SBML Model Report

Model name: “Roblitz2013 - Menstrual Cycle following GnRH analogue administration”

May 5, 2016

1 General Overview

This is a document in SBML Level 2 Version 4 format. This model was created by the following two authors: Vijayalakshmi Chelliah[1] and Susanna Rblitz[2] at November 22nd 2013 at 12:55 a. m. and last time modified at October tenth 2014 at 11:32 a. m. Table 1 provides 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	1
species types	0	species	80
events	2	constraints	0
reactions	71	function definitions	71
global parameters	141	unit definitions	2
rules	2	initial assignments	0

Model Notes

Roblitz2013 - Menstrual Cycle following GnRH analogue administration

The model describes the menstrual cycle feedback mechanisms. GnRH, FSH, LH, E2, P4, inbibins A and B, and follicular development are modelled. The model predicts hormonal changes

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following GnRH analogue administration. Simulation results agree with measurements of hormone blood concentrations. The model gives insight into mechanisms underlying gonadotropin supression.

This model is described in the article:A mathematical model of the human menstrual cycle for the administration of GnRH analogues.Rblitz S, Sttzel C, Deuflhard P, Jones HM, Azulay DO, van der Graaf PH, Martin SW.J. Theor. Biol. 2013 Mar; 321: 8-27

Abstract:

The paper presents a differential equation model for the feedback mechanisms between gonadotropin-releasing hormone (GnRH), follicle-stimulating hormone (FSH), luteinizing hormone (LH), development of follicles and corpus luteum, and the production of estradiol (E2), progesterone (P4), inhibin A (IhA), and inhibin B (IhB) during the female menstrual cycle. Compared to earlier human cycle models, there are three important differences: The model presented here (a) does not involve any delay equations, (b) is based on a deterministic modeling of the GnRH pulse pattern, and (c) contains less differential equations and less parameters. These differences allow for a faster simulation and parameter identification. The focus is on modeling GnRH-receptor binding, in particular, by inclusion of a pharmacokinetic/pharmacodynamic (PK/PD) model for a GnRH agonist, Nafarelin, and a GnRH antagonist, Cetrorelix, into the menstrual cycle model. The final mathematical model describes the hormone profiles (LH, FSH, P4, E2) throughout the menstrual cycle of 12 healthy women. It correctly predicts hormonal changes following single and multiple dose administration of Nafarelin or Cetrorelix at different stages in the cycle.

This model is hosted on BioModels Database and identifiedby: BIOMD0000000494 .

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

2 Unit Definitions

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

2.1 Unit `time`

Name time

Definition 86400 s

2.2 Unit `substance`

Name substance

Definition dimensionless

2.3 Unit volume

Notes Litre is the predefined SBML unit for volume.

Definition l

2.4 Unit area

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

Definition m^2

2.5 Unit length

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

Definition m

3 Compartment

This model contains one compartment.

Table 2: Properties of all compartments.

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

3.1 Compartment default

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

Name default

4 Species

This model contains 80 species. The boundary condition of 35 of these species is set to `true` so that these species' amount cannot be changed by any reaction. Section 10 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
AF1	AF1	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
AF2	AF2	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
E2	E2	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
FSH_R	FSH_R	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
FSH_bld	FSH_bld	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
FSH_pit	FSH_pit	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
GnRH	GnRH	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
GnRH_R_a	GnRH_R-a	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
GnRH_R_i	GnRH_R-i	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
InhA	InhA	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
InhA_delay	InhA_delay	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
InhB	InhB	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
LH_Pit	LH_Pit	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
LH_R	LH_R	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
LH_bld	LH_bld	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
Lut1	Lut1	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
Lut2	Lut2	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
Lut3	Lut3	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
Lut4	Lut4	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
OvF	OvF	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
P4	P4	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
PrF	PrF	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
R_FSH	R_FSH	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
R_FSH_des	R_FSH_des	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
R_Foll	R_Foll	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
R_GnRH_a	R_GnRH-a	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
R_GnRH_i	R_GnRH-i	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
R_LH	R_LH	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
R_LH_des	R_LH_des	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
csa1_degraded	csa1_degraded	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s33	s33	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s38	s38	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s62	s62	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s64	s64	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s66	s66	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s67	s67	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s69	s69	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s71	s71	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s72	s72	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s74	s74	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s76	s76	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s78	s78	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s82	s82	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s85	s85	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s87	s87	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s92	s92	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s93	s93	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s94	s94	default	dimensionless $\cdot\, l^{-1}$	☑	☑

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
s95	s95	default	dimensionless $\cdot\, l^{-1}$	☑	☑
sa1_degraded	sa1_degraded	default	dimensionless $\cdot\, l^{-1}$	☑	☑
sa28_degraded	sa28_degraded	default	dimensionless $\cdot\, l^{-1}$	☑	☑
sa31_degraded	sa31_degraded	default	dimensionless $\cdot\, l^{-1}$	☑	☑
sa35_degraded	sa35_degraded	default	dimensionless $\cdot\, l^{-1}$	☑	☑
sa3_degraded	sa3_degraded	default	dimensionless $\cdot\, l^{-1}$	☑	☑
sa52_degraded	sa52_degraded	default	dimensionless $\cdot\, l^{-1}$	☑	☑
sa53_degraded	sa53_degraded	default	dimensionless $\cdot\, l^{-1}$	☑	☑
sa61_degraded	sa61_degraded	default	dimensionless $\cdot\, l^{-1}$	☑	☑
sa75_degraded	sa75_degraded	default	dimensionless $\cdot\, l^{-1}$	☑	☑
sa78_degraded	sa78_degraded	default	dimensionless $\cdot\, l^{-1}$	☑	☑
sa86_degraded	sa86_degraded	default	dimensionless $\cdot\, l^{-1}$	☑	☑
Sc1	Sc1	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
Sc2	Sc2	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
AF3	AF3	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
AF4	AF4	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
Ago_c	Ago_c	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
Ago_d	Ago_d	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
s102	s102	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s106	s106	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s108	s108	default	dimensionless $\cdot\, l^{-1}$	☑	☑
s107	s107	default	dimensionless $\cdot\, l^{-1}$	☑	☑
Ago_R_i	Ago_R-i	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
Ago_R_a	Ago_R-a	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
Ant_d	Ant_d	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
Ant_c	Ant_c	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
Ant_p	Ant_p	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
Ant_R	Ant_R	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
s113	s113	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
s114	s114	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
s115	s115	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟
s116	s116	default	dimensionless $\cdot\, l^{-1}$	⊟	⊟

5 Parameters

This model contains 141 global parameters.

Table 4: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
p1	b_syn_LH		7309.916		☑
p2	k_E2_LH		7309.916		☑
p174	k_AF2_IhB		447.467		☑
p173	b_IhB		89.493		☑
p3	T_E2_LH		192.204		☑
p4	T_P4_LH		2.371		☑
p6	n_E2_LH		10.000		☑
p7	n_P4_LH		1.000		☑
p175	k_Sc2_IhB		134240.200		☑
p152	k_AF2_E2		2.095		☑
p158	b_E2		51.558		☑
p159	k_AF3_E2		9.280		☑
p160	k_AF4_E2		3480.270		☑
p161	k_PrF_E2		0.972		☑
p164	k_Lut1_E2		1713.710		☑
p165	k_Lut4_E2		8675.139		☑
p154	k_cl_E2		5.235		☑
p168	b_IhA		1.445		☑
p169	k_PrF_IhA		2.285		☑
p170	k_Lut2_IhA		28.211		☑
p171	k_Lut3_IhA		216.850		☑
p172	k_Lut4_IhA		114.247		☑
p177	k_Sc1_IhA		60.000		☑
p178	k_Lut1_IhA		180.000		☑
p166	b_P4		0.943		☑
p167	k_Lut4_P4		761.643		☑
p155	k_cl_P4		5.130		☑
p301	a_0		0.006		☑
p203	T_P4_freq		1.200		☑
p204	n_P4_freq		2.000		☑
p205	T_E2_freq		220.000		☑
p206	n_E2_freq		10.000		☑
p208	T_E2_mass_1		220.000		☑
p209	n_E2_mass_1		2.000		☑
p210	T_E2_mass_2		9.600		☑
p211	n_E2_mass_2		1.000		☑
p12	V_blood		5.000		☑

Id	Name	SBO	Value	Unit	Constant
p300	k_degr_G		0.447		☑
p30	k_cl_IhAe		0.199		☑
p21	k_Ih_FSH		22129.050		☑
p22	T_IhA		95.810		☑
p23	T_IhB		70.000		☑
p24	n_IhA		5.000		☑
p25	n_IhB		2.000		☑
p11	T_freq_FSH		10.000		☑
p13	n_freq_FSH		3.000		☑
p8	T_GR_LH		$3 \cdot 10^{-4}$		☑
p9	n_GR_LH		5.000		☑
p16	b_rel_LH		0.005		☑
p5	k_GR_LH		0.190		☑
p302	k_on_G		322.176		☑
p307	k_recy_RG		32.218		☑
p306	k_inter_RG		3.222		☑
p308	k_degr_RG		0.089		☑
p311	k_syn_RG		$8.94934669769107 \cdot 10^{-5}$		☑
p303	k_off_G		644.353		☑
p309	k_inact_GR		32.218		☑
p310	k_act_GR		3.222		☑
p305	k_diss_GRi		32.218		☑
p231	k_cl_LH		74.851		☑
p230	k_on_LH		2.143		☑
p234	k_des_LH		183.363		☑
p232	k_recy_LH		68.949		☑
p17	b_rel_FSH		0.057		☑
p28	k_GR_FSH		0.272		☑
p18	T_GR_FSH		$3 \cdot 10^{-4}$		☑
p20	n_GR_FSH		2.000		☑
p240	k_on_FSH		3.529		☑
p242	k_recy_FSH		61.029		☑
p244	k_des_FSH		138.303		☑
p94	k_s		0.219		☑
p90	T_FSH_s		3.000		☑
p91	n_FSH_s		5.000		☑
p95	k_cl_s		1.343		☑
p92	T_P4_s		1.235		☑
p93	n_P4_s		5.000		☑
p49	k_AF1		3.662		☑
p48	T_FSHR_AF1		0.608		☑
p47	n_FSHR_AF1		3.000		☑

Id	Name	SBO	Value	Unit	Constant
p50	k_AF1_AF2		1.221		☑
p51	k_AF2_AF3		4.882		☑
p52	SF_LHR		2.726		☑
p46	n_AF2_AF3		3.689		☑
p32	k_AF3_AF4		122.060		☑
p43	n_AF3_AF4		5.000		☑
p31	k_AF3_AF3		0.122		☑
p55	SeF_max		10.000		☑
p33	k_A42_AF4		12.206		☑
p44	n_AF4		2.000		☑
p34	k_AF4_PrF		332.755		☑
p35	k_cl_PrF		122.060		☑
p45	n_OvF		6.000		☑
p27	k_OvF		7.984		☑
p53	T_PrF_OvF		3.000		☑
p54	n_PrF_OvF		10.000		☑
p36	k_cl_OvF		12.206		☑
p26	k_Sc1		1.208		☑
p56	T_OvF_Sc1		0.020		☑
p57	n_OvF_Sc1		10.000		☑
p37	k_Sc1_Sc2		1.221		☑
p38	k_Sc2_Lut1		0.958		☑
p39	k_Lut1_Lut2		0.925		☑
p83	T_GR_Lut		$8 \cdot 10^{-4}$		☑
p84	n_GR_Lut		5.000		☑
p40	k_Lut2_Lut3		0.757		☑
p41	k_Lut3_Lut4		0.610		☑
p42	k_cl_Lut4		0.543		☑
p156	k_IhA		4.287		☑
p157	k_cl_IhB		172.454		☑
p304	k_degr_GRi		0.009		☑
p241	k_cl_FSH		114.247		☑
p80	m_GR_Lut		20.000		☑
freq	freq		3.179		☐
mass	mass		0.001		☐
facE2	facE2		1.000		☑
facP4	facP4		1.000		☑
facLH	facLH		1.000		☑
facFSH	facFSH		1.000		☑
p202	f_0		16.000		☑
p201	m_E2_freq		1.000		☑
p274	k_A_Ago		54.200		☑

Id	Name	SBO	Value	Unit	Constant
p275	cl_Ago		2.650		☑
p273	V_c_F_Ago		38.120		☑
p313	k_off_Ago		644.350		☑
p312	k_on_Ago		322.180		☑
p314	k_degr_AgoR		0.009		☑
p315	k_diss_AgoR		32.220		☑
p319	k_inact_AgoR		32.220		☑
p320	k_act_AgoR		3.220		☑
p269	t_0_Ago		91.000		☑
p272	dose_Ago		100.000		☑
p512	k_on_ant		322.180		☑
p513	k_off_Ant		644.350		☑
p514	k_degr_Ant		0.009		☑
p474	k_A_Ant		45.560		☑
p475	cl_Ant		5.000		☑
p473	V_c_F_Ant		34.900		☑
p476	k_cp_Ant		3.216		☑
p477	k_pc_Ant		4.760		☑
p469	t_0_Ant		34.000		☑
p472	dose_Ant		500.000		☑

6 Function definitions

This is an overview of 71 function definitions.

