species\_60} \xrightarrow{\mathrm{species\_60}} \mathrm{species\_61} + \mathrm{species\_55} \tag{134}$$

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

$$v_{58} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_114} \cdot [\mathrm{species\_60}] \tag{135}$$

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

$$\mathrm{species\_55} + \mathrm{species\_61} \xrightleftharpoons{\mathrm{species\_55},\ \mathrm{species\_61},\ \mathrm{species\_62}} \mathrm{species\_62} \tag{136}$$

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

$$v_{59} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_115} \cdot [\mathrm{species\_55}] \cdot [\mathrm{species\_61}] - \mathrm{parameter\_116} \cdot [\mathrm{species\_62}]) \tag{137}$$

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

$$\mathrm{species\_8} \xrightarrow{\mathrm{species\_8}} \mathrm{species\_9} \tag{138}$$

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

$$v_{60} = \mathrm{vol}(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_13} \cdot [\mathrm{species\_8}] \tag{139}$$

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

$$\mathrm{species\_62} \xrightarrow{\mathrm{species\_62}} \mathrm{species\_63} + \mathrm{species\_55} \tag{140}$$

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

$$v_{61} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{parameter\_117} \cdot [\mathrm{species\_62}] \tag{141}$$

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

$$\mathrm{species\_63} + \mathrm{species\_64} \xrightleftharpoons{\mathrm{species\_63,\ species\_64,\ species\_65}} \mathrm{species\_65} \tag{142}$$

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

$$v_{62} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_118} \cdot [\mathrm{species\_63}] \cdot [\mathrm{species\_64}] - \mathrm{parameter\_119} \cdot [\mathrm{species\_65}]) \tag{143}$$

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

$$\mathrm{species\_65} \xrightarrow{\mathrm{species\_65}} \mathrm{species\_64} + \mathrm{species\_61} \tag{144}$$

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

$$v_{63} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{parameter\_120} \cdot [\mathrm{species\_65}] \tag{145}$$

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

$$\mathrm{species\_61} + \mathrm{species\_64} \xrightleftharpoons{\mathrm{species\_61,\ species\_64,\ species\_66}} \mathrm{species\_66} \tag{146}$$

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

$$v_{64} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_121} \cdot [\mathrm{species\_61}] \cdot [\mathrm{species\_64}] - \mathrm{parameter\_122} \cdot [\mathrm{species\_66}]) \tag{147}$$

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

$$\mathrm{species\_66} \xrightarrow{\mathrm{species\_66}} \mathrm{species\_64} + \mathrm{species\_59} \tag{148}$$

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

$$v_{65} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_123} \cdot [\mathrm{species\_66}] \tag{149}$$

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

$$\mathrm{species\_74} \xrightarrow{\mathrm{species\_63,\ species\_63,\ species\_74}} \mathrm{species\_75} \tag{150}$$

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

$$v_{66} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{function\_activation}\left(\mathrm{parameter\_124}, [\mathrm{species\_63}], [\mathrm{species\_74}], \mathrm{parameter\_125}\right) \tag{151}$$

$$\mathrm{function\_activation}\left(\mathrm{v}, \mathrm{a}, \mathrm{b}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{a} \cdot \mathrm{b}}{\mathrm{b} + \mathrm{k}} \tag{152}$$

$$\mathrm{function\_activation}\left(\mathrm{v}, \mathrm{a}, \mathrm{b}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{a} \cdot \mathrm{b}}{\mathrm{b} + \mathrm{k}} \tag{153}$$

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

$$\mathrm{species\_75} \xrightarrow{\mathrm{species\_75}} \mathrm{species\_74} \tag{154}$$

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

$$v_{67} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{parameter\_126} \cdot \left[\mathrm{species\_75}\right] \tag{155}$$

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

$$2\,\mathrm{species\_75} \underset{}{\overset{\mathrm{species\_75},\ \mathrm{species\_76}}{\rightleftharpoons}} \mathrm{species\_76} \tag{156}$$

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

$$v_{68} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \left(\mathrm{parameter\_127} \cdot \left[\mathrm{species\_75}\right]^2 - \mathrm{parameter\_128} \cdot \left[\mathrm{species\_76}\right]\right) \tag{157}$$

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

$$\mathrm{species\_9} + \mathrm{species\_11} \xrightleftharpoons{\mathrm{species\_9},\ \mathrm{species\_11},\ \mathrm{species\_10}} \mathrm{species\_10} \tag{158}$$

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

$$v_{69} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_14} \cdot [\mathrm{species\_9}] \cdot [\mathrm{species\_11}] - \mathrm{parameter\_15} \cdot [\mathrm{species\_10}]) \tag{159}$$

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

$$\mathrm{species\_10} \xrightarrow{\mathrm{species\_10}} \mathrm{species\_9} + \mathrm{species\_12} \tag{160}$$

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

$$v_{70} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_16} \cdot [\mathrm{species\_10}] \tag{161}$$

8.71 Reaction re135

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

Name reaction-v1

Reaction equation

$$\mathrm{species\_5} + \mathrm{species\_107} \xrightleftharpoons{\mathrm{species\_5},\ \mathrm{species\_107},\ \mathrm{species\_78}} \mathrm{species\_78} \tag{162}$$

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

$$v_{71} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_129} \cdot [\mathrm{species\_5}] \cdot [\mathrm{species\_107}] - \mathrm{parameter\_130} \cdot [\mathrm{species\_78}]) \tag{163}$$

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

$$\mathrm{species\_88} \xrightarrow{\mathrm{species\_88}} \mathrm{species\_81} + \mathrm{species\_108} \tag{164}$$

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

$$v_{72} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_145} \cdot [\mathrm{species\_88}] \tag{165}$$

8.73 Reaction re140

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

Name reaction-v11

Reaction equation

$$\mathrm{species\_85} + \mathrm{species\_20} \xrightleftharpoons{\mathrm{species\_85,\ species\_20,\ species\_90}} \mathrm{species\_90} \tag{166}$$

Reactants

Table 218: Properties of each reactant.