6.1 Function definition `function_1`

Name Function for re2

Arguments [GnRH_R_a], vol (default), p309

Mathematical Expression

$$\frac{\text{p309} \cdot [\text{GnRH\_R\_a}] \cdot \text{vol}\,(\text{default})}{\text{vol}\,(\text{default})} \tag{1}$$

6.2 Function definition `function_2`

Name Function for re3

Arguments [GnRH_R_i], vol (default), p310

Mathematical Expression

$$\frac{\mathrm{p310} \cdot [\mathrm{GnRH\_R\_i}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{2}$$

6.3 Function definition `function_3`

Name Function for re4

Arguments [R_GnRH_i], vol (default), p307

Mathematical Expression

$$\frac{\mathrm{p307} \cdot [\mathrm{R\_GnRH\_i}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{3}$$

6.4 Function definition `function_4`

Name Function for re5

Arguments [R_GnRH_a], vol (default), p306

Mathematical Expression

$$\frac{\mathrm{p306} \cdot [\mathrm{R\_GnRH\_a}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{4}$$

6.5 Function definition `function_5`

Name Function for re6

Arguments [GnRH_R_i], vol (default), p305

Mathematical Expression

$$\frac{\mathrm{p305} \cdot [\mathrm{GnRH\_R\_i}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{5}$$

6.6 Function definition `function_6`

Name Function for re8

Arguments [GnRH], [R_GnRH_a], vol (default), p302

Mathematical Expression

$$\frac{\mathrm{p302} \cdot [\mathrm{GnRH}] \cdot \mathrm{vol}\,(\mathrm{default}) \cdot [\mathrm{R\_GnRH\_a}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{6}$$

6.7 Function definition function_7

Name Function for re11

Arguments [R_GnRH_i], vol (default), p308

Mathematical Expression

$$\frac{\mathrm{p308} \cdot [\mathrm{R\_GnRH\_i}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{7}$$

6.8 Function definition function_8

Name Function for re15

Arguments [GnRH_R_a], vol (default), p303

Mathematical Expression

$$\frac{\mathrm{p303} \cdot [\mathrm{GnRH\_R\_a}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{8}$$

6.9 Function definition function_9

Name Function for re24

Arguments [GnRH], vol (default), p300

Mathematical Expression

$$\frac{\mathrm{p300} \cdot [\mathrm{GnRH}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{9}$$

6.10 Function definition function_10

Name Function for re25

Arguments [E2], [P4], vol (default), facE2, facP4, p1, p2, p3, p4, p6, p7

Mathematical Expression

$$\frac{\mathrm{p1} + \frac{\mathrm{p2} \cdot \left(\frac{[\mathrm{E2}] \cdot \mathrm{vol}(\mathrm{default})}{\mathrm{p3} \cdot \mathrm{facE2}}\right)^{\mathrm{p6}}}{1 + \left(\frac{[\mathrm{E2}] \cdot \mathrm{vol}(\mathrm{default})}{\mathrm{p3} \cdot \mathrm{facE2}}\right)^{\mathrm{p6}}}}{1 + \left(\frac{[\mathrm{P4}] \cdot \mathrm{vol}(\mathrm{default})}{\mathrm{p4} \cdot \mathrm{facP4}}\right)^{\mathrm{p7}}}}{\mathrm{vol}\,(\mathrm{default})} \tag{10}$$

6.11 Function definition function_11

Name Function for re26

Arguments [InhA_delay], [InhB], vol (default), freq, p11, p13, p21, p22, p23, p24, p25

Mathematical Expression

$$\frac{\frac{\mathrm{p21}}{1+\left(\frac{[\mathrm{InhA\_delay}]\cdot \mathrm{vol(default)}}{\mathrm{p22}}\right)^{\mathrm{p24}}+\left(\frac{[\mathrm{InhB}]\cdot \mathrm{vol(default)}}{\mathrm{p23}}\right)^{\mathrm{p25}}}\cdot 1}{1+\left(\frac{\mathrm{freq}}{\mathrm{p11}}\right)^{\mathrm{p13}}}}{\mathrm{vol\,(default)}} \tag{11}$$

6.12 Function definition function_12

Name Function for re28

Arguments [Ago_R_a], [GnRH_R_a], [LH_Pit], vol (default), p16, p5, p8, p9

Mathematical Expression

$$\frac{\left(\mathrm{p16}+\frac{\mathrm{p5}\cdot\left(\frac{[\mathrm{GnRH\_R\_a}]\cdot \mathrm{vol(default)}+[\mathrm{Ago\_R\_a}]\cdot \mathrm{vol(default)}}{\mathrm{p8}}\right)^{\mathrm{p9}}}{1+\left(\frac{[\mathrm{GnRH\_R\_a}]\cdot \mathrm{vol(default)}+[\mathrm{Ago\_R\_a}]\cdot \mathrm{vol(default)}}{\mathrm{p8}}\right)^{\mathrm{p9}}}\right)\cdot[\mathrm{LH\_Pit}]\cdot \mathrm{vol\,(default)}}{\mathrm{vol\,(default)}} \tag{12}$$

6.13 Function definition function_13

Name Function for re29

Arguments [Ago_R_a], [FSH_pit], [GnRH_R_a], vol (default), p17, p18, p20, p28

Mathematical Expression

$$\frac{\left(\mathrm{p17}+\frac{\mathrm{p28}\cdot\left(\frac{[\mathrm{GnRH\_R\_a}]\cdot \mathrm{vol(default)}+[\mathrm{Ago\_R\_a}]\cdot \mathrm{vol(default)}}{\mathrm{p18}}\right)^{\mathrm{p20}}}{1+\left(\frac{[\mathrm{GnRH\_R\_a}]\cdot \mathrm{vol(default)}+[\mathrm{Ago\_R\_a}]\cdot \mathrm{vol(default)}}{\mathrm{p18}}\right)^{\mathrm{p20}}}\right)\cdot[\mathrm{FSH\_pit}]\cdot \mathrm{vol\,(default)}}{\mathrm{vol\,(default)}} \tag{13}$$

6.14 Function definition function_14

Name Function for re35

Arguments [LH_bld], [R_LH], vol (default), facLH, p230

Mathematical Expression

$$\frac{\frac{\mathrm{p230}}{\mathrm{facLH}}\cdot[\mathrm{LH\_bld}]\cdot \mathrm{vol\,(default)}\cdot[\mathrm{R\_LH}]\cdot \mathrm{vol\,(default)}}{\mathrm{vol\,(default)}} \tag{14}$$

6.15 Function definition function_15

Name Function for re36

Arguments [LH_R], vol (default), p234

Mathematical Expression

$$\frac{\mathrm{p234} \cdot [\mathrm{LH\_R}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{15}$$

6.16 Function definition function_16

Name Function for re37

Arguments [R_LH_des], vol (default), p232

Mathematical Expression

$$\frac{\mathrm{p232} \cdot [\mathrm{R\_LH\_des}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{16}$$

6.17 Function definition function_17

Name Function for re38

Arguments [LH_bld], vol (default), p231

Mathematical Expression

$$\frac{\mathrm{p231} \cdot [\mathrm{LH\_bld}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{17}$$

6.18 Function definition function_18

Name Function for re39

Arguments [FSH_R], vol (default), p244

Mathematical Expression

$$\frac{\mathrm{p244} \cdot [\mathrm{FSH\_R}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{18}$$

6.19 Function definition function_19

Name Function for re40

Arguments [R_FSH_des], vol (default), p242

Mathematical Expression

$$\frac{\mathrm{p242} \cdot [\mathrm{R\_FSH\_des}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{19}$$

6.20 Function definition function_20

Name Function for re42

Arguments [AF1], [FSH_R], vol (default), p50

Mathematical Expression

$$\frac{\mathrm{p50} \cdot [\mathrm{FSH\_R}] \cdot \mathrm{vol}\,(\mathrm{default}) \cdot [\mathrm{AF1}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{20}$$

6.21 Function definition function_21

Name Function for re43

Arguments [FSH_R], vol (default), p47, p48, p49

Mathematical Expression

$$\frac{\frac{\mathrm{p49} \cdot \left(\frac{[\mathrm{FSH\_R}] \cdot \mathrm{vol}(\mathrm{default})}{\mathrm{p48}}\right)^{\mathrm{p47}}}{1 + \left(\frac{[\mathrm{FSH\_R}] \cdot \mathrm{vol}(\mathrm{default})}{\mathrm{p48}}\right)^{\mathrm{p47}}}}{\mathrm{vol}\,(\mathrm{default})} \tag{21}$$

6.22 Function definition function_22

Name Function for re44

Arguments [AF2], [LH_R], [R_Foll], vol (default), p46, p51, p52

Mathematical Expression

$$\frac{\mathrm{p51} \cdot \left(\frac{[\mathrm{LH\_R}] \cdot \mathrm{vol}(\mathrm{default})}{\mathrm{p52}}\right)^{\mathrm{p46}} \cdot [\mathrm{R\_Foll}] \cdot \mathrm{vol}\,(\mathrm{default}) \cdot [\mathrm{AF2}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{22}$$

6.23 Function definition function_23

Name Function for re45

Arguments [AF3], [LH_R], [R_Foll], vol (default), p32, p43, p52

Mathematical Expression

$$\frac{\mathrm{p32} \cdot \left(\frac{[\mathrm{LH\_R}] \cdot \mathrm{vol(default)}}{\mathrm{p52}}\right)^{\mathrm{p43}} \cdot [\mathrm{R\_Foll}] \cdot \mathrm{vol\,(default)} \cdot [\mathrm{AF3}] \cdot \mathrm{vol\,(default)}}{\mathrm{vol\,(default)}} \tag{23}$$

6.24 Function definition function_24

Name Function for re46

Arguments [AF4], [LH_R], [R_Foll], vol (default), p34, p52

Mathematical Expression

$$\frac{\frac{\mathrm{p34} \cdot [\mathrm{LH\_R}] \cdot \mathrm{vol(default)}}{\mathrm{p52}} \cdot [\mathrm{R\_Foll}] \cdot \mathrm{vol\,(default)} \cdot [\mathrm{AF4}] \cdot \mathrm{vol\,(default)}}{\mathrm{vol\,(default)}} \tag{24}$$

6.25 Function definition function_25

Name Function for re49

Arguments [Sc1], vol (default), p37

Mathematical Expression

$$\frac{\mathrm{p37} \cdot [\mathrm{Sc1}] \cdot \mathrm{vol\,(default)}}{\mathrm{vol\,(default)}} \tag{25}$$

6.26 Function definition function_26

Name Function for re50

Arguments [Sc2], vol (default), p38

Mathematical Expression

$$\frac{\mathrm{p38} \cdot [\mathrm{Sc2}] \cdot \mathrm{vol\,(default)}}{\mathrm{vol\,(default)}} \tag{26}$$

6.27 Function definition function_27

Name Function for re51

Arguments [Ago_R_a], [GnRH_R_a], [Lut1], vol (default), p39, p80, p83, p84

Mathematical Expression

$$\frac{\mathrm{p39}\cdot\left(1+\frac{\mathrm{p80}\cdot\left(\frac{[\mathrm{GnRH\_R\_a}]\cdot\mathrm{vol(default)}+[\mathrm{Ago\_R\_a}]\cdot\mathrm{vol(default)}}{\mathrm{p83}}\right)^{\mathrm{p84}}}{1+\left(\frac{[\mathrm{GnRH\_R\_a}]\cdot\mathrm{vol(default)}+[\mathrm{Ago\_R\_a}]\cdot\mathrm{vol(default)}}{\mathrm{p83}}\right)^{\mathrm{p84}}}\right)\cdot[\mathrm{Lut1}]\cdot\mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{27}$$

6.28 Function definition function_28

Name Function for re52

Arguments [Ago_R_a], [GnRH_R_a], [Lut2], vol (default), p40, p80, p83, p84

Mathematical Expression

$$\frac{\mathrm{p40}\cdot\left(1+\frac{\mathrm{p80}\cdot\left(\frac{[\mathrm{GnRH\_R\_a}]\cdot\mathrm{vol(default)}+[\mathrm{Ago\_R\_a}]\cdot\mathrm{vol(default)}}{\mathrm{p83}}\right)^{\mathrm{p84}}}{1+\left(\frac{[\mathrm{GnRH\_R\_a}]\cdot\mathrm{vol(default)}+[\mathrm{Ago\_R\_a}]\cdot\mathrm{vol(default)}}{\mathrm{p83}}\right)^{\mathrm{p84}}}\right)\cdot[\mathrm{Lut2}]\cdot\mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{28}$$

6.29 Function definition function_29

Name Function for re53

Arguments [Ago_R_a], [GnRH_R_a], [Lut3], vol (default), p41, p80, p83, p84

Mathematical Expression

$$\frac{\mathrm{p41}\cdot\left(1+\frac{\mathrm{p80}\cdot\left(\frac{[\mathrm{GnRH\_R\_a}]\cdot\mathrm{vol(default)}+[\mathrm{Ago\_R\_a}]\cdot\mathrm{vol(default)}}{\mathrm{p83}}\right)^{\mathrm{p84}}}{1+\left(\frac{[\mathrm{GnRH\_R\_a}]\cdot\mathrm{vol(default)}+[\mathrm{Ago\_R\_a}]\cdot\mathrm{vol(default)}}{\mathrm{p83}}\right)^{\mathrm{p84}}}\right)\cdot[\mathrm{Lut3}]\cdot\mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{29}$$

6.30 Function definition function_30

Name Function for re54

Arguments [FSH_bld], vol (default), p90, p91, p94

Mathematical Expression

$$\frac{\mathrm{p94}\cdot\left(\frac{[\mathrm{FSH\_bld}]\cdot\mathrm{vol(default)}}{\mathrm{p90}}\right)^{\mathrm{p91}}}{1+\left(\frac{[\mathrm{FSH\_bld}]\cdot\mathrm{vol(default)}}{\mathrm{p90}}\right)^{\mathrm{p91}}}}{\mathrm{vol}\,(\mathrm{default})} \tag{30}$$

6.31 Function definition function_31

Name Function for re56

Arguments [P4], [R_Foll], vol (default), facP4, p92, p93, p95

Mathematical Expression

$$\frac{\frac{\mathrm{p95}\cdot\left(\frac{[\mathrm{P4}]\cdot\mathrm{vol(default)}}{\mathrm{p92}\cdot\mathrm{facP4}}\right)^{\mathrm{p93}}}{1+\left(\frac{[\mathrm{P4}]\cdot\mathrm{vol(default)}}{\mathrm{p92}\cdot\mathrm{facP4}}\right)^{\mathrm{p93}}}\cdot[\mathrm{R\_Foll}]\cdot\mathrm{vol\,(default)}}{\mathrm{vol\,(default)}} \tag{31}$$

6.32 Function definition function_32

Name Function for re57

Arguments [AF3], [FSH_R], vol (default), p31, p55

Mathematical Expression

$$\frac{\mathrm{p31}\cdot[\mathrm{FSH\_R}]\cdot\mathrm{vol\,(default)}\cdot[\mathrm{AF3}]\cdot\mathrm{vol\,(default)}\cdot\left(1-\frac{[\mathrm{AF3}]\cdot\mathrm{vol(default)}}{\mathrm{p55}}\right)}{\mathrm{vol\,(default)}} \tag{32}$$

6.33 Function definition function_33

Name Function for re58

Arguments [AF4], [LH_R], vol (default), p33, p44, p52, p55

Mathematical Expression

$$\frac{\mathrm{p33}\cdot\left(\frac{[\mathrm{LH\_R}]\cdot\mathrm{vol(default)}}{\mathrm{p52}}\right)^{\mathrm{p44}}\cdot[\mathrm{AF4}]\cdot\mathrm{vol\,(default)}\cdot\left(1-\frac{[\mathrm{AF4}]\cdot\mathrm{vol(default)}}{\mathrm{p55}}\right)}{\mathrm{vol\,(default)}} \tag{33}$$

6.34 Function definition function_34

Name Function for re59

Arguments [LH_R], [PrF], [R_Foll], vol (default), p35, p45, p52

Mathematical Expression

$$\frac{\mathrm{p35}\cdot\left(\frac{[\mathrm{LH\_R}]\cdot\mathrm{vol(default)}}{\mathrm{p52}}\right)^{\mathrm{p45}}\cdot[\mathrm{R\_Foll}]\cdot\mathrm{vol\,(default)}\cdot[\mathrm{PrF}]\cdot\mathrm{vol\,(default)}}{\mathrm{vol\,(default)}} \tag{34}$$

6.35 Function definition function_35

Name Function for re60

Arguments [LH_R], [PrF], [R_Foll], vol (default), p27, p45, p52, p53, p54

Mathematical Expression

$$\frac{\mathrm{p27}\cdot[\mathrm{R\_Foll}]\cdot\mathrm{vol(default)}\cdot\left(\frac{[\mathrm{LH\_R}]\cdot\mathrm{vol(default)}}{\mathrm{p52}}\right)^{\mathrm{p45}}\cdot\left(\frac{[\mathrm{PrF}]\cdot\mathrm{vol(default)}}{\mathrm{p53}}\right)^{\mathrm{p54}}}{1+\left(\frac{[\mathrm{PrF}]\cdot\mathrm{vol(default)}}{\mathrm{p53}}\right)^{\mathrm{p54}}}}{\mathrm{vol\,(default)}} \tag{35}$$

6.36 Function definition function_36

Name Function for re61

Arguments [OvF], vol (default), p36

Mathematical Expression

$$\frac{\mathrm{p36}\cdot[\mathrm{OvF}]\cdot\mathrm{vol\,(default)}}{\mathrm{vol\,(default)}} \tag{36}$$

6.37 Function definition function_37

Name Function for re62

Arguments [OvF], vol (default), p26, p56, p57

Mathematical Expression

$$\frac{\frac{\mathrm{p26}\cdot\left(\frac{[\mathrm{OvF}]\cdot\mathrm{vol(default)}}{\mathrm{p56}}\right)^{\mathrm{p57}}}{1+\left(\frac{[\mathrm{OvF}]\cdot\mathrm{vol(default)}}{\mathrm{p56}}\right)^{\mathrm{p57}}}}{\mathrm{vol\,(default)}} \tag{37}$$

6.38 Function definition function_39

Name Function for re65

Arguments [AF2], [AF3], [AF4], [LH_bld], [Lut1], [Lut4], [PrF], vol (default), facE2, p152, p158, p159, p160, p161, p164, p165

Mathematical Expression

$$\frac{\mathrm{facE2}\cdot(\mathrm{p158}+\mathrm{p152}\cdot[\mathrm{AF2}]\cdot\mathrm{vol\,(default)}+\mathrm{p159}\cdot[\mathrm{AF3}]\cdot\mathrm{vol\,(default)}\cdot[\mathrm{LH\_bld}]\cdot\mathrm{vol\,(default)}+\mathrm{p160}\cdot[\mathrm{AF4}]\cdot} \tag{38}$$

6.39 Function definition function_38

Name Function for re64

Arguments [Ago_R_a], [GnRH_R_a], [Lut4], vol (default), p42, p80, p83, p84

Mathematical Expression

$$\frac{\mathrm{p42} \cdot \left(1 + \frac{\mathrm{p80} \cdot \left(\frac{[\mathrm{GnRH\_R\_a}] \cdot \mathrm{vol}(\mathrm{default}) + [\mathrm{Ago\_R\_a}] \cdot \mathrm{vol}(\mathrm{default})}{\mathrm{p83}}\right)^{\mathrm{p84}}}{1 + \left(\frac{[\mathrm{GnRH\_R\_a}] \cdot \mathrm{vol}(\mathrm{default}) + [\mathrm{Ago\_R\_a}] \cdot \mathrm{vol}(\mathrm{default})}{\mathrm{p83}}\right)^{\mathrm{p84}}}\right) \cdot [\mathrm{Lut4}] \cdot \mathrm{vol}(\mathrm{default})}{\mathrm{vol}(\mathrm{default})} \tag{39}$$

6.40 Function definition function_40

Name Function for re66

Arguments [E2], vol (default), p154

Mathematical Expression

$$\frac{\mathrm{p154} \cdot [\mathrm{E2}] \cdot \mathrm{vol}(\mathrm{default})}{\mathrm{vol}(\mathrm{default})} \tag{40}$$

6.41 Function definition function_41

Name Function for re67

Arguments [Lut4], vol (default), facP4, p166, p167

Mathematical Expression

$$\frac{\mathrm{facP4} \cdot (\mathrm{p166} + \mathrm{p167} \cdot [\mathrm{Lut4}] \cdot \mathrm{vol}(\mathrm{default}))}{\mathrm{vol}(\mathrm{default})} \tag{41}$$

6.42 Function definition function_42

Name Function for re69

Arguments [Lut1], [Lut2], [Lut3], [Lut4], [PrF], [Sc1], vol (default), p168, p169, p170, p171, p172, p177, p178

Mathematical Expression

$$\frac{\mathrm{p168} + \mathrm{p169} \cdot [\mathrm{PrF}] \cdot \mathrm{vol}(\mathrm{default}) + \mathrm{p177} \cdot [\mathrm{Sc1}] \cdot \mathrm{vol}(\mathrm{default}) + \mathrm{p178} \cdot [\mathrm{Lut1}] \cdot \mathrm{vol}(\mathrm{default}) + \mathrm{p170} \cdot [\mathrm{Lut2}] \cdot \mathrm{vol}(}{\mathrm{vol}(\mathrm{default})} \tag{42}$$

6.43 Function definition function_43

Name Function for re71

Arguments [P4], vol (default), p155

Mathematical Expression

$$\frac{\mathrm{p155} \cdot [\mathrm{P4}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{43}$$

6.44 Function definition function_44

Name Function for re72

Arguments [AF2], [Sc2], vol (default), p173, p174, p175

Mathematical Expression

$$\frac{\mathrm{p173} + \mathrm{p174} \cdot [\mathrm{AF2}] \cdot \mathrm{vol}\,(\mathrm{default}) + \mathrm{p175} \cdot [\mathrm{Sc2}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{44}$$

6.45 Function definition function_45

Name Function for re73

Arguments [InhB], vol (default), p157

Mathematical Expression

$$\frac{\mathrm{p157} \cdot [\mathrm{InhB}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{45}$$

6.46 Function definition function_46

Name Function for re74

Arguments [InhA_delay], vol (default), p30

Mathematical Expression

$$\frac{\mathrm{p30} \cdot [\mathrm{InhA\_delay}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{46}$$

6.47 Function definition function_47

Name Function for re75

Arguments vol (default), p311

Mathematical Expression

$$\frac{\text{p311}}{\text{vol}\,(\text{default})} \tag{47}$$

6.48 Function definition function_48

Name Function for re76

Arguments [GnRH_R_i], vol (default), p304

Mathematical Expression

$$\frac{\text{p304} \cdot [\text{GnRH\_R\_i}] \cdot \text{vol}\,(\text{default})}{\text{vol}\,(\text{default})} \tag{48}$$

6.49 Function definition function_49

Name Function for re78

Arguments vol (default), freq, mass

Mathematical Expression

$$\frac{\text{freq} \cdot \text{mass}}{\text{vol}\,(\text{default})} \tag{49}$$

6.50 Function definition function_50

Name Function for re82

Arguments [FSH_bld], vol (default), p241

Mathematical Expression

$$\frac{\text{p241} \cdot [\text{FSH\_bld}] \cdot \text{vol}\,(\text{default})}{\text{vol}\,(\text{default})} \tag{50}$$

6.51 Function definition function_51

Name Function for re83

Arguments [Ago_R_a], [GnRH_R_a], [LH_Pit], vol (default), facLH, p12, p16, p5, p8, p9

Mathematical Expression

$$\frac{\frac{\text{facLH}}{\text{p12}} \cdot \left(\text{p16} + \frac{\text{p5} \cdot \left(\frac{[\text{GnRH\_R\_a}] \cdot \text{vol(default)} + [\text{Ago\_R\_a}] \cdot \text{vol(default)}}{\text{p8}}\right)^{\text{p9}}}{1 + \left(\frac{[\text{GnRH\_R\_a}] \cdot \text{vol(default)} + [\text{Ago\_R\_a}] \cdot \text{vol(default)}}{\text{p8}}\right)^{\text{p9}}}\right) \cdot [\text{LH\_Pit}] \cdot \text{vol}\,(\text{default})}{\text{vol}\,(\text{default})} \tag{51}$$

6.52 Function definition function_52

Name Function for re84

Arguments [Ago_R_a], [FSH_pit], [GnRH_R_a], vol (default), facFSH, p12, p17, p18, p20, p28

Mathematical Expression

$$\frac{\frac{\text{facFSH}}{\text{p12}} \cdot \left(\text{p17} + \frac{\text{p28} \cdot \left(\frac{[\text{GnRH\_R\_a}] \cdot \text{vol(default)} + [\text{Ago\_R\_a}] \cdot \text{vol(default)}}{\text{p18}}\right)^{\text{p20}}}{1 + \left(\frac{[\text{GnRH\_R\_a}] \cdot \text{vol(default)} + [\text{Ago\_R\_a}] \cdot \text{vol(default)}}{\text{p18}}\right)^{\text{p20}}}\right) \cdot [\text{FSH\_pit}] \cdot \text{vol}\,(\text{default})}{\text{vol}\,(\text{default})} \tag{52}$$

6.53 Function definition function_53

Name Function for re85

Arguments [FSH_bld], [R_FSH], vol (default), facFSH, p240

Mathematical Expression

$$\frac{\frac{\text{p240}}{\text{facFSH}} \cdot [\text{FSH\_bld}] \cdot \text{vol}\,(\text{default}) \cdot [\text{R\_FSH}] \cdot \text{vol}\,(\text{default})}{\text{vol}\,(\text{default})} \tag{53}$$

6.54 Function definition function_54

Name Function for re87

Arguments [InhA], vol (default), p156

Mathematical Expression

$$\frac{\text{p156} \cdot [\text{InhA}] \cdot \text{vol}\,(\text{default})}{\text{vol}\,(\text{default})} \tag{54}$$

6.55 Function definition function_55

Name Function for re90

Arguments [Ago_c], vol (default), p275

Mathematical Expression

$$\frac{\text{p275} \cdot [\text{Ago\_c}] \cdot \text{vol}\,(\text{default})}{\text{vol}\,(\text{default})} \tag{55}$$

6.56 Function definition function_56

Name Function for re93

Arguments [Ago_R_a], vol (default), p319

Mathematical Expression

$$\frac{\text{p319} \cdot [\text{Ago\_R\_a}] \cdot \text{vol}\,(\text{default})}{\text{vol}\,(\text{default})} \tag{56}$$

6.57 Function definition function_57

Name Function for re94

Arguments [Ago_R_i], vol (default), p320

Mathematical Expression

$$\frac{\text{p320} \cdot [\text{Ago\_R\_i}] \cdot \text{vol}\,(\text{default})}{\text{vol}\,(\text{default})} \tag{57}$$

6.58 Function definition function_58

Name Function for re95

Arguments [Ago_R_i], vol (default), p314

Mathematical Expression

$$\frac{\text{p314} \cdot [\text{Ago\_R\_i}] \cdot \text{vol}\,(\text{default})}{\text{vol}\,(\text{default})} \tag{58}$$

6.59 Function definition function_59

Name Function for re97

Arguments [Ago_c], [R_GnRH_a], vol (default), p312

Mathematical Expression

$$\frac{\mathrm{p312} \cdot [\mathrm{R\_GnRH\_a}] \cdot \mathrm{vol}\,(\mathrm{default}) \cdot [\mathrm{Ago\_c}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{59}$$

6.60 Function definition function_60

Name Function for re98

Arguments [Ago_R_a], vol (default), p313

Mathematical Expression

$$\frac{\mathrm{p313} \cdot [\mathrm{Ago\_R\_a}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{60}$$

6.61 Function definition function_61

Name Function for re99

Arguments [Ago_R_i], vol (default), p315

Mathematical Expression

$$\frac{\mathrm{p315} \cdot [\mathrm{Ago\_R\_i}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{61}$$

6.62 Function definition function_62

Name Function for re100

Arguments [Ago_d], vol (default), p274

Mathematical Expression

$$\frac{\mathrm{p274} \cdot [\mathrm{Ago\_d}] \cdot \mathrm{vol}\,(\mathrm{default})}{\mathrm{vol}\,(\mathrm{default})} \tag{62}$$

6.63 Function definition function_63

Name Function for re101

Arguments [Ago_d], vol (default), p273, p274

Mathematical Expression

$$\frac{\frac{\text{p274}}{\text{p273}} \cdot [\text{Ago\_d}] \cdot \text{vol}\,(\text{default})}{\text{vol}\,(\text{default})} \tag{63}$$

6.64 Function definition function_64

Name Function for re102

Arguments [Ant_d], vol (default), p474

Mathematical Expression

$$\frac{\text{p474} \cdot [\text{Ant\_d}]}{\text{vol}\,(\text{default})} \tag{64}$$

6.65 Function definition function_65

Name Function for re103

Arguments [Ant_d], vol (default), p473, p474

Mathematical Expression

$$\frac{\frac{\text{p474}}{\text{p473}} \cdot [\text{Ant\_d}]}{\text{vol}\,(\text{default})} \tag{65}$$

6.66 Function definition function_66

Name Function for re104

Arguments [Ant_c], vol (default), p475

Mathematical Expression

$$\frac{\text{p475} \cdot [\text{Ant\_c}]}{\text{vol}\,(\text{default})} \tag{66}$$

6.67 Function definition function_67

Name Function for re105

Arguments [Ant_R], vol (default), p513

Mathematical Expression

$$\frac{\text{p513} \cdot [\text{Ant\_R}]}{\text{vol}\,(\text{default})} \tag{67}$$

6.68 Function definition function_68

Name Function for re106

Arguments [Ant_c], [R_GnRH_a], vol (default), p512

Mathematical Expression

$$\frac{\mathrm{p512} \cdot [\mathrm{R\_GnRH\_a}] \cdot \mathrm{vol}\,(\mathrm{default}) \cdot [\mathrm{Ant\_c}]}{\mathrm{vol}\,(\mathrm{default})} \tag{68}$$

6.69 Function definition function_69

Name Function for re107

Arguments [Ant_R], vol (default), p514

Mathematical Expression

$$\frac{\mathrm{p514} \cdot [\mathrm{Ant\_R}]}{\mathrm{vol}\,(\mathrm{default})} \tag{69}$$

6.70 Function definition function_70

Name Function for re108

Arguments [Ant_c], vol (default), p476

Mathematical Expression

$$\frac{\mathrm{p476} \cdot [\mathrm{Ant\_c}]}{\mathrm{vol}\,(\mathrm{default})} \tag{70}$$

6.71 Function definition function_71

Name Function for re109

Arguments [Ant_p], vol (default), p477

Mathematical Expression

$$\frac{\mathrm{p477} \cdot [\mathrm{Ant\_p}]}{\mathrm{vol}\,(\mathrm{default})} \tag{71}$$

7 Rules

This is an overview of two rules.