Id	Name	SBO
species_85	STAT1C*	
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

$$v_{73} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_146} \cdot [\mathrm{species\_85}] \cdot [\mathrm{species\_20}] - \mathrm{parameter\_147} \cdot [\mathrm{species\_90}]) \tag{167}$$

8.74 Reaction re141

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

Name reaction-v12

Reaction equation

$$\mathrm{species\_90} \xrightarrow{\mathrm{species\_90}} \mathrm{species\_84} + \mathrm{species\_20} \tag{168}$$

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

$$v_{74} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_148} \cdot [\mathrm{species\_90}] \tag{169}$$

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

$$\mathrm{species\_84} + \mathrm{species\_85} \xrightleftharpoons{\mathrm{species\_84,\ species\_85,\ species\_91}} \mathrm{species\_91} \tag{170}$$

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

$$v_{75} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_149} \cdot [\mathrm{species\_84}] \cdot [\mathrm{species\_85}] - \mathrm{parameter\_150} \cdot [\mathrm{species\_91}]) \tag{171}$$

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

$$\mathrm{species\_87} \xrightarrow{\mathrm{species\_87}} \mathrm{species\_92} \tag{172}$$

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

$$v_{76} = \text{parameter\_151} \cdot [\text{species\_87}] \tag{173}$$

8.77 Reaction re144

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

Name reaction-v15

Reaction equation

$$\text{species\_95} + \text{species\_24} \xrightleftharpoons{\text{species\_24, species\_94, species\_95}} \text{species\_94} \tag{174}$$

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

$$v_{77} = \text{function\_4}\left(\text{vol}\left(\text{c2}\right), \text{parameter\_152}, \text{parameter\_153}, [\text{species\_24}], [\text{species\_94}], [\text{species\_95}]\right) \tag{175}$$

$$\begin{aligned}&\text{function\_4}\left(\text{vol}\left(\text{c2}\right), \text{parameter\_152}, \text{parameter\_153}, [\text{species\_24}], [\text{species\_94}], [\text{species\_95}]\right)\\ &= \text{vol}\left(\text{c2}\right) \cdot \left(\text{parameter\_152} \cdot [\text{species\_24}] \cdot [\text{species\_95}] - \text{parameter\_153} \cdot [\text{species\_94}]\right)\end{aligned} \tag{176}$$

8.78 Reaction re145

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

Name reaction-v16

Reaction equation

$$\text{species\_94} \xrightarrow{\text{species\_94}} \text{species\_96} + \text{species\_24} \tag{177}$$

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

$$v_{78} = \text{function\_5}\left(\text{vol}\left(\text{c2}\right), \text{parameter\_155}, \left[\text{species\_94}\right]\right) \tag{178}$$

$$\text{function\_5}\left(\text{vol}\left(\text{c2}\right), \text{parameter\_155}, \left[\text{species\_94}\right]\right) = \text{vol}\left(\text{c2}\right) \cdot \text{parameter\_155} \cdot \left[\text{species\_94}\right] \tag{179}$$

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

$$\text{species\_96} \xrightarrow{\text{species\_96}} \text{species\_84} \tag{180}$$

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

$$v_{79} = \text{parameter\_154} \cdot [\text{species\_96}] \tag{181}$$

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

$$\emptyset \xrightarrow{\text{species\_92, species\_92}} \text{species\_97} \tag{182}$$

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

$$v_{80} = \mathrm{vol}\,(\mathrm{c2}) \cdot \mathrm{function\_6}\,(\mathrm{parameter\_156}, \mathrm{parameter\_157}, [\mathrm{species\_92}]) \tag{183}$$

$$\mathrm{function\_6}\,(\mathrm{parameter\_156}, \mathrm{parameter\_157}, [\mathrm{species\_92}]) = \frac{\mathrm{parameter\_156} \cdot [\mathrm{species\_92}]}{\mathrm{parameter\_157} + [\mathrm{species\_92}]} \tag{184}$$

$$\mathrm{function\_6}\,(\mathrm{parameter\_156}, \mathrm{parameter\_157}, [\mathrm{species\_92}]) = \frac{\mathrm{parameter\_156} \cdot [\mathrm{species\_92}]}{\mathrm{parameter\_157} + [\mathrm{species\_92}]} \tag{185}$$

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

$$\mathrm{species\_97} \xrightarrow{\mathrm{species\_97}} \mathrm{species\_98} \tag{186}$$

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

$$v_{81} = \text{parameter\_158} \cdot [\text{species\_97}] \tag{187}$$

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

$$\text{species\_79} + \text{species\_78} \xrightleftharpoons{\text{species\_79, species\_78, species\_80}} \text{species\_80} \tag{188}$$