7.1 Rule `freq`

Rule `freq` is an assignment rule for parameter `freq`:

$$\text{freq} = \frac{\text{p202}}{1 + \left(\frac{\frac{[\text{P4}] \cdot \text{p201} \cdot \text{vol(default)}}{\text{p7}}}{\text{p203} \cdot \text{facP4}} \right)^{\text{p204}}} \cdot \left(1 + \frac{\text{p201} \cdot \left(\frac{\frac{[\text{E2}] \cdot \text{p201} \cdot \text{vol(default)}}{\text{p7}}}{\text{p205} \cdot \text{facE2}} \right)^{\text{p206}}}{1 + \left(\frac{\frac{[\text{E2}] \cdot \text{p201} \cdot \text{vol(default)}}{\text{p7}}}{\text{p205} \cdot \text{facE2}} \right)^{\text{p206}}} \right) \tag{72}$$

7.2 Rule `mass`

Rule `mass` is an assignment rule for parameter `mass`:

$$\text{mass} = \text{p301} \cdot \left(\frac{\left(\frac{\frac{[\text{E2}] \cdot \text{p201} \cdot \text{vol(default)}}{\text{p7}}}{\text{p208} \cdot \text{facE2}} \right)^{\text{p209}}}{1 + \left(\frac{\frac{[\text{E2}] \cdot \text{p201} \cdot \text{vol(default)}}{\text{p7}}}{\text{p208} \cdot \text{facE2}} \right)^{\text{p209}}} + \frac{1}{1 + \left(\frac{\frac{[\text{E2}] \cdot \text{p201} \cdot \text{vol(default)}}{\text{p7}}}{\text{p210} \cdot \text{facE2}} \right)^{\text{p211}}} \right) \tag{73}$$

8 Events

This is an overview of two events. Each event is initiated whenever its trigger condition switches from `false` to `true`. A delay function postpones the effects of an event to a later time point. At the time of execution, an event can assign values to species, parameters or compartments if these are not set to constant.

8.1 Event `event_1`

Name ago_admin

Trigger condition

$$\text{time} \geq \text{p269} \tag{74}$$

Delay

$$0 \tag{75}$$

Assignment

$$\text{Ago\_d} = \frac{\text{p272}}{\text{vol}\,(\text{default})} \tag{76}$$

8.2 Event `event_2`

Name ant_admin

Trigger condition

$$\text{time} \geq \text{p469} \tag{77}$$

Delay

$$0 \tag{78}$$

Assignment

$$\text{Ant\_d} = [\text{Ant\_d}] + \text{p472} \tag{79}$$

9 Reactions

This model contains 71 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	re2	re2	$\text{GnRH\_R\_a} \xrightarrow{\text{GnRH\_R\_a}} \text{GnRH\_R\_i}$	
2	re3	re3	$\text{GnRH\_R\_i} \xrightarrow{\text{GnRH\_R\_i}} \text{GnRH\_R\_a}$	
3	re4	re4	$\text{R\_GnRH\_i} \xrightarrow{\text{R\_GnRH\_i}} \text{R\_GnRH\_a}$	
4	re5	re5	$\text{R\_GnRH\_a} \xrightarrow{\text{R\_GnRH\_a}} \text{R\_GnRH\_i}$	
5	re6	re6	$\text{GnRH\_R\_i} \xrightarrow{\text{GnRH\_R\_i}} \text{R\_GnRH\_i}$	
6	re8	re8	$\text{GnRH} + \text{R\_GnRH\_a} \xrightarrow{\text{GnRH, R\_GnRH\_a}} \text{GnRH\_R\_a}$	
7	re11	re11	$\text{R\_GnRH\_i} \xrightarrow{\text{R\_GnRH\_i}} \text{sa1\_degraded}$	
8	re15	re15	$\text{GnRH\_R\_a} \xrightarrow{\text{GnRH\_R\_a}} \text{GnRH} + \text{R\_GnRH\_a}$	
9	re24	re24	$\text{GnRH} \xrightarrow{\text{GnRH}} \text{sa3\_degraded}$	
10	re25	re25	$\text{s33} \xrightarrow{\text{E2, P4, E2, P4}} \text{LH\_Pit}$	
11	re26	re26	$\text{s38} \xrightarrow{\text{InhA\_delay, InhB, InhA\_delay, InhB}} \text{FSH\_pit}$	
12	re28	re28	$\text{LH\_Pit} \xrightarrow{\text{GnRH\_R\_a, Ago\_R\_a, Ago\_R\_a, GnRH\_R\_a, LH\_Pit}} \text{s92}$	
13	re29	re29	$\text{FSH\_pit} \xrightarrow{\text{GnRH\_R\_a, Ago\_R\_a, Ago\_R\_a, FSH\_pit, GnRH\_R\_a}} \text{s94}$	
14	re35	re35	$\text{LH\_bld} + \text{R\_LH} \xrightarrow{\text{LH\_bld, R\_LH}} \text{LH\_R}$	
15	re36	re36	$\text{LH\_R} \xrightarrow{\text{LH\_R}} \text{R\_LH\_des}$	
16	re37	re37	$\text{R\_LH\_des} \xrightarrow{\text{R\_LH\_des}} \text{R\_LH}$	

№	Id	Name	Reaction Equation	SBO
17	re38	re38	LH_bld $\xrightarrow{\text{LH\_bld}}$ sa28_degraded	
18	re39	re39	FSH_R $\xrightarrow{\text{FSH\_R}}$ R_FSH_des	
19	re40	re40	R_FSH_des $\xrightarrow{\text{R\_FSH\_des}}$ R_FSH	
20	re42	re42	AF1 $\xrightarrow{\text{FSH\_R, AF1, FSH\_R}}$ AF2	
21	re43	re43	s62 $\xrightarrow{\text{FSH\_R, FSH\_R}}$ AF1	
22	re44	re44	AF2 $\xrightarrow{\text{LH\_R, R\_Foll, AF2, LH\_R, R\_Foll}}$ AF3	
23	re45	re45	AF3 $\xrightarrow{\text{R\_Foll, LH\_R, AF3, LH\_R, R\_Foll}}$ AF4	
24	re46	re46	AF4 $\xrightarrow{\text{LH\_R, R\_Foll, AF4, LH\_R, R\_Foll}}$ PrF	
25	re49	re49	Sc1 $\xrightarrow{\text{Sc1}}$ Sc2	
26	re50	re50	Sc2 $\xrightarrow{\text{Sc2}}$ Lut1	
27	re51	re51	Lut1 $\xrightarrow{\text{GnRH\_R\_a, Ago\_R\_a, Ago\_R\_a, GnRH\_R\_a, Lut1}}$ Lut2	
28	re52	re52	Lut2 $\xrightarrow{\text{GnRH\_R\_a, Ago\_R\_a, Ago\_R\_a, GnRH\_R\_a, Lut2}}$ Lut3	
29	re53	re53	Lut3 $\xrightarrow{\text{GnRH\_R\_a, Ago\_R\_a, Ago\_R\_a, GnRH\_R\_a, Lut3}}$ Lut4	
30	re54	re54	s64 $\xrightarrow{\text{FSH\_bld, FSH\_bld}}$ R_Foll	
31	re56	re56	R_Foll $\xrightarrow{\text{P4, P4, R\_Foll}}$ sa61_degraded	
32	re57	re57	s66 $\xrightarrow{\text{FSH\_R, AF3, AF3, FSH\_R}}$ AF3	
33	re58	re58	s67 $\xrightarrow{\text{LH\_R, AF4, AF4, LH\_R}}$ AF4	
34	re59	re59	PrF $\xrightarrow{\text{R\_Foll, LH\_R, LH\_R, PrF, R\_Foll}}$ sa52_degraded	
35	re60	re60	s69 $\xrightarrow{\text{R\_Foll, LH\_R, PrF, LH\_R, PrF, R\_Foll}}$ OvF	
36	re61	re61	OvF $\xrightarrow{\text{OvF}}$ sa53_degraded	

№	Id	Name	Reaction Equation	SBO
37	re62	re62	$s71 \xrightarrow{OvF,\ OvF} Sc1$	
38	re64	re64	$Lut4 \xrightarrow{GnRH\_R\_a,\ Ago\_R\_a,\ Ago\_R\_a,\ GnRH\_R\_a,\ Lut4} s72$	
39	re65	re65	$s74 \xrightarrow{AF3,\ AF4,\ Lut1,\ Lut4,\ AF2,\ PrF,\ LH\_bld,\ AF2,\ AF3,\ AF4,\ LH\_bld,\ Lut1,\ Lut4,\ Pr$	
40	re66	re66	$E2 \xrightarrow{E2} sa75\_degraded$	
41	re67	re67	$s76 \xrightarrow{Lut4,\ Lut4} P4$	
42	re69	re69	$s78 \xrightarrow{PrF,\ Sc1,\ Lut1,\ Lut2,\ Lut3,\ Lut4,\ Lut1,\ Lut2,\ Lut3,\ Lut4,\ PrF,\ Sc1} InhA$	
43	re71	re71	$P4 \xrightarrow{P4} sa78\_degraded$	
44	re72	re72	$s82 \xrightarrow{AF2,\ Sc2,\ AF2,\ Sc2} InhB$	
45	re73	re73	$InhB \xrightarrow{InhB} sa86\_degraded$	
46	re74	re74	$InhA\_delay \xrightarrow{InhA\_delay} sa35\_degraded$	
47	re75	re75	$s85 \longrightarrow R\_GnRH\_i$	
48	re76	re76	$GnRH\_R\_i \xrightarrow{GnRH\_R\_i} csa1\_degraded$	
49	re78	re78	$s87 \xrightarrow{E2,\ P4} GnRH$	
50	re82	re82	$FSH\_bld \xrightarrow{FSH\_bld} sa31\_degraded$	
51	re83	re83	$s93 \xrightarrow{GnRH\_R\_a,\ LH\_Pit,\ Ago\_R\_a,\ Ago\_R\_a,\ GnRH\_R\_a,\ LH\_Pit} LH\_bld$	
52	re84	re84	$s95 \xrightarrow{GnRH\_R\_a,\ FSH\_pit,\ Ago\_R\_a,\ Ago\_R\_a,\ FSH\_pit,\ GnRH\_R\_a} FSH\_bld$	
53	re85	re85	$FSH\_bld + R\_FSH \xrightarrow{FSH\_bld,\ R\_FSH} FSH\_R$	
54	re87	re87	$InhA \xrightarrow{InhA} InhA\_delay$	
55	re90	re90	$Ago\_c \xrightarrow{Ago\_c} s102$	
56	re93	re93	$Ago\_R\_a \xrightarrow{Ago\_R\_a} Ago\_R\_i$	

№	Id	Name	Reaction Equation	SBO
57	re94	re94	$\text{Ago\_R\_i} \xrightarrow{\text{Ago\_R\_i}} \text{Ago\_R\_a}$	
58	re95	re95	$\text{Ago\_R\_i} \xrightarrow{\text{Ago\_R\_i}} \text{s106}$	
59	re97	re97	$\text{R\_GnRH\_a} + \text{Ago\_c} \xrightarrow{\text{Ago\_c, R\_GnRH\_a}} \text{Ago\_R\_a}$	
60	re98	re98	$\text{Ago\_R\_a} \xrightarrow{\text{Ago\_R\_a}} \text{Ago\_c} + \text{R\_GnRH\_a}$	
61	re99	re99	$\text{Ago\_R\_i} \xrightarrow{\text{Ago\_R\_i}} \text{R\_GnRH\_i}$	
62	re100	re100	$\text{Ago\_d} \xrightarrow{\text{Ago\_d}} \text{s107}$	
63	re101	re101	$\text{s108} \xrightarrow{\text{Ago\_d, Ago\_d}} \text{Ago\_c}$	
64	re102	re102	$\text{Ant\_d} \xrightarrow{\text{Ant\_d}} \text{s113}$	
65	re103	re103	$\text{s114} \xrightarrow{\text{Ant\_d, Ant\_d}} \text{Ant\_c}$	
66	re104	re104	$\text{Ant\_c} \xrightarrow{\text{Ant\_c}} \text{s115}$	
67	re105	re105	$\text{Ant\_R} \xrightarrow{\text{Ant\_R}} \text{R\_GnRH\_a} + \text{Ant\_c}$	
68	re106	re106	$\text{R\_GnRH\_a} + \text{Ant\_c} \xrightarrow{\text{Ant\_c, R\_GnRH\_a}} \text{Ant\_R}$	
69	re107	re107	$\text{Ant\_R} \xrightarrow{\text{Ant\_R}} \text{s116}$	
70	re108	re108	$\text{Ant\_c} \xrightarrow{\text{Ant\_c}} \text{Ant\_p}$	
71	re109	re109	$\text{Ant\_p} \xrightarrow{\text{Ant\_p}} \text{Ant\_c}$	

9.1 Reaction re2

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

Name re2

Reaction equation

$$\text{GnRH\_R\_a} \xrightarrow{\text{GnRH\_R\_a}} \text{GnRH\_R\_i} \tag{80}$$

Reactant

Table 6: Properties of each reactant.

Id	Name	SBO
GnRH_R_a	GnRH_R-a	

Modifier

Table 7: Properties of each modifier.

Id	Name	SBO
GnRH_R_a	GnRH_R-a	

Product

Table 8: Properties of each product.

Id	Name	SBO
GnRH_R_i	GnRH_R-i	

Kinetic Law

Derived unit contains undeclared units

$$v_1 = \text{vol}\left(\text{default}\right) \cdot \text{function\_1}\left(\left[\text{GnRH\_R\_a}\right], \text{vol}\left(\text{default}\right), \text{p309}\right) \tag{81}$$

$$\text{function\_1}\left(\left[\text{GnRH\_R\_a}\right], \text{vol}\left(\text{default}\right), \text{p309}\right) = \frac{\text{p309} \cdot \left[\text{GnRH\_R\_a}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{82}$$

$$\text{function\_1}\left(\left[\text{GnRH\_R\_a}\right], \text{vol}\left(\text{default}\right), \text{p309}\right) = \frac{\text{p309} \cdot \left[\text{GnRH\_R\_a}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{83}$$

9.2 Reaction re3

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

Name re3

Reaction equation

$$\text{GnRH\_R\_i} \xrightarrow{\text{GnRH\_R\_i}} \text{GnRH\_R\_a} \tag{84}$$

Reactant

Table 9: Properties of each reactant.

Id	Name	SBO
GnRH_R_i	GnRH_R-i	

Modifier

Table 10: Properties of each modifier.

Id	Name	SBO
GnRH_R_i	GnRH_R-i	

Product

Table 11: Properties of each product.

Id	Name	SBO
GnRH_R_a	GnRH_R-a	

Kinetic Law

Derived unit contains undeclared units

$$v_2 = \text{vol}\left(\text{default}\right) \cdot \text{function\_2}\left(\left[\text{GnRH\_R\_i}\right], \text{vol}\left(\text{default}\right), \text{p310}\right) \tag{85}$$

$$\text{function\_2}\left(\left[\text{GnRH\_R\_i}\right], \text{vol}\left(\text{default}\right), \text{p310}\right) = \frac{\text{p310} \cdot \left[\text{GnRH\_R\_i}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{86}$$

$$\text{function\_2}\left(\left[\text{GnRH\_R\_i}\right], \text{vol}\left(\text{default}\right), \text{p310}\right) = \frac{\text{p310} \cdot \left[\text{GnRH\_R\_i}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{87}$$

9.3 Reaction re4

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

Name re4

Reaction equation

$$\text{R\_GnRH\_i} \xrightarrow{\text{R\_GnRH\_i}} \text{R\_GnRH\_a} \tag{88}$$

Reactant

Table 12: Properties of each reactant.

Id	Name	SBO
R_GnRH_i	R_GnRH-i	

Modifier

Table 13: Properties of each modifier.

Id	Name	SBO
R_GnRH_i	R_GnRH-i	

Product

Table 14: Properties of each product.

Id	Name	SBO
R_GnRH_a	R_GnRH-a	

Kinetic Law

Derived unit contains undeclared units

$$v_3 = \text{vol}\left(\text{default}\right) \cdot \text{function\_3}\left(\left[\text{R\_GnRH\_i}\right], \text{vol}\left(\text{default}\right), \text{p307}\right) \tag{89}$$

$$\text{function\_3}\left(\left[\text{R\_GnRH\_i}\right], \text{vol}\left(\text{default}\right), \text{p307}\right) = \frac{\text{p307} \cdot \left[\text{R\_GnRH\_i}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{90}$$

$$\text{function\_3}\left(\left[\text{R\_GnRH\_i}\right], \text{vol}\left(\text{default}\right), \text{p307}\right) = \frac{\text{p307} \cdot \left[\text{R\_GnRH\_i}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{91}$$

9.4 Reaction re5

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

Name re5

Reaction equation

$$\text{R\_GnRH\_a} \xrightarrow{\text{R\_GnRH\_a}} \text{R\_GnRH\_i} \tag{92}$$

Reactant

Table 15: Properties of each reactant.

Id	Name	SBO
R_GnRH_a	R_GnRH-a	

Modifier

Table 16: Properties of each modifier.

Id	Name	SBO
R_GnRH_a	R_GnRH-a	

Product

Table 17: Properties of each product.

Id	Name	SBO
R_GnRH_i	R_GnRH-i	

Kinetic Law

Derived unit contains undeclared units

$$v_4 = \text{vol}\left(\text{default}\right) \cdot \text{function\_4}\left(\left[\text{R\_GnRH\_a}\right], \text{vol}\left(\text{default}\right), \text{p306}\right) \tag{93}$$

$$\text{function\_4}\left(\left[\text{R\_GnRH\_a}\right], \text{vol}\left(\text{default}\right), \text{p306}\right) = \frac{\text{p306} \cdot \left[\text{R\_GnRH\_a}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{94}$$

$$\text{function\_4}\left(\left[\text{R\_GnRH\_a}\right], \text{vol}\left(\text{default}\right), \text{p306}\right) = \frac{\text{p306} \cdot \left[\text{R\_GnRH\_a}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{95}$$

9.5 Reaction re6

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

Name re6

Reaction equation

$$\text{GnRH\_R\_i} \xrightarrow{\text{GnRH\_R\_i}} \text{R\_GnRH\_i} \tag{96}$$

Reactant

Table 18: Properties of each reactant.

Id	Name	SBO
GnRH_R_i	GnRH_R-i	

Modifier

Table 19: Properties of each modifier.

Id	Name	SBO
GnRH_R_i	GnRH_R-i	

Product

Table 20: Properties of each product.

Id	Name	SBO
R_GnRH_i	R_GnRH-i	

Kinetic Law

Derived unit contains undeclared units

$$v_5 = \text{vol}\left(\text{default}\right) \cdot \text{function\_5}\left(\left[\text{GnRH\_R\_i}\right], \text{vol}\left(\text{default}\right), \text{p305}\right) \tag{97}$$

$$\text{function\_5}\left(\left[\text{GnRH\_R\_i}\right], \text{vol}\left(\text{default}\right), \text{p305}\right) = \frac{\text{p305} \cdot \left[\text{GnRH\_R\_i}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{98}$$

$$\text{function\_5}\left(\left[\text{GnRH\_R\_i}\right], \text{vol}\left(\text{default}\right), \text{p305}\right) = \frac{\text{p305} \cdot \left[\text{GnRH\_R\_i}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{99}$$

9.6 Reaction re8

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

Name re8

Reaction equation

$$\mathrm{GnRH} + \mathrm{R\_GnRH\_a} \xrightarrow{\mathrm{GnRH,\ R\_GnRH\_a}} \mathrm{GnRH\_R\_a} \tag{100}$$

Reactants

Table 21: Properties of each reactant.

Id	Name	SBO
GnRH	GnRH	
R_GnRH_a	R_GnRH-a	

Modifiers

Table 22: Properties of each modifier.

Id	Name	SBO
GnRH	GnRH	
R_GnRH_a	R_GnRH-a	

Product

Table 23: Properties of each product.

Id	Name	SBO
GnRH_R_a	GnRH_R-a	

Kinetic Law

Derived unit contains undeclared units

$$v_6 = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_6}\left(\left[\mathrm{GnRH}\right], \left[\mathrm{R\_GnRH\_a}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p302}\right) \tag{101}$$

$$\begin{aligned} &\mathrm{function\_6}\left(\left[\mathrm{GnRH}\right], \left[\mathrm{R\_GnRH\_a}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p302}\right) \\ &= \frac{\mathrm{p302} \cdot \left[\mathrm{GnRH}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) \cdot \left[\mathrm{R\_GnRH\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{102}$$

$$\begin{aligned} &\text{function\_6}\left([\text{GnRH}], [\text{R\_GnRH\_a}], \text{vol}\left(\text{default}\right), \text{p302}\right) \\ &= \frac{\text{p302} \cdot [\text{GnRH}] \cdot \text{vol}\left(\text{default}\right) \cdot [\text{R\_GnRH\_a}] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \end{aligned} \tag{103}$$

9.7 Reaction `re11`

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

Name re11

Reaction equation

$$\text{R\_GnRH\_i} \xrightarrow{\text{R\_GnRH\_i}} \text{sa1\_degraded} \tag{104}$$

Reactant

Table 24: Properties of each reactant.

Id	Name	SBO
`R_GnRH_i`	R_GnRH-i	

Modifier

Table 25: Properties of each modifier.

Id	Name	SBO
`R_GnRH_i`	R_GnRH-i	

Product

Table 26: Properties of each product.

Id	Name	SBO
`sa1_degraded`	sa1_degraded	

Kinetic Law

Derived unit contains undeclared units

$$v_7 = \text{vol}\left(\text{default}\right) \cdot \text{function\_7}\left([\text{R\_GnRH\_i}], \text{vol}\left(\text{default}\right), \text{p308}\right) \tag{105}$$

$$\text{function\_7}\left(\left[\text{R\_GnRH\_i}\right], \text{vol}\left(\text{default}\right), \text{p308}\right) = \frac{\text{p308} \cdot \left[\text{R\_GnRH\_i}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \quad (106)$$

$$\text{function\_7}\left(\left[\text{R\_GnRH\_i}\right], \text{vol}\left(\text{default}\right), \text{p308}\right) = \frac{\text{p308} \cdot \left[\text{R\_GnRH\_i}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \quad (107)$$

9.8 Reaction `re15`

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

Name re15

Reaction equation

$$\text{GnRH\_R\_a} \xrightarrow{\text{GnRH\_R\_a}} \text{GnRH} + \text{R\_GnRH\_a} \quad (108)$$

Reactant

Table 27: Properties of each reactant.

Id	Name	SBO
`GnRH_R_a`	GnRH_R-a	

Modifier

Table 28: Properties of each modifier.

Id	Name	SBO
`GnRH_R_a`	GnRH_R-a	

Products

Table 29: Properties of each product.

Id	Name	SBO
`GnRH`	GnRH	
`R_GnRH_a`	R_GnRH-a	

Kinetic Law

Derived unit contains undeclared units

$$v_8 = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_8}\left(\left[\mathrm{GnRH\_R\_a}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p303}\right) \tag{109}$$

$$\mathrm{function\_8}\left(\left[\mathrm{GnRH\_R\_a}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p303}\right) = \frac{\mathrm{p303} \cdot \left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{110}$$

$$\mathrm{function\_8}\left(\left[\mathrm{GnRH\_R\_a}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p303}\right) = \frac{\mathrm{p303} \cdot \left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{111}$$

9.9 Reaction `re24`

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

Name re24

Reaction equation

$$\mathrm{GnRH} \xrightarrow{\mathrm{GnRH}} \mathrm{sa3\_degraded} \tag{112}$$

Reactant

Table 30: Properties of each reactant.

Id	Name	SBO
`GnRH`	GnRH	

Modifier

Table 31: Properties of each modifier.

Id	Name	SBO
`GnRH`	GnRH	

Product

Table 32: Properties of each product.

Id	Name	SBO
`sa3_degraded`	sa3_degraded	

Kinetic Law

Derived unit contains undeclared units

$$v_9 = \text{vol}\left(\text{default}\right) \cdot \text{function\_9}\left(\left[\text{GnRH}\right], \text{vol}\left(\text{default}\right), \text{p300}\right) \tag{113}$$

$$\text{function\_9}\left(\left[\text{GnRH}\right], \text{vol}\left(\text{default}\right), \text{p300}\right) = \frac{\text{p300} \cdot \left[\text{GnRH}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{114}$$

$$\text{function\_9}\left(\left[\text{GnRH}\right], \text{vol}\left(\text{default}\right), \text{p300}\right) = \frac{\text{p300} \cdot \left[\text{GnRH}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{115}$$

9.10 Reaction `re25`

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

Name re25

Reaction equation

$$\text{s33} \xrightarrow{\text{E2, P4, E2, P4}} \text{LH\_Pit} \tag{116}$$

Reactant

Table 33: Properties of each reactant.

Id	Name	SBO
s33	s33	

Modifiers

Table 34: Properties of each modifier.

Id	Name	SBO
E2	E2	
P4	P4	
E2	E2	
P4	P4	

Product

Table 35: Properties of each product.

Id	Name	SBO
LH_Pit	LH_Pit	

Kinetic Law

Derived unit contains undeclared units

$$v_{10} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_10}\left(\left[\mathrm{E2}\right], \left[\mathrm{P4}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{facE2}, \mathrm{facP4}, \mathrm{p1}, \mathrm{p2}, \mathrm{p3}, \mathrm{p4}, \mathrm{p6}, \mathrm{p7}\right) \tag{117}$$

$$\mathrm{function\_10}\left(\left[\mathrm{E2}\right], \left[\mathrm{P4}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{facE2}, \mathrm{facP4}, \mathrm{p1}, \mathrm{p2}, \mathrm{p3}, \mathrm{p4}, \mathrm{p6}, \mathrm{p7}\right) = \frac{\mathrm{p1} + \frac{\mathrm{p2} \cdot \left(\frac{\left[\mathrm{E2}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p3} \cdot \mathrm{facE2}}\right)^{\mathrm{p6}}}{1 + \left(\frac{\left[\mathrm{E2}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p3} \cdot \mathrm{facE2}}\right)^{\mathrm{p6}}}}{1 + \left(\frac{\left[\mathrm{P4}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p4} \cdot \mathrm{facP4}}\right)^{\mathrm{p7}}}}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{118}$$

$$\mathrm{function\_10}\left(\left[\mathrm{E2}\right], \left[\mathrm{P4}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{facE2}, \mathrm{facP4}, \mathrm{p1}, \mathrm{p2}, \mathrm{p3}, \mathrm{p4}, \mathrm{p6}, \mathrm{p7}\right) = \frac{\mathrm{p1} + \frac{\mathrm{p2} \cdot \left(\frac{\left[\mathrm{E2}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p3} \cdot \mathrm{facE2}}\right)^{\mathrm{p6}}}{1 + \left(\frac{\left[\mathrm{E2}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p3} \cdot \mathrm{facE2}}\right)^{\mathrm{p6}}}}{1 + \left(\frac{\left[\mathrm{P4}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p4} \cdot \mathrm{facP4}}\right)^{\mathrm{p7}}}}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{119}$$

9.11 Reaction re26

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

Name re26

Reaction equation

$$\mathrm{s38} \xrightarrow{\mathrm{InhA\_delay},\ \mathrm{InhB},\ \mathrm{InhA\_delay},\ \mathrm{InhB}} \mathrm{FSH\_pit} \tag{120}$$

Reactant

Table 36: Properties of each reactant.

Id	Name	SBO
s38	s38	

Modifiers

Table 37: Properties of each modifier.

Id	Name	SBO
`InhA_delay`	InhA_delay	
`InhB`	InhB	
`InhA_delay`	InhA_delay	
`InhB`	InhB	

Product

Table 38: Properties of each product.

Id	Name	SBO
`FSH_pit`	FSH_pit	

Kinetic Law

Derived unit contains undeclared units

$$v_{11} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_11}\left(\left[\mathrm{InhA\_delay}\right], \left[\mathrm{InhB}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{freq}, \mathrm{p11}, \mathrm{p13}, \mathrm{p21}, \mathrm{p22}, \mathrm{p23}, \mathrm{p24}, \mathrm{p25}\right) \tag{121}$$

$$\begin{aligned} &\mathrm{function\_11}\left(\left[\mathrm{InhA\_delay}\right], \left[\mathrm{InhB}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{freq}, \mathrm{p11}, \mathrm{p13}, \mathrm{p21}, \mathrm{p22}, \mathrm{p23}, \mathrm{p24}, \mathrm{p25}\right) \\ &= \frac{\frac{\mathrm{p21}}{1+\left(\frac{\left[\mathrm{InhA\_delay}\right]\cdot\mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p22}}\right)^{\mathrm{p24}}+\left(\frac{\left[\mathrm{InhB}\right]\cdot\mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p23}}\right)^{\mathrm{p25}}}\cdot 1}{1+\left(\frac{\mathrm{freq}}{\mathrm{p11}}\right)^{\mathrm{p13}}}}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{122}$$

$$\begin{aligned} &\mathrm{function\_11}\left(\left[\mathrm{InhA\_delay}\right], \left[\mathrm{InhB}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{freq}, \mathrm{p11}, \mathrm{p13}, \mathrm{p21}, \mathrm{p22}, \mathrm{p23}, \mathrm{p24}, \mathrm{p25}\right) \\ &= \frac{\frac{\mathrm{p21}}{1+\left(\frac{\left[\mathrm{InhA\_delay}\right]\cdot\mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p22}}\right)^{\mathrm{p24}}+\left(\frac{\left[\mathrm{InhB}\right]\cdot\mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p23}}\right)^{\mathrm{p25}}}\cdot 1}{1+\left(\frac{\mathrm{freq}}{\mathrm{p11}}\right)^{\mathrm{p13}}}}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{123}$$

9.12 Reaction `re28`

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

Name re28

Reaction equation

$$\text{LH\_Pit} \xrightarrow{\text{GnRH\_R\_a, Ago\_R\_a, Ago\_R\_a, GnRH\_R\_a, LH\_Pit}} \text{s92} \tag{124}$$

Reactant

Table 39: Properties of each reactant.