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

$$\emptyset \xrightarrow{\text{species\_98, species\_98}} \text{species\_99} \quad (190)$$

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

$$v_{83} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{function\_7}\,(\mathrm{parameter\_159}, [\mathrm{species\_98}]) \tag{191}$$

$$\mathrm{function\_7}\,(\mathrm{parameter\_159}, [\mathrm{species\_98}]) = \mathrm{parameter\_159} \cdot [\mathrm{species\_98}] \tag{192}$$

$$\mathrm{function\_7}\,(\mathrm{parameter\_159}, [\mathrm{species\_98}]) = \mathrm{parameter\_159} \cdot [\mathrm{species\_98}] \tag{193}$$

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

$$\mathrm{species\_99} + \mathrm{species\_82} \xrightleftharpoons{\mathrm{species\_99},\ \mathrm{species\_82},\ \mathrm{species\_100}} \mathrm{species\_100} \tag{194}$$

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

$$v_{84} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_160} \cdot [\mathrm{species\_99}] \cdot [\mathrm{species\_82}] - \mathrm{parameter\_161} \cdot [\mathrm{species\_100}]) \tag{195}$$

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

$$\mathrm{species\_98} \xrightarrow{\mathrm{species\_98}} \emptyset \tag{196}$$

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

$$v_{85} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_162} \cdot [\mathrm{species\_98}] \tag{197}$$

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

$$\mathrm{species\_99} \xrightarrow{\mathrm{species\_99}} \emptyset \tag{198}$$

Reactant

Table 254: Properties of each reactant.

Id	Name	SBO
`species_99`	SOCS1	

Modifier

Table 255: Properties of each modifier.

Id	Name	SBO
`species_99`	SOCS1	

Kinetic Law

Derived unit contains undeclared units

$$v_{86} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_163} \cdot [\mathrm{species\_99}] \tag{199}$$

8.87 Reaction `re142`

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

Name reaction-v24

Reaction equation

$$\mathrm{species\_87} + \mathrm{species\_20} \rightleftharpoons^{\mathrm{species\_87,\ species\_20,\ species\_101}} \mathrm{species\_101} \tag{200}$$

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

$$v_{87} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_164} \cdot [\mathrm{species\_87}] \cdot [\mathrm{species\_20}] - \mathrm{parameter\_165} \cdot [\mathrm{species\_101}]) \tag{201}$$

8.88 Reaction re143

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

Name reaction-v25

Reaction equation

$$\mathrm{species\_101} \xrightarrow{\mathrm{species\_101}} \mathrm{species\_91} + \mathrm{species\_20} \tag{202}$$

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

$$v_{88} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{parameter\_166} \cdot \left[\mathrm{species\_101}\right] \tag{203}$$

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

$$2\,\mathrm{species\_95} \xrightleftharpoons{\mathrm{species\_95},\ \mathrm{species\_92}} \mathrm{species\_92} \tag{204}$$

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

$$v_{89} = \mathrm{vol}\,(\mathrm{c2}) \cdot \left(\mathrm{parameter\_167} \cdot [\mathrm{species\_95}]^2 - \mathrm{parameter\_168} \cdot [\mathrm{species\_92}]\right) \quad (205)$$

8.90 Reaction re147

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

Name reaction-v27

Reaction equation

$$\mathrm{species\_92} + \mathrm{species\_24} \xrightleftharpoons{\mathrm{species\_102,\ species\_24,\ species\_92}} \mathrm{species\_102} \quad (206)$$

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

$$v_{90} = \text{function\_8}\left(\text{vol}\left(\text{c2}\right), \text{parameter\_169}, \text{parameter\_170}, [\text{species\_102}], [\text{species\_24}], [\text{species\_92}]\right) \tag{207}$$

$$\begin{aligned}&\text{function\_8}\left(\text{vol}\left(\text{c2}\right), \text{parameter\_169}, \text{parameter\_170}, [\text{species\_102}], [\text{species\_24}], [\text{species\_92}]\right)\\ &= \text{vol}\left(\text{c2}\right) \cdot \left(\text{parameter\_169} \cdot [\text{species\_24}] \cdot [\text{species\_92}] - \text{parameter\_170} \cdot [\text{species\_102}]\right)\end{aligned} \tag{208}$$

8.91 Reaction re148

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

Name reaction-v28

Reaction equation

$$\text{species\_102} \xrightarrow{\text{species\_102}} \text{species\_103} + \text{species\_24} \tag{209}$$

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

$$v_{91} = \text{function\_9}\left(\text{vol}\left(\text{c2}\right), \text{parameter\_171}, \left[\text{species\_102}\right]\right) \tag{210}$$

$$\text{function\_9}\left(\text{vol}\left(\text{c2}\right), \text{parameter\_171}, \left[\text{species\_102}\right]\right) = \text{vol}\left(\text{c2}\right) \cdot \text{parameter\_171} \cdot \left[\text{species\_102}\right] \tag{211}$$

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

$$\text{species\_96} + \text{species\_95} \xrightleftharpoons{\text{species\_96, species\_95, species\_103}} \text{species\_103} \tag{212}$$

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

$$v_{92} = \mathrm{vol}\,(\mathrm{c2}) \cdot (\mathrm{parameter\_172} \cdot [\mathrm{species\_96}] \cdot [\mathrm{species\_95}] - \mathrm{parameter\_173} \cdot [\mathrm{species\_103}]) \tag{213}$$

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

$$2\,\mathrm{species\_80} \xrightleftharpoons{\mathrm{species\_80},\ \mathrm{species\_81}} \mathrm{species\_81} \tag{214}$$

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

$$v_{93} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \left(\mathrm{parameter\_133} \cdot \left[\mathrm{species\_80}\right]^2 - \mathrm{parameter\_134} \cdot \left[\mathrm{species\_81}\right]\right) \tag{215}$$

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

$$\mathrm{species\_84} + \mathrm{species\_100} \xrightleftharpoons{\mathrm{species\_84,\ species\_100,\ species\_104}} \mathrm{species\_104} \tag{216}$$

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

$$v_{94} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_174} \cdot [\mathrm{species\_84}] \cdot [\mathrm{species\_100}] - \mathrm{parameter\_175} \cdot [\mathrm{species\_104}]) \tag{217}$$

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

$$\mathrm{species\_108} + \mathrm{species\_104} \xrightleftharpoons{\mathrm{species\_108},\ \mathrm{species\_104},\ \mathrm{species\_105}} \mathrm{species\_105} \tag{218}$$

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

$$v_{95} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_176} \cdot [\mathrm{species\_108}] \cdot [\mathrm{species\_104}] - \mathrm{parameter\_177} \cdot [\mathrm{species\_105}]) \tag{219}$$

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

$$\mathrm{species\_105} \xrightarrow{\mathrm{species\_105}} \mathrm{species\_99} + \mathrm{species\_81} + \mathrm{species\_84} + \mathrm{species\_108} \tag{220}$$

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

$$v_{96} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_178} \cdot [\mathrm{species\_105}] \tag{221}$$

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

$$\mathrm{species\_105} \xrightarrow{\mathrm{species\_105}} \mathrm{species\_99} + \mathrm{species\_106} \tag{222}$$

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

$$v_{97} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{parameter\_179} \cdot [\mathrm{species\_105}] \tag{223}$$

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

$$\mathrm{species\_81} \xrightarrow{\mathrm{species\_81}} \mathrm{species\_82} \tag{224}$$

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

$$v_{98} = \mathrm{vol}(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_135} \cdot [\mathrm{species\_81}] \tag{225}$$

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

$$\mathrm{species\_82} + \mathrm{species\_84} \xrightleftharpoons{\mathrm{species\_82,\ species\_84,\ species\_83}} \mathrm{species\_83} \tag{226}$$

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

$$v_{99} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_136} \cdot [\mathrm{species\_82}] \cdot [\mathrm{species\_84}] - \mathrm{parameter\_137} \cdot [\mathrm{species\_83}]) \tag{227}$$

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

$$\mathrm{species\_83} \xrightarrow{\mathrm{species\_83}} \mathrm{species\_82} + \mathrm{species\_85} \tag{228}$$

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

$$v_{100} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_138} \cdot [\mathrm{species\_83}] \tag{229}$$

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

$$\mathrm{species\_82} + \mathrm{species\_85} \xrightleftharpoons{\mathrm{species\_82},\ \mathrm{species\_85},\ \mathrm{species\_86}} \mathrm{species\_86} \tag{230}$$

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

$$v_{101} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_139} \cdot [\mathrm{species\_82}] \cdot [\mathrm{species\_85}] - \mathrm{parameter\_140} \cdot [\mathrm{species\_86}]) \tag{231}$$

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

$$2\,\mathrm{species\_85} \overset{\mathrm{species\_85,\ species\_87}}{\rightleftharpoons} \mathrm{species\_87} \tag{232}$$

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

$$v_{102} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \left(\mathrm{parameter\_141} \cdot \left[\mathrm{species\_85}\right]^2 - \mathrm{parameter\_142} \cdot \left[\mathrm{species\_87}\right]\right) \tag{233}$$

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

$$\mathrm{species\_82} + \mathrm{species\_108} \xrightleftharpoons{\mathrm{species\_82},\ \mathrm{species\_108},\ \mathrm{species\_88}} \mathrm{species\_88} \tag{234}$$

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

$$v_{103} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_143} \cdot [\mathrm{species\_82}] \cdot [\mathrm{species\_108}] - \mathrm{parameter\_144} \cdot [\mathrm{species\_88}]) \tag{235}$$

8.104 Reaction re112

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

Name reaction_n1

Reaction equation

$$\mathrm{species\_82} + \mathrm{species\_11} \xrightleftharpoons{\mathrm{species\_82},\ \mathrm{species\_11},\ \mathrm{s118}} \mathrm{s118} \tag{236}$$

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

$$v_{104} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_221} \cdot [\mathrm{species\_82}] \cdot [\mathrm{species\_11}] - \mathrm{parameter\_222} \cdot [\mathrm{s118}]) \tag{237}$$

8.105 Reaction re117

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

Name reaction_n10

Reaction equation

$$\mathrm{s120} \xrightarrow{\mathrm{s120}} \mathrm{s122} \tag{238}$$

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

$$v_{105} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_237} \cdot [\mathrm{s120}] \tag{239}$$