Id	Name	SBO
LH_Pit	LH_Pit	

Modifiers

Table 40: Properties of each modifier.

Id	Name	SBO
GnRH_R_a	GnRH_R-a	
Ago_R_a	Ago_R-a	
Ago_R_a	Ago_R-a	
GnRH_R_a	GnRH_R-a	
LH_Pit	LH_Pit	

Product

Table 41: Properties of each product.

Id	Name	SBO
s92	s92	

Kinetic Law

Derived unit contains undeclared units

$$v_{12} = \text{vol}\left(\text{default}\right) \cdot \text{function\_12}\left(\left[\text{Ago\_R\_a}\right], \left[\text{GnRH\_R\_a}\right], \left[\text{LH\_Pit}\right], \text{vol}\left(\text{default}\right), \text{p16}, \text{p5}, \text{p8}, \text{p9}\right) \tag{125}$$

$$\begin{aligned} &\text{function\_12}\left(\left[\text{Ago\_R\_a}\right], \left[\text{GnRH\_R\_a}\right], \left[\text{LH\_Pit}\right], \text{vol}\left(\text{default}\right), \text{p16}, \text{p5}, \text{p8}, \text{p9}\right) \\ &= \frac{\left(\text{p16} + \frac{\text{p5} \cdot \left(\frac{\left[\text{GnRH\_R\_a}\right] \cdot \text{vol}(\text{default}) + \left[\text{Ago\_R\_a}\right] \cdot \text{vol}(\text{default})}{\text{p8}}\right)^{\text{p9}}}{1 + \left(\frac{\left[\text{GnRH\_R\_a}\right] \cdot \text{vol}(\text{default}) + \left[\text{Ago\_R\_a}\right] \cdot \text{vol}(\text{default})}{\text{p8}}\right)^{\text{p9}}}\right) \cdot \left[\text{LH\_Pit}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \end{aligned} \tag{126}$$

$$\begin{aligned}&\text{function\_12}\left(\left[\text{Ago\_R\_a}\right],\left[\text{GnRH\_R\_a}\right],\left[\text{LH\_Pit}\right],\text{vol}\left(\text{default}\right),\text{p16},\text{p5},\text{p8},\text{p9}\right)\\&=\frac{\left(\text{p16}+\frac{\text{p5}\cdot\left(\frac{\left[\text{GnRH\_R\_a}\right]\cdot\text{vol}(\text{default})+\left[\text{Ago\_R\_a}\right]\cdot\text{vol}(\text{default})}{\text{p8}}\right)^{\text{p9}}}{1+\left(\frac{\left[\text{GnRH\_R\_a}\right]\cdot\text{vol}(\text{default})+\left[\text{Ago\_R\_a}\right]\cdot\text{vol}(\text{default})}{\text{p8}}\right)^{\text{p9}}}\right)\cdot\left[\text{LH\_Pit}\right]\cdot\text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)}\end{aligned}\tag{127}$$

9.13 Reaction re29

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

Name re29

Reaction equation

$$\text{FSH\_pit}\xrightarrow{\text{GnRH\_R\_a, Ago\_R\_a, Ago\_R\_a, FSH\_pit, GnRH\_R\_a}}\text{s94}\tag{128}$$

Reactant

Table 42: Properties of each reactant.

Id	Name	SBO
FSH_pit	FSH_pit	

Modifiers

Table 43: Properties of each modifier.

Id	Name	SBO
GnRH_R_a	GnRH_R-a	
Ago_R_a	Ago_R-a	
Ago_R_a	Ago_R-a	
FSH_pit	FSH_pit	
GnRH_R_a	GnRH_R-a	

Product

Table 44: Properties of each product.

Id	Name	SBO
s94	s94	

Kinetic Law

Derived unit contains undeclared units

$$v_{13} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_13}\left(\left[\mathrm{Ago\_R\_a}\right], \left[\mathrm{FSH\_pit}\right], \left[\mathrm{GnRH\_R\_a}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p17}, \mathrm{p18}, \mathrm{p20}, \mathrm{p28}\right) \tag{129}$$

$$\mathrm{function\_13}\left(\left[\mathrm{Ago\_R\_a}\right], \left[\mathrm{FSH\_pit}\right], \left[\mathrm{GnRH\_R\_a}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p17}, \mathrm{p18}, \mathrm{p20}, \mathrm{p28}\right) = \frac{\left(\mathrm{p17} + \frac{\mathrm{p28} \cdot \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p18}}\right)^{\mathrm{p20}}}{1 + \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p18}}\right)^{\mathrm{p20}}}\right) \cdot \left[\mathrm{FSH\_pit}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{130}$$

$$\mathrm{function\_13}\left(\left[\mathrm{Ago\_R\_a}\right], \left[\mathrm{FSH\_pit}\right], \left[\mathrm{GnRH\_R\_a}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p17}, \mathrm{p18}, \mathrm{p20}, \mathrm{p28}\right) = \frac{\left(\mathrm{p17} + \frac{\mathrm{p28} \cdot \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p18}}\right)^{\mathrm{p20}}}{1 + \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p18}}\right)^{\mathrm{p20}}}\right) \cdot \left[\mathrm{FSH\_pit}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{131}$$

9.14 Reaction re35

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

Name re35

Reaction equation

$$\mathrm{LH\_bld} + \mathrm{R\_LH} \xrightarrow{\mathrm{LH\_bld,\ R\_LH}} \mathrm{LH\_R} \tag{132}$$

Reactants

Table 45: Properties of each reactant.

Id	Name	SBO
LH_bld	LH_bld	
R_LH	R_LH	

Modifiers

Table 46: Properties of each modifier.

Id	Name	SBO
LH_bld	LH_bld	
R_LH	R_LH	

Product

Table 47: Properties of each product.

Id	Name	SBO
LH_R	LH_R	

Kinetic Law

Derived unit contains undeclared units

$$v_{14} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_14}\left(\left[\mathrm{LH\_bld}\right], \left[\mathrm{R\_LH}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{facLH}, \mathrm{p230}\right) \tag{133}$$

$$\begin{aligned} &\mathrm{function\_14}\left(\left[\mathrm{LH\_bld}\right], \left[\mathrm{R\_LH}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{facLH}, \mathrm{p230}\right) \\ &= \frac{\frac{\mathrm{p230}}{\mathrm{facLH}} \cdot \left[\mathrm{LH\_bld}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) \cdot \left[\mathrm{R\_LH}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{134}$$

$$\begin{aligned} &\mathrm{function\_14}\left(\left[\mathrm{LH\_bld}\right], \left[\mathrm{R\_LH}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{facLH}, \mathrm{p230}\right) \\ &= \frac{\frac{\mathrm{p230}}{\mathrm{facLH}} \cdot \left[\mathrm{LH\_bld}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) \cdot \left[\mathrm{R\_LH}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{135}$$

9.15 Reaction re36

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

Name re36

Reaction equation

$$\mathrm{LH\_R} \xrightarrow{\mathrm{LH\_R}} \mathrm{R\_LH\_des} \tag{136}$$

Reactant

Table 48: Properties of each reactant.

Id	Name	SBO
LH_R	LH_R	

Modifier

Table 49: Properties of each modifier.

Id	Name	SBO
LH_R	LH_R	

Product

Table 50: Properties of each product.

Id	Name	SBO
R_LH_des	R_LH_des	

Kinetic Law

Derived unit contains undeclared units

$$v_{15} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_15}\left(\left[\mathrm{LH\_R}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p234}\right) \tag{137}$$

$$\mathrm{function\_15}\left(\left[\mathrm{LH\_R}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p234}\right) = \frac{\mathrm{p234} \cdot \left[\mathrm{LH\_R}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{138}$$

$$\mathrm{function\_15}\left(\left[\mathrm{LH\_R}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p234}\right) = \frac{\mathrm{p234} \cdot \left[\mathrm{LH\_R}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{139}$$

9.16 Reaction re37

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

Name re37

Reaction equation

$$\mathrm{R\_LH\_des} \xrightarrow{\mathrm{R\_LH\_des}} \mathrm{R\_LH} \tag{140}$$

Reactant

Table 51: Properties of each reactant.

Id	Name	SBO
R_LH_des	R_LH_des	

Modifier

Table 52: Properties of each modifier.

Id	Name	SBO
R_LH_des	R_LH_des	

Product

Table 53: Properties of each product.

Id	Name	SBO
R_LH	R_LH	

Kinetic Law

Derived unit contains undeclared units

$$v_{16} = \text{vol}\left(\text{default}\right) \cdot \text{function\_16}\left(\left[\text{R\_LH\_des}\right], \text{vol}\left(\text{default}\right), \text{p232}\right) \tag{141}$$

$$\text{function\_16}\left(\left[\text{R\_LH\_des}\right], \text{vol}\left(\text{default}\right), \text{p232}\right) = \frac{\text{p232} \cdot \left[\text{R\_LH\_des}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{142}$$

$$\text{function\_16}\left(\left[\text{R\_LH\_des}\right], \text{vol}\left(\text{default}\right), \text{p232}\right) = \frac{\text{p232} \cdot \left[\text{R\_LH\_des}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{143}$$

9.17 Reaction re38

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

Name re38

Reaction equation

$$\text{LH\_bld} \xrightarrow{\text{LH\_bld}} \text{sa28\_degraded} \tag{144}$$

Reactant

Table 54: Properties of each reactant.

Id	Name	SBO
LH_bld	LH_bld	

Modifier

Table 55: Properties of each modifier.

Id	Name	SBO
LH_bld	LH_bld	

Product

Table 56: Properties of each product.

Id	Name	SBO
sa28_degraded	sa28_degraded	

Kinetic Law

Derived unit contains undeclared units

$$v_{17} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_17}\left(\left[\mathrm{LH\_bld}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p231}\right) \tag{145}$$

$$\mathrm{function\_17}\left(\left[\mathrm{LH\_bld}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p231}\right) = \frac{\mathrm{p231} \cdot \left[\mathrm{LH\_bld}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{146}$$

$$\mathrm{function\_17}\left(\left[\mathrm{LH\_bld}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p231}\right) = \frac{\mathrm{p231} \cdot \left[\mathrm{LH\_bld}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{147}$$

9.18 Reaction re39

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

Name re39

Reaction equation

$$\mathrm{FSH\_R} \xrightarrow{\mathrm{FSH\_R}} \mathrm{R\_FSH\_des} \tag{148}$$

Reactant

Table 57: Properties of each reactant.

Id	Name	SBO
FSH_R	FSH_R	

Modifier

Table 58: Properties of each modifier.

Id	Name	SBO
FSH_R	FSH_R	

Product

Table 59: Properties of each product.

Id	Name	SBO
R_FSH_des	R_FSH_des	

Kinetic Law

Derived unit contains undeclared units

$$v_{18} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_18}\left(\left[\mathrm{FSH\_R}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p244}\right) \tag{149}$$

$$\mathrm{function\_18}\left(\left[\mathrm{FSH\_R}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p244}\right) = \frac{\mathrm{p244} \cdot \left[\mathrm{FSH\_R}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{150}$$

$$\mathrm{function\_18}\left(\left[\mathrm{FSH\_R}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p244}\right) = \frac{\mathrm{p244} \cdot \left[\mathrm{FSH\_R}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{151}$$

9.19 Reaction re40

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

Name re40

Reaction equation

$$\mathrm{R\_FSH\_des} \xrightarrow{\mathrm{R\_FSH\_des}} \mathrm{R\_FSH} \tag{152}$$

Reactant

Table 60: Properties of each reactant.

Id	Name	SBO
R_FSH_des	R_FSH_des	

Modifier

Table 61: Properties of each modifier.

Id	Name	SBO
R_FSH_des	R_FSH_des	

Product

Table 62: Properties of each product.

Id	Name	SBO
R_FSH	R_FSH	

Kinetic Law

Derived unit contains undeclared units

$$v_{19} = \text{vol}\left(\text{default}\right) \cdot \text{function\_19}\left(\left[\text{R\_FSH\_des}\right], \text{vol}\left(\text{default}\right), \text{p242}\right) \tag{153}$$

$$\text{function\_19}\left(\left[\text{R\_FSH\_des}\right], \text{vol}\left(\text{default}\right), \text{p242}\right) = \frac{\text{p242} \cdot \left[\text{R\_FSH\_des}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{154}$$

$$\text{function\_19}\left(\left[\text{R\_FSH\_des}\right], \text{vol}\left(\text{default}\right), \text{p242}\right) = \frac{\text{p242} \cdot \left[\text{R\_FSH\_des}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{155}$$

9.20 Reaction re42

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

Name re42

Reaction equation

$$\text{AF1} \xrightarrow{\text{FSH\_R, AF1, FSH\_R}} \text{AF2} \tag{156}$$

Reactant

Table 63: Properties of each reactant.

Id	Name	SBO
AF1	AF1	

Modifiers

Table 64: Properties of each modifier.

Id	Name	SBO
FSH_R	FSH_R	
AF1	AF1	
FSH_R	FSH_R	

Product

Table 65: Properties of each product.

Id	Name	SBO
AF2	AF2	

Kinetic Law

Derived unit contains undeclared units

$$v_{20} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_20}\left(\left[\mathrm{AF1}\right], \left[\mathrm{FSH\_R}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p50}\right) \tag{157}$$

$$\begin{aligned} &\mathrm{function\_20}\left(\left[\mathrm{AF1}\right], \left[\mathrm{FSH\_R}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p50}\right) \\ &= \frac{\mathrm{p50} \cdot \left[\mathrm{FSH\_R}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) \cdot \left[\mathrm{AF1}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{158}$$

$$\begin{aligned} &\mathrm{function\_20}\left(\left[\mathrm{AF1}\right], \left[\mathrm{FSH\_R}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p50}\right) \\ &= \frac{\mathrm{p50} \cdot \left[\mathrm{FSH\_R}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) \cdot \left[\mathrm{AF1}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{159}$$

9.21 Reaction re43

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

Name re43

Reaction equation

$$\text{s62} \xrightarrow{\text{FSH\_R, FSH\_R}} \text{AF1} \tag{160}$$

Reactant

Table 66: Properties of each reactant.

Id	Name	SBO
s62	s62	

Modifiers

Table 67: Properties of each modifier.

Id	Name	SBO
FSH_R	FSH_R	
FSH_R	FSH_R	

Product

Table 68: Properties of each product.