8.106 Reaction re153

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

Name reaction_n11

Reaction equation

$$\mathrm{species\_20} + \mathrm{s120} \xrightleftharpoons{\mathrm{species\_20,\ s120,\ s135}} \mathrm{s135} \tag{240}$$

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

$$v_{106} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_238} \cdot [\mathrm{species\_20}] \cdot [\mathrm{s120}] - \mathrm{parameter\_239} \cdot [\mathrm{s135}]) \tag{241}$$

8.107 Reaction re126

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

Name reaction_n12

Reaction equation

$$\mathrm{s122} + \mathrm{species\_24} \xrightleftharpoons{\mathrm{s122,\ species\_24,\ s126}} \mathrm{s126} \tag{242}$$

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

$$v_{107} = \text{parameter\_240} \cdot [\text{s122}] \cdot [\text{species\_24}] - \text{parameter\_241} \cdot [\text{s126}] \tag{243}$$

8.108 Reaction re113

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

Name reaction_n2

Reaction equation

$$\text{s118} \xrightarrow{\text{s118}} \text{species\_12} + \text{species\_82} \tag{244}$$

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

$$v_{108} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{parameter\_223} \cdot [\mathrm{s118}] \tag{245}$$

8.109 Reaction re114

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

Name reaction_n3

Reaction equation

$$\mathrm{species\_12} + \mathrm{species\_82} \xrightleftharpoons{\mathrm{species\_12,\ species\_82,\ s119}} \mathrm{s119} \tag{246}$$

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

$$v_{109} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_224} \cdot [\mathrm{species\_12}] \cdot [\mathrm{species\_82}] - \mathrm{parameter\_225} \cdot [\mathrm{s119}]) \tag{247}$$

8.110 Reaction re157

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

Name reaction_n4

Reaction equation

$$\mathrm{species\_9} + \mathrm{species\_84} \xrightleftharpoons{\mathrm{species\_9},\ \mathrm{species\_84},\ \mathrm{s138}} \mathrm{s138} \tag{248}$$

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

$$v_{110} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_226} \cdot [\mathrm{species\_9}] \cdot [\mathrm{species\_84}] - \mathrm{parameter\_227} \cdot [\mathrm{s138}]) \tag{249}$$

8.111 Reaction re158

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

Name reaction_n5

Reaction equation

$$\mathrm{s138} \xrightarrow{\mathrm{s138}} \mathrm{species\_9} + \mathrm{species\_85} \tag{250}$$

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

$$v_{111} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{parameter\_228} \cdot [\mathrm{s138}] \tag{251}$$

8.112 Reaction re159

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

Name reaction_n6

Reaction equation

$$\mathrm{species\_85} + \mathrm{species\_9} \xrightleftharpoons{\mathrm{species\_85,\ species\_9,\ s139}} \mathrm{s139} \tag{252}$$

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

$$v_{112} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_229} \cdot [\mathrm{species\_85}] \cdot [\mathrm{species\_9}] - \mathrm{parameter\_230} \cdot [\mathrm{s139}]) \tag{253}$$

8.113 Reaction re116

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

Name reaction_n7

Reaction equation

$$\emptyset \xrightarrow{\text{species\_92, species\_92}} \text{species\_30} \tag{254}$$

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

$$v_{113} = \mathrm{vol}\,(\mathrm{c3}) \cdot \mathrm{function\_4\_reaction\_n7\_1}\,(\mathrm{parameter\_231}, \mathrm{parameter\_232}, [\mathrm{species\_92}]) \quad (255)$$

$$\mathrm{function\_4\_reaction\_n7\_1}\,(\mathrm{parameter\_231}, \mathrm{parameter\_232}, [\mathrm{species\_92}]) = \frac{\mathrm{parameter\_231} \cdot [\mathrm{species\_92}]}{\mathrm{parameter\_232} + [\mathrm{species\_92}]} \quad (256)$$

$$\mathrm{function\_4\_reaction\_n7\_1}\,(\mathrm{parameter\_231}, \mathrm{parameter\_232}, [\mathrm{species\_92}]) = \frac{\mathrm{parameter\_231} \cdot [\mathrm{species\_92}]}{\mathrm{parameter\_232} + [\mathrm{species\_92}]} \quad (257)$$

8.114 Reaction re115

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

Name reaction_n8

Reaction equation

$$\mathrm{species\_12} + \mathrm{species\_85} \xrightleftharpoons{\mathrm{species\_12},\ \mathrm{species\_85},\ \mathrm{s120}} \mathrm{s120} \quad (258)$$

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

$$v_{114} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{parameter\_233} \cdot [\mathrm{species\_12}] \cdot [\mathrm{species\_85}] - \mathrm{parameter\_234} \cdot [\mathrm{s120}]) \tag{259}$$

8.115 Reaction re121

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

Name reaction_n9

Reaction equation

$$\mathrm{species\_26} + \mathrm{species\_95} \xrightleftharpoons{\mathrm{species\_26},\ \mathrm{species\_95},\ \mathrm{s122}} \mathrm{s122} \tag{260}$$

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

$$v_{115} = \text{parameter\_235} \cdot [\text{species\_26}] \cdot [\text{species\_95}] - \text{parameter\_236} \cdot [\text{s122}] \qquad (261)$$

8.116 Reaction re161

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

Name reaction_n13

Reaction equation

$$\text{s135} \xrightarrow{\text{s135}} \text{species\_20} + \text{species\_12} + \text{species\_84} \qquad (262)$$

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-STAT1C*-STAT3C*	

Products

Table 344: Properties of each product.

Id	Name	SBO
species_20	PP1	
species_12	STAT3C*	
species_84	STAT1C	

Kinetic Law

Derived unit contains undeclared units

$$v_{116} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_242} \cdot [\mathrm{s135}] \tag{263}$$

8.117 Reaction re162

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

Name reaction_n14

Reaction equation

$$\mathrm{s135} \xrightarrow{\mathrm{s135}} \mathrm{species\_85} + \mathrm{species\_11} + \mathrm{species\_20} \tag{264}$$

Reactant

Table 345: Properties of each reactant.

Id	Name	SBO
s135	PP1-STAT1C*-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

$$v_{117} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{parameter\_243} \cdot [\mathrm{s135}] \tag{265}$$

8.118 Reaction re163

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

Name reaction_n15

Reaction equation

$$\mathrm{s126} \xrightarrow{\mathrm{s126}} \mathrm{species\_26} + \mathrm{species\_24} + \mathrm{species\_96} \tag{266}$$

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

$$v_{118} = \text{parameter\_244} \cdot [\text{s126}] \tag{267}$$

8.119 Reaction re164

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

Name reaction_n16

Reaction equation

$$\text{s126} \xrightarrow{\text{s126}} \text{species\_95} + \text{species\_28} + \text{species\_24} \tag{268}$$

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

$$v_{119} = \text{parameter\_245} \cdot [\text{s126}] \tag{269}$$

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

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:

$$\frac{\text{d}}{\text{d}t}\text{species\_1} = 0 \tag{270}$$

9.2 Species species_79

Name IFN

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

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:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_79} = 0 \tag{271}$$

9.3 Species s118

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

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s118} = v_{104} - v_{108} \tag{272}$$

9.4 Species s119

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

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s119} = v_{109} \tag{273}$$

9.5 Species s120

Name STAT1C*-STAT3C*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s120} = v_{114} - v_{105} - v_{106} \tag{274}$$

9.6 Species s122

Name STAT1N*-STAT3N*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s122} = v_{105} + v_{115} - v_{107} \tag{275}$$

9.7 Species species_2

Name gp80

Initial concentration $8\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

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:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_2} = 0 \tag{276}$$

9.8 Species species_3

Name IL6-gp80

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_3} = v_{2} - v_{18} \tag{277}$$

9.9 Species species_4

Name gp130

Initial concentration $0.8\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

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:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_4} = 0 \tag{278}$$

9.10 Species species_5

Name JAK(IFN)

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_5} = -\,v_{71} \tag{279}$$

9.11 Species species_6

Name gp130-JAK

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_6} = v_{1} - v_{18} \tag{280}$$

9.12 Species species_7

Name IL6-gp80-gp130-JAK

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_7} = v_{18} - 2\,v_{49} \tag{281}$$

9.13 Species species_8

Name (IL6-gp80-gp130-JAK)2

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_8} = v_{6} + v_{27} + v_{49} - v_{60} \tag{282}$$

9.14 Species species_9

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

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_9} = v_{37} + v_{41} + v_{43} + v_{60} + v_{70} + v_{111} - v_3 - v_5 - v_{24} - v_{69} - v_{110} - v_{112} \tag{283}$$

9.15 Species species_10

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

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_10} = v_{69} - v_{70} \tag{284}$$

9.16 Species species_11

Name STAT3C

Initial concentration $1000\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_11} = v_8 + v_{20} + v_{117} - v_{11} - v_{69} - v_{104} \tag{285}$$

9.17 Species species_12

Name STAT3C*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_12} = v_{70} + v_{108} + v_{116} - v_3 - 2\,v_4 - v_7 - v_{11} - v_{109} - v_{114} \tag{286}$$

9.18 Species species_13

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

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_13} = v_3 \tag{287}$$

9.19 Species species_14

Name (STAT3C*)2

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_14} = v_4 - v_9 - v_{12} \tag{288}$$

9.20 Species species_15

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

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_15} = v_{24} - v_{27} \tag{289}$$

9.21 Species species_16

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

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

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 re138, re137, reaction_39).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_16} = v_5 - v_6 - v_{28} \tag{290}$$

9.22 Species species_18

Name STAT3C-STAT3C*

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_18} = v_{10} + v_{11} \tag{291}$$

9.23 Species species_19

Name SOCS3

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_19} = v_{23} + v_{27} - v_{24} - v_{26} \tag{292}$$

9.24 Species species_20

Name PP1

Initial concentration $50\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_20} = v_8 + v_{10} + v_{74} + v_{88} + v_{116} + v_{117} - v_7 - v_9 - v_{73} - v_{87} - v_{106} \tag{293}$$

9.25 Species species_21

Name PP1-STAT3C*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_21} = v_7 - v_8 \tag{294}$$

9.26 Species species_22

Name PP1-(STAT3C*)2

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_22} = v_9 - v_{10} \tag{295}$$

9.27 Species species_31

Name mRNA-SOCS3C

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_31} = v_{22} - v_{25} \tag{296}$$