Id	Name	SBO
AF1	AF1	

Kinetic Law

Derived unit contains undeclared units

$$v_{21} = \text{vol}\left(\text{default}\right) \cdot \text{function\_21}\left(\left[\text{FSH\_R}\right], \text{vol}\left(\text{default}\right), \text{p47}, \text{p48}, \text{p49}\right) \tag{161}$$

$$\text{function\_21}\left(\left[\text{FSH\_R}\right], \text{vol}\left(\text{default}\right), \text{p47}, \text{p48}, \text{p49}\right) = \frac{\frac{\text{p49} \cdot \left(\frac{\left[\text{FSH\_R}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{p48}}\right)^{\text{p47}}}{1 + \left(\frac{\left[\text{FSH\_R}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{p48}}\right)^{\text{p47}}}}{\text{vol}\left(\text{default}\right)} \tag{162}$$

$$\text{function\_21}\left(\left[\text{FSH\_R}\right], \text{vol}\left(\text{default}\right), \text{p47}, \text{p48}, \text{p49}\right) = \frac{\frac{\text{p49} \cdot \left(\frac{\left[\text{FSH\_R}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{p48}}\right)^{\text{p47}}}{1 + \left(\frac{\left[\text{FSH\_R}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{p48}}\right)^{\text{p47}}}}{\text{vol}\left(\text{default}\right)} \tag{163}$$

9.22 Reaction re44

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

Name re44

Reaction equation

$$\mathrm{AF2} \xrightarrow{\mathrm{LH\_R,\ R\_Foll,\ AF2,\ LH\_R,\ R\_Foll}} \mathrm{AF3} \tag{164}$$

Reactant

Table 69: Properties of each reactant.

Id	Name	SBO
AF2	AF2	

Modifiers

Table 70: Properties of each modifier.

Id	Name	SBO
LH_R	LH_R	
R_Foll	R_Foll	
AF2	AF2	
LH_R	LH_R	
R_Foll	R_Foll	

Product

Table 71: Properties of each product.

Id	Name	SBO
AF3	AF3	

Kinetic Law

Derived unit contains undeclared units

$$v_{22} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_22}\left(\left[\mathrm{AF2}\right], \left[\mathrm{LH\_R}\right], \left[\mathrm{R\_Foll}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p46}, \mathrm{p51}, \mathrm{p52}\right) \tag{165}$$

$$\begin{aligned}&\text{function\_22}\left([\text{AF2}],[\text{LH\_R}],[\text{R\_Foll}],\text{vol}\left(\text{default}\right),\text{p46},\text{p51},\text{p52}\right)\\&=\frac{\text{p51}\cdot\left(\frac{[\text{LH\_R}]\cdot\text{vol}(\text{default})}{\text{p52}}\right)^{\text{p46}}\cdot[\text{R\_Foll}]\cdot\text{vol}\left(\text{default}\right)\cdot[\text{AF2}]\cdot\text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)}\end{aligned}\tag{166}$$

$$\begin{aligned}&\text{function\_22}\left([\text{AF2}],[\text{LH\_R}],[\text{R\_Foll}],\text{vol}\left(\text{default}\right),\text{p46},\text{p51},\text{p52}\right)\\&=\frac{\text{p51}\cdot\left(\frac{[\text{LH\_R}]\cdot\text{vol}(\text{default})}{\text{p52}}\right)^{\text{p46}}\cdot[\text{R\_Foll}]\cdot\text{vol}\left(\text{default}\right)\cdot[\text{AF2}]\cdot\text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)}\end{aligned}\tag{167}$$

9.23 Reaction `re45`

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

Name re45

Reaction equation

$$\text{AF3}\xrightarrow{\text{R\_Foll, LH\_R, AF3, LH\_R, R\_Foll}}\text{AF4}\tag{168}$$

Reactant

Table 72: Properties of each reactant.

Id	Name	SBO
`AF3`	AF3	

Modifiers

Table 73: Properties of each modifier.

Id	Name	SBO
`R_Foll`	R_Foll	
`LH_R`	LH_R	
`AF3`	AF3	
`LH_R`	LH_R	
`R_Foll`	R_Foll	

Product

Table 74: Properties of each product.

Id	Name	SBO
AF4	AF4	

Kinetic Law

Derived unit contains undeclared units

$$v_{23} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_23}\left(\left[\mathrm{AF3}\right], \left[\mathrm{LH\_R}\right], \left[\mathrm{R\_Foll}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p32}, \mathrm{p43}, \mathrm{p52}\right) \tag{169}$$

$$\begin{aligned} &\mathrm{function\_23}\left(\left[\mathrm{AF3}\right], \left[\mathrm{LH\_R}\right], \left[\mathrm{R\_Foll}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p32}, \mathrm{p43}, \mathrm{p52}\right) \\ &= \frac{\mathrm{p32} \cdot \left(\frac{\left[\mathrm{LH\_R}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p52}}\right)^{\mathrm{p43}} \cdot \left[\mathrm{R\_Foll}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) \cdot \left[\mathrm{AF3}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{170}$$

$$\begin{aligned} &\mathrm{function\_23}\left(\left[\mathrm{AF3}\right], \left[\mathrm{LH\_R}\right], \left[\mathrm{R\_Foll}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p32}, \mathrm{p43}, \mathrm{p52}\right) \\ &= \frac{\mathrm{p32} \cdot \left(\frac{\left[\mathrm{LH\_R}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p52}}\right)^{\mathrm{p43}} \cdot \left[\mathrm{R\_Foll}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) \cdot \left[\mathrm{AF3}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{171}$$

9.24 Reaction re46

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

Name re46

Reaction equation

$$\mathrm{AF4} \xrightarrow{\mathrm{LH\_R,\ R\_Foll,\ AF4,\ LH\_R,\ R\_Foll}} \mathrm{PrF} \tag{172}$$

Reactant

Table 75: Properties of each reactant.

Id	Name	SBO
AF4	AF4	

Modifiers

Table 76: Properties of each modifier.

Id	Name	SBO
LH_R	LH_R	
R_Foll	R_Foll	
AF4	AF4	
LH_R	LH_R	
R_Foll	R_Foll	

Product

Table 77: Properties of each product.

Id	Name	SBO
PrF	PrF	

Kinetic Law

Derived unit contains undeclared units

$$v_{24} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_24}\left(\left[\mathrm{AF4}\right], \left[\mathrm{LH\_R}\right], \left[\mathrm{R\_Foll}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p34}, \mathrm{p52}\right) \tag{173}$$

$$\begin{aligned} &\mathrm{function\_24}\left(\left[\mathrm{AF4}\right], \left[\mathrm{LH\_R}\right], \left[\mathrm{R\_Foll}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p34}, \mathrm{p52}\right) \\ &= \frac{\frac{\mathrm{p34} \cdot \left[\mathrm{LH\_R}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p52}} \cdot \left[\mathrm{R\_Foll}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) \cdot \left[\mathrm{AF4}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{174}$$

$$\begin{aligned} &\mathrm{function\_24}\left(\left[\mathrm{AF4}\right], \left[\mathrm{LH\_R}\right], \left[\mathrm{R\_Foll}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p34}, \mathrm{p52}\right) \\ &= \frac{\frac{\mathrm{p34} \cdot \left[\mathrm{LH\_R}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p52}} \cdot \left[\mathrm{R\_Foll}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) \cdot \left[\mathrm{AF4}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{175}$$

9.25 Reaction re49

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

Name re49

Reaction equation

$$\mathrm{Sc1} \xrightarrow{\mathrm{Sc1}} \mathrm{Sc2} \tag{176}$$

Reactant

Table 78: Properties of each reactant.

Id	Name	SBO
Sc1	Sc1	

Modifier

Table 79: Properties of each modifier.

Id	Name	SBO
Sc1	Sc1	

Product

Table 80: Properties of each product.

Id	Name	SBO
Sc2	Sc2	

Kinetic Law

Derived unit contains undeclared units

$$v_{25} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_25}\left(\left[\mathrm{Sc1}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p37}\right) \tag{177}$$

$$\mathrm{function\_25}\left(\left[\mathrm{Sc1}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p37}\right) = \frac{\mathrm{p37} \cdot \left[\mathrm{Sc1}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{178}$$

$$\mathrm{function\_25}\left(\left[\mathrm{Sc1}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p37}\right) = \frac{\mathrm{p37} \cdot \left[\mathrm{Sc1}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{179}$$

9.26 Reaction re50

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

Name re50

Reaction equation

$$\mathrm{Sc2} \xrightarrow{\mathrm{Sc2}} \mathrm{Lut1} \tag{180}$$

Reactant

Table 81: Properties of each reactant.

Id	Name	SBO
Sc2	Sc2	

Modifier

Table 82: Properties of each modifier.

Id	Name	SBO
Sc2	Sc2	

Product

Table 83: Properties of each product.

Id	Name	SBO
Lut1	Lut1	

Kinetic Law

Derived unit contains undeclared units

$$v_{26} = \text{vol}\left(\text{default}\right) \cdot \text{function\_26}\left(\left[\text{Sc2}\right], \text{vol}\left(\text{default}\right), \text{p38}\right) \tag{181}$$

$$\text{function\_26}\left(\left[\text{Sc2}\right], \text{vol}\left(\text{default}\right), \text{p38}\right) = \frac{\text{p38} \cdot \left[\text{Sc2}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{182}$$

$$\text{function\_26}\left(\left[\text{Sc2}\right], \text{vol}\left(\text{default}\right), \text{p38}\right) = \frac{\text{p38} \cdot \left[\text{Sc2}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{183}$$

9.27 Reaction re51

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

Name re51

Reaction equation

$$\text{Lut1} \xrightarrow{\text{GnRH\_R\_a, Ago\_R\_a, Ago\_R\_a, GnRH\_R\_a, Lut1}} \text{Lut2} \tag{184}$$

Reactant

Table 84: Properties of each reactant.

Id	Name	SBO
Lut1	Lut1	

Modifiers

Table 85: Properties of each modifier.

Id	Name	SBO
GnRH_R_a	GnRH_R-a	
Ago_R_a	Ago_R-a	
Ago_R_a	Ago_R-a	
GnRH_R_a	GnRH_R-a	
Lut1	Lut1	

Product

Table 86: Properties of each product.

Id	Name	SBO
Lut2	Lut2	

Kinetic Law

Derived unit contains undeclared units

$$v_{27} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_27}\left(\left[\mathrm{Ago\_R\_a}\right], \left[\mathrm{GnRH\_R\_a}\right], \left[\mathrm{Lut1}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p39}, \mathrm{p80}, \mathrm{p83}, \mathrm{p84}\right) \tag{185}$$

$$\mathrm{function\_27}\left(\left[\mathrm{Ago\_R\_a}\right], \left[\mathrm{GnRH\_R\_a}\right], \left[\mathrm{Lut1}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p39}, \mathrm{p80}, \mathrm{p83}, \mathrm{p84}\right) = \frac{\mathrm{p39} \cdot \left(1 + \frac{\mathrm{p80} \cdot \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p83}}\right)^{\mathrm{p84}}}{1 + \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p83}}\right)^{\mathrm{p84}}}\right) \cdot \left[\mathrm{Lut1}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{186}$$

$$\mathrm{function\_27}\left(\left[\mathrm{Ago\_R\_a}\right], \left[\mathrm{GnRH\_R\_a}\right], \left[\mathrm{Lut1}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p39}, \mathrm{p80}, \mathrm{p83}, \mathrm{p84}\right) = \frac{\mathrm{p39} \cdot \left(1 + \frac{\mathrm{p80} \cdot \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p83}}\right)^{\mathrm{p84}}}{1 + \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p83}}\right)^{\mathrm{p84}}}\right) \cdot \left[\mathrm{Lut1}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{187}$$

9.28 Reaction re52

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

Name re52

Reaction equation

$$\text{Lut2} \xrightarrow{\text{GnRH\_R\_a, Ago\_R\_a, Ago\_R\_a, GnRH\_R\_a, Lut2}} \text{Lut3} \tag{188}$$

Reactant

Table 87: Properties of each reactant.

Id	Name	SBO
Lut2	Lut2	

Modifiers

Table 88: Properties of each modifier.

Id	Name	SBO
GnRH_R_a	GnRH_R-a	
Ago_R_a	Ago_R-a	
Ago_R_a	Ago_R-a	
GnRH_R_a	GnRH_R-a	
Lut2	Lut2	

Product

Table 89: Properties of each product.

Id	Name	SBO
Lut3	Lut3	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{28} = {} & \text{vol}\left(\text{default}\right) \\ & \cdot \text{function\_28}\left(\left[\text{Ago\_R\_a}\right], \left[\text{GnRH\_R\_a}\right], \left[\text{Lut2}\right], \text{vol}\left(\text{default}\right), \text{p40}, \text{p80}, \text{p83}, \text{p84}\right) \end{aligned} \tag{189}$$

$$\begin{aligned}&\text{function\_28}\left([\text{Ago\_R\_a}], [\text{GnRH\_R\_a}], [\text{Lut2}], \text{vol}\left(\text{default}\right), \text{p40}, \text{p80}, \text{p83}, \text{p84}\right)\\ &= \frac{\text{p40} \cdot \left(1 + \frac{\text{p80} \cdot \left(\frac{[\text{GnRH\_R\_a}] \cdot \text{vol}(\text{default}) + [\text{Ago\_R\_a}] \cdot \text{vol}(\text{default})}{\text{p83}}\right)^{\text{p84}}}{1 + \left(\frac{[\text{GnRH\_R\_a}] \cdot \text{vol}(\text{default}) + [\text{Ago\_R\_a}] \cdot \text{vol}(\text{default})}{\text{p83}}\right)^{\text{p84}}}\right) \cdot [\text{Lut2}] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)}\end{aligned} \tag{190}$$

$$\begin{aligned}&\text{function\_28}\left([\text{Ago\_R\_a}], [\text{GnRH\_R\_a}], [\text{Lut2}], \text{vol}\left(\text{default}\right), \text{p40}, \text{p80}, \text{p83}, \text{p84}\right)\\ &= \frac{\text{p40} \cdot \left(1 + \frac{\text{p80} \cdot \left(\frac{[\text{GnRH\_R\_a}] \cdot \text{vol}(\text{default}) + [\text{Ago\_R\_a}] \cdot \text{vol}(\text{default})}{\text{p83}}\right)^{\text{p84}}}{1 + \left(\frac{[\text{GnRH\_R\_a}] \cdot \text{vol}(\text{default}) + [\text{Ago\_R\_a}] \cdot \text{vol}(\text{default})}{\text{p83}}\right)^{\text{p84}}}\right) \cdot [\text{Lut2}] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)}\end{aligned} \tag{191}$$

9.29 Reaction `re53`

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

Name re53

Reaction equation

$$\text{Lut3} \xrightarrow{\text{GnRH\_R\_a, Ago\_R\_a, Ago\_R\_a, GnRH\_R\_a, Lut3}} \text{Lut4} \tag{192}$$

Reactant

Table 90: Properties of each reactant.

Id	Name	SBO
`Lut3`	Lut3	

Modifiers

Table 91: Properties of each modifier.

Id	Name	SBO
`GnRH_R_a`	GnRH_R-a	
`Ago_R_a`	Ago_R-a	
`Ago_R_a`	Ago_R-a	
`GnRH_R_a`	GnRH_R-a	
`Lut3`	Lut3	

Product

Table 92: Properties of each product.