9.28 Species species_32

Name Grb2

Initial concentration $85\ \mathrm{nmol} \cdot \mathrm{l}^{-1}$

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_32} = v_{39} - v_{29} - v_{42} \tag{297}$$

9.29 Species species_33

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

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_33} = v_{28} - v_{29} - v_{41} - v_{45} \tag{298}$$

9.30 Species species_34

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

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_34} = v_{29} - v_{30} - v_{43} \tag{299}$$

9.31 Species species_35

Name SOS

Initial concentration $34\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_35} = v_{39} - v_{30} - v_{44} \tag{300}$$

9.32 Species species_36

Name SHP2*-Grb2

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_36} = v_{42} + v_{43} - v_{44} \tag{301}$$

9.33 Species species_37

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

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_37} = v_{30} + v_{32} + v_{36} + v_{45} - v_{31} - v_{35} - v_{37} \tag{302}$$

9.34 Species species_38

Name Ras-GDP

Initial concentration $19000\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_38} = v_{36} - v_{31} \tag{303}$$

9.35 Species species_39

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

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_39} = v_{31} - v_{32} \tag{304}$$

9.36 Species species_40

Name Ras-GTP

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_40} = v_{32} - v_{33} \tag{305}$$

9.37 Species species_41

Name Raf

Initial concentration $67\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_41} = v_{47} - v_{33} \tag{306}$$

9.38 Species species_42

Name Raf-Ras-GTP

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_42} = v_{33} - v_{34} \tag{307}$$

9.39 Species species_43

Name Ras-GTP*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_43} = v_{34} - v_{35} \tag{308}$$

9.40 Species species_44

Name Raf*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_44} = v_{34} + v_{50} + v_{52} - v_{46} - v_{48} - v_{51} \tag{309}$$

9.41 Species species_45

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

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_45} = v_{35} - v_{36} \tag{310}$$

9.42 Species species_46

Name SHP2*-Grb2-SOS

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_46} = v_{37} + v_{44} - v_{38} \tag{311}$$

9.43 Species species_47

Name Grb2-SOS

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_47} = v_{38} - v_{39} - v_{45} \tag{312}$$

9.44 Species species_48

Name SHP2*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_48} = v_{38} + v_{41} - v_{40} - v_{42} \tag{313}$$

9.45 Species species_49

Name Phosp1

Initial concentration $67\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_49} = v_{47} - v_{46} \tag{314}$$

9.46 Species species_50

Name Raf*-Phosp1

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_50} = v_{46} - v_{47} \tag{315}$$

9.47 Species species_51

Name MEK

Initial concentration $41667\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_51} = v_{56} - v_{48} \tag{316}$$

9.48 Species species_52

Name MEK-Raf*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_52} = v_{48} - v_{50} \tag{317}$$

9.49 Species species_53

Name MEK-P

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_53} = v_{50} + v_{54} - v_{51} - v_{55} \tag{318}$$

9.50 Species species_54

Name MEK-P-Raf*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_54} = v_{51} - v_{52} \tag{319}$$

9.51 Species species_55

Name MEK-PP

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_55} = v_{52} + v_{58} + v_{61} - v_{53} - v_{57} - v_{59} \tag{320}$$

9.52 Species species_56

Name MEK-PP-Phosp2

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_56} = v_{53} - v_{54} \tag{321}$$

9.53 Species species_57

Name Phosp2

Initial concentration $67\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_57} = v_{54} + v_{56} - v_{53} - v_{55} \tag{322}$$

9.54 Species species_58

Name MEK-P-Phosp2

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_58} = v_{55} - v_{56} \tag{323}$$

9.55 Species species_59

Name ERK

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_59} = v_{65} - v_{57} \tag{324}$$

9.56 Species species_60

Name ERK-MEK-PP

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_60} = v_{57} - v_{58} \tag{325}$$

9.57 Species species_61

Name ERK-P

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_61} = v_{58} + v_{63} - v_{59} - v_{64} \tag{326}$$

9.58 Species species_62

Name ERK-P-MEK-PP

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_62} = v_{59} - v_{61} \tag{327}$$

9.59 Species species_63

Name ERK-PP

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_63} = v_{61} - v_{62} \tag{328}$$

9.60 Species species_64

Name Phosp3

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_64} = v_{63} + v_{65} - v_{62} - v_{64} \tag{329}$$

9.61 Species species_65

Name ERK-PP-Phosp3

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_65} = v_{62} - v_{63} \tag{330}$$

9.62 Species species_66

Name ERK-P-Phosp3

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_66} = v_{64} - v_{65} \tag{331}$$

9.63 Species s126

Name PP2-STAT1N*-STAT3N*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s126} = v_{107} - v_{118} - v_{119} \tag{332}$$

9.64 Species s135

Name PP1-STAT1C*-STAT3C*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s135} = v_{106} - v_{116} - v_{117} \tag{333}$$

9.65 Species species_74

Name CEBPi

Initial concentration $40493\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_74} = v_{67} - v_{66} \tag{334}$$

9.66 Species species_75

Name CEBP

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_75} = v_{66} - v_{67} - 2\,v_{68} \tag{335}$$

9.67 Species species_76

Name CEBPn

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_76} = v_{68} \tag{336}$$

9.68 Species species_78

Name R-JAK

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_78} = v_{71} - v_{82} \tag{337}$$

9.69 Species species_80

Name IFN-R-JAK

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_80} = v_{82} - 2\,v_{93} \tag{338}$$

9.70 Species species_81

Name (IFN-R-JAK)2

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_81} = v_{72} + v_{93} + v_{96} - v_{98} \tag{339}$$

9.71 Species species_82

Name (IFN-R-JAK)2*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_82} = v_{98} + v_{100} + v_{108} - v_{84} - v_{99} - v_{101} - v_{103} - v_{104} - v_{109} \tag{340}$$

9.72 Species species_83

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

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_83} = v_{99} - v_{100} \tag{341}$$

9.73 Species species_84

Name STAT1C

Initial concentration $1000\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_84} = v_{74} + v_{79} + v_{96} + v_{116} - v_{75} - v_{94} - v_{99} - v_{110} \tag{342}$$

9.74 Species species_85

Name STAT1C*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_85} = v_{100} + v_{111} + v_{117} - v_{73} - v_{75} - v_{101} - 2\,v_{102} - v_{112} - v_{114} \tag{343}$$

9.75 Species species_86

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

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_86} = v_{101} \tag{344}$$

9.76 Species species_87

Name (STAT1C*)2

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_87} = v_{102} - v_{76} - v_{87} \tag{345}$$

9.77 Species species_88

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

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_88} = v_{103} - v_{72} \tag{346}$$

9.78 Species species_90

Name PP1-STAT1C*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_90} = v_{73} - v_{74} \tag{347}$$

9.79 Species species_91

Name STAT1C-STAT1C*

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_91} = v_{75} + v_{88} \tag{348}$$

9.80 Species species_98

Name mRNA-SOCS1C

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_98} = v_{81} - v_{85} \tag{349}$$

9.81 Species species_99

Name SOCS1

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_99} = v_{83} + v_{96} + v_{97} - v_{84} - v_{86} \tag{350}$$

9.82 Species species_100

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

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_100} = v_{84} - v_{94} \tag{351}$$

9.83 Species species_101

Name PP1-(STAT1C*)2

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_101} = v_{87} - v_{88} \tag{352}$$

9.84 Species species_104

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

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_104} = v_{94} - v_{95} \tag{353}$$

9.85 Species species_105

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

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_105} = v_{95} - v_{96} - v_{97} \tag{354}$$

9.86 Species species_106

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

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_106} = v_{97} \tag{355}$$

9.87 Species species_107

Name R

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_107} = -v_{71} \tag{356}$$

9.88 Species species_108

Name SHP2

Initial concentration $100\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_108} = v_6 + v_{40} + v_{72} + v_{96} - v_5 - v_{95} - v_{103} \tag{357}$$

9.89 Species s137

Name STAT3*

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

Involved in rule s137

One rule determines the species' quantity.

9.90 Species s136

Name STAT1*

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

Involved in rule s136

One rule determines the species' quantity.

9.91 Species s138

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

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s138} = v_{110} - v_{111} \tag{358}$$

9.92 Species s139

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

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s139} = v_{112} \tag{359}$$

9.93 Species s140

Name JAK(IL-6)

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s140} = -v_{1} \tag{360}$$

9.94 Species species_92

Name (STAT1N*)2

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_92} = v_{76} + v_{89} - v_{90} \tag{361}$$

9.95 Species species_94

Name PP2-STAT1N*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_94} = v_{77} - v_{78} \tag{362}$$

9.96 Species species_95

Name STAT1N*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_95} = v_{119} - v_{77} - 2\,v_{89} - v_{92} - v_{115} \tag{363}$$

9.97 Species species_96

Name STAT1N

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_96} = v_{78} + v_{118} - v_{79} - v_{92} \tag{364}$$

9.98 Species species_97

Name mRNA-SOCS1N

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_97} = v_{80} - v_{81} \tag{365}$$

9.99 Species species_102

Name PP2-(STAT1N*)2

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_102} = v_{90} - v_{91} \tag{366}$$

9.100 Species species_103

Name STAT1N-STAT1N*

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_103} = v_{91} + v_{92} \tag{367}$$

9.101 Species species_23

Name (STAT3N*)2

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_23} = v_{12} - v_{13} - v_{16} \tag{368}$$

9.102 Species species_24

Name PP2

Initial concentration $60\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_24} = v_{15} + v_{17} + v_{78} + v_{91} + v_{118} + v_{119} - v_{14} - v_{16} - v_{77} - v_{90} - v_{107} \tag{369}$$

9.103 Species species_25

Name PP2-(STAT3N*)2

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_25} = v_{16} - v_{17} \tag{370}$$

9.104 Species species_26

Name STAT3N*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_26} = 2\,v_{13} + v_{19} + v_{118} - v_{14} - v_{115} \tag{371}$$

9.105 Species species_27

Name PP2-STAT3N*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_27} = v_{14} - v_{15} \tag{372}$$

9.106 Species species_28

Name STAT3N

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_28} = v_{15} + v_{19} + v_{119} - v_{20} \tag{373}$$

9.107 Species species_29

Name STAT3N-STAT3N*

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_29} = v_{17} - v_{19} \tag{374}$$

9.108 Species species_30

Name mRNA-SOCS3N

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{species\_30} = v_{21} + v_{113} - v_{22} \tag{375}$$

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