Id	Name	SBO
Lut4	Lut4	

Kinetic Law

Derived unit contains undeclared units

$$v_{29} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_29}\left(\left[\mathrm{Ago\_R\_a}\right], \left[\mathrm{GnRH\_R\_a}\right], \left[\mathrm{Lut3}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p41}, \mathrm{p80}, \mathrm{p83}, \mathrm{p84}\right) \tag{193}$$

$$\mathrm{function\_29}\left(\left[\mathrm{Ago\_R\_a}\right], \left[\mathrm{GnRH\_R\_a}\right], \left[\mathrm{Lut3}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p41}, \mathrm{p80}, \mathrm{p83}, \mathrm{p84}\right) = \frac{\mathrm{p41} \cdot \left(1 + \frac{\mathrm{p80} \cdot \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p83}}\right)^{\mathrm{p84}}}{1 + \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p83}}\right)^{\mathrm{p84}}}\right) \cdot \left[\mathrm{Lut3}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{194}$$

$$\mathrm{function\_29}\left(\left[\mathrm{Ago\_R\_a}\right], \left[\mathrm{GnRH\_R\_a}\right], \left[\mathrm{Lut3}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p41}, \mathrm{p80}, \mathrm{p83}, \mathrm{p84}\right) = \frac{\mathrm{p41} \cdot \left(1 + \frac{\mathrm{p80} \cdot \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p83}}\right)^{\mathrm{p84}}}{1 + \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p83}}\right)^{\mathrm{p84}}}\right) \cdot \left[\mathrm{Lut3}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{195}$$

9.30 Reaction re54

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

Name re54

Reaction equation

$$\mathrm{s64} \xrightarrow{\mathrm{FSH\_bld,\ FSH\_bld}} \mathrm{R\_Foll} \tag{196}$$

Reactant

Table 93: Properties of each reactant.

Id	Name	SBO
s64	s64	

Modifiers

Table 94: Properties of each modifier.

Id	Name	SBO
FSH_bld	FSH_bld	
FSH_bld	FSH_bld	

Product

Table 95: Properties of each product.

Id	Name	SBO
R_Foll	R_Foll	

Kinetic Law

Derived unit contains undeclared units

$$v_{30} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_30}\left(\left[\mathrm{FSH\_bld}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p90}, \mathrm{p91}, \mathrm{p94}\right) \tag{197}$$

$$\mathrm{function\_30}\left(\left[\mathrm{FSH\_bld}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p90}, \mathrm{p91}, \mathrm{p94}\right) = \frac{\mathrm{p94} \cdot \left(\frac{\left[\mathrm{FSH\_bld}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p90}}\right)^{\mathrm{p91}}}{1 + \left(\frac{\left[\mathrm{FSH\_bld}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p90}}\right)^{\mathrm{p91}}}}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{198}$$

$$\mathrm{function\_30}\left(\left[\mathrm{FSH\_bld}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p90}, \mathrm{p91}, \mathrm{p94}\right) = \frac{\mathrm{p94} \cdot \left(\frac{\left[\mathrm{FSH\_bld}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p90}}\right)^{\mathrm{p91}}}{1 + \left(\frac{\left[\mathrm{FSH\_bld}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p90}}\right)^{\mathrm{p91}}}}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{199}$$

9.31 Reaction re56

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

Name re56

Reaction equation

$$\text{R\_Foll} \xrightarrow{\text{P4, P4, R\_Foll}} \text{sa61\_degraded} \tag{200}$$

Reactant

Table 96: Properties of each reactant.

Id	Name	SBO
R_Foll	R_Foll	

Modifiers

Table 97: Properties of each modifier.

Id	Name	SBO
P4	P4	
P4	P4	
R_Foll	R_Foll	

Product

Table 98: Properties of each product.

Id	Name	SBO
sa61_degraded	sa61_degraded	

Kinetic Law

Derived unit contains undeclared units

$$v_{31} = \text{vol}\left(\text{default}\right) \cdot \text{function\_31}\left(\left[\text{P4}\right], \left[\text{R\_Foll}\right], \text{vol}\left(\text{default}\right), \text{facP4}, \text{p92}, \text{p93}, \text{p95}\right) \tag{201}$$

$$\begin{aligned} &\text{function\_31}\left(\left[\text{P4}\right], \left[\text{R\_Foll}\right], \text{vol}\left(\text{default}\right), \text{facP4}, \text{p92}, \text{p93}, \text{p95}\right) \\ &= \frac{\frac{\text{p95} \cdot \left(\frac{\left[\text{P4}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{p92} \cdot \text{facP4}}\right)^{\text{p93}}}{1 + \left(\frac{\left[\text{P4}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{p92} \cdot \text{facP4}}\right)^{\text{p93}}} \cdot \left[\text{R\_Foll}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \end{aligned} \tag{202}$$

$$\begin{aligned}&\text{function\_31}\left(\left[\text{P4}\right],\left[\text{R\_Foll}\right],\text{vol}\left(\text{default}\right),\text{facP4},\text{p92},\text{p93},\text{p95}\right)\\&=\frac{\frac{\text{p95}\cdot\left(\frac{\left[\text{P4}\right]\cdot\text{vol}\left(\text{default}\right)}{\text{p92}\cdot\text{facP4}}\right)^{\text{p93}}}{1+\left(\frac{\left[\text{P4}\right]\cdot\text{vol}\left(\text{default}\right)}{\text{p92}\cdot\text{facP4}}\right)^{\text{p93}}}\cdot\left[\text{R\_Foll}\right]\cdot\text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)}\end{aligned}\tag{203}$$

9.32 Reaction re57

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

Name re57

Reaction equation

$$\text{s66}\xrightarrow{\text{FSH\_R, AF3, AF3, FSH\_R}}\text{AF3}\tag{204}$$

Reactant

Table 99: Properties of each reactant.

Id	Name	SBO
s66	s66	

Modifiers

Table 100: Properties of each modifier.

Id	Name	SBO
FSH_R	FSH_R	
AF3	AF3	
AF3	AF3	
FSH_R	FSH_R	

Product

Table 101: Properties of each product.

Id	Name	SBO
AF3	AF3	

Kinetic Law

Derived unit contains undeclared units

$$v_{32} = \text{vol}\left(\text{default}\right) \cdot \text{function\_32}\left(\left[\text{AF3}\right], \left[\text{FSH\_R}\right], \text{vol}\left(\text{default}\right), \text{p31}, \text{p55}\right) \tag{205}$$

$$\begin{aligned} &\text{function\_32}\left(\left[\text{AF3}\right], \left[\text{FSH\_R}\right], \text{vol}\left(\text{default}\right), \text{p31}, \text{p55}\right) \\ &= \frac{\text{p31} \cdot \left[\text{FSH\_R}\right] \cdot \text{vol}\left(\text{default}\right) \cdot \left[\text{AF3}\right] \cdot \text{vol}\left(\text{default}\right) \cdot \left(1 - \frac{\left[\text{AF3}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{p55}}\right)}{\text{vol}\left(\text{default}\right)} \end{aligned} \tag{206}$$

$$\begin{aligned} &\text{function\_32}\left(\left[\text{AF3}\right], \left[\text{FSH\_R}\right], \text{vol}\left(\text{default}\right), \text{p31}, \text{p55}\right) \\ &= \frac{\text{p31} \cdot \left[\text{FSH\_R}\right] \cdot \text{vol}\left(\text{default}\right) \cdot \left[\text{AF3}\right] \cdot \text{vol}\left(\text{default}\right) \cdot \left(1 - \frac{\left[\text{AF3}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{p55}}\right)}{\text{vol}\left(\text{default}\right)} \end{aligned} \tag{207}$$

9.33 Reaction `re58`

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

Name re58

Reaction equation

$$\text{s67} \xrightarrow{\text{LH\_R, AF4, AF4, LH\_R}} \text{AF4} \tag{208}$$

Reactant

Table 102: Properties of each reactant.

Id	Name	SBO
s67	s67	

Modifiers

Table 103: Properties of each modifier.

Id	Name	SBO
LH_R	LH_R	
AF4	AF4	
AF4	AF4	
LH_R	LH_R	

Product

Table 104: Properties of each product.

Id	Name	SBO
AF4	AF4	

Kinetic Law

Derived unit contains undeclared units

$$v_{33} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_33}\left(\left[\mathrm{AF4}\right], \left[\mathrm{LH\_R}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p33}, \mathrm{p44}, \mathrm{p52}, \mathrm{p55}\right) \quad (209)$$

$$\begin{aligned} &\mathrm{function\_33}\left(\left[\mathrm{AF4}\right], \left[\mathrm{LH\_R}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p33}, \mathrm{p44}, \mathrm{p52}, \mathrm{p55}\right) \\ &= \frac{\mathrm{p33} \cdot \left(\frac{\left[\mathrm{LH\_R}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p52}}\right)^{\mathrm{p44}} \cdot \left[\mathrm{AF4}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) \cdot \left(1 - \frac{\left[\mathrm{AF4}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p55}}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \quad (210)$$

$$\begin{aligned} &\mathrm{function\_33}\left(\left[\mathrm{AF4}\right], \left[\mathrm{LH\_R}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p33}, \mathrm{p44}, \mathrm{p52}, \mathrm{p55}\right) \\ &= \frac{\mathrm{p33} \cdot \left(\frac{\left[\mathrm{LH\_R}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p52}}\right)^{\mathrm{p44}} \cdot \left[\mathrm{AF4}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) \cdot \left(1 - \frac{\left[\mathrm{AF4}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p55}}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \quad (211)$$

9.34 Reaction re59

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

Name re59

Reaction equation

$$\mathrm{PrF} \xrightarrow{\mathrm{R\_Foll,\ LH\_R,\ LH\_R,\ PrF,\ R\_Foll}} \mathrm{sa52\_degraded} \quad (212)$$

Reactant

Table 105: Properties of each reactant.

Id	Name	SBO
PrF	PrF	

Modifiers

Table 106: Properties of each modifier.

Id	Name	SBO
R_Foll	R_Foll	
LH_R	LH_R	
LH_R	LH_R	
PrF	PrF	
R_Foll	R_Foll	

Product

Table 107: Properties of each product.

Id	Name	SBO
sa52_degraded	sa52_degraded	

Kinetic Law

Derived unit contains undeclared units

$$v_{34} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_34}\left(\left[\mathrm{LH\_R}\right], \left[\mathrm{PrF}\right], \left[\mathrm{R\_Foll}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p35}, \mathrm{p45}, \mathrm{p52}\right) \tag{213}$$

$$\begin{aligned} &\mathrm{function\_34}\left(\left[\mathrm{LH\_R}\right], \left[\mathrm{PrF}\right], \left[\mathrm{R\_Foll}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p35}, \mathrm{p45}, \mathrm{p52}\right) \\ &= \frac{\mathrm{p35} \cdot \left(\frac{\left[\mathrm{LH\_R}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p52}}\right)^{\mathrm{p45}} \cdot \left[\mathrm{R\_Foll}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) \cdot \left[\mathrm{PrF}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{214}$$

$$\begin{aligned} &\mathrm{function\_34}\left(\left[\mathrm{LH\_R}\right], \left[\mathrm{PrF}\right], \left[\mathrm{R\_Foll}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p35}, \mathrm{p45}, \mathrm{p52}\right) \\ &= \frac{\mathrm{p35} \cdot \left(\frac{\left[\mathrm{LH\_R}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p52}}\right)^{\mathrm{p45}} \cdot \left[\mathrm{R\_Foll}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) \cdot \left[\mathrm{PrF}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{215}$$

9.35 Reaction re60

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

Name re60

Reaction equation

$$\mathrm{s69} \xrightarrow{\mathrm{R\_Foll,\ LH\_R,\ PrF,\ LH\_R,\ PrF,\ R\_Foll}} \mathrm{OvF} \tag{216}$$

Reactant

Table 108: Properties of each reactant.

Id	Name	SBO
s69	s69	

Modifiers

Table 109: Properties of each modifier.

Id	Name	SBO
R_Foll	R_Foll	
LH_R	LH_R	
PrF	PrF	
LH_R	LH_R	
PrF	PrF	
R_Foll	R_Foll	

Product

Table 110: Properties of each product.

Id	Name	SBO
OvF	OvF	

Kinetic Law

Derived unit contains undeclared units

$$v_{35} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_35}\left(\left[\mathrm{LH\_R}\right], \left[\mathrm{PrF}\right], \left[\mathrm{R\_Foll}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p27}, \mathrm{p45}, \mathrm{p52}, \mathrm{p53}, \mathrm{p54}\right) \tag{217}$$

$$\begin{aligned} &\mathrm{function\_35}\left(\left[\mathrm{LH\_R}\right], \left[\mathrm{PrF}\right], \left[\mathrm{R\_Foll}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p27}, \mathrm{p45}, \mathrm{p52}, \mathrm{p53}, \mathrm{p54}\right) \\ &= \frac{\frac{\mathrm{p27} \cdot \left[\mathrm{R\_Foll}\right] \cdot \mathrm{vol}(\mathrm{default}) \cdot \left(\frac{\left[\mathrm{LH\_R}\right] \cdot \mathrm{vol}(\mathrm{default})}{\mathrm{p52}}\right)^{\mathrm{p45}} \cdot \left(\frac{\left[\mathrm{PrF}\right] \cdot \mathrm{vol}(\mathrm{default})}{\mathrm{p53}}\right)^{\mathrm{p54}}}{1 + \left(\frac{\left[\mathrm{PrF}\right] \cdot \mathrm{vol}(\mathrm{default})}{\mathrm{p53}}\right)^{\mathrm{p54}}}}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{218}$$

$$\begin{aligned} &\mathrm{function\_35}\left(\left[\mathrm{LH\_R}\right], \left[\mathrm{PrF}\right], \left[\mathrm{R\_Foll}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p27}, \mathrm{p45}, \mathrm{p52}, \mathrm{p53}, \mathrm{p54}\right) \\ &= \frac{\frac{\mathrm{p27} \cdot \left[\mathrm{R\_Foll}\right] \cdot \mathrm{vol}(\mathrm{default}) \cdot \left(\frac{\left[\mathrm{LH\_R}\right] \cdot \mathrm{vol}(\mathrm{default})}{\mathrm{p52}}\right)^{\mathrm{p45}} \cdot \left(\frac{\left[\mathrm{PrF}\right] \cdot \mathrm{vol}(\mathrm{default})}{\mathrm{p53}}\right)^{\mathrm{p54}}}{1 + \left(\frac{\left[\mathrm{PrF}\right] \cdot \mathrm{vol}(\mathrm{default})}{\mathrm{p53}}\right)^{\mathrm{p54}}}}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{219}$$

9.36 Reaction re61

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

Name re61

Reaction equation

$$\mathrm{OvF} \xrightarrow{\mathrm{OvF}} \mathrm{sa53\_degraded} \tag{220}$$

Reactant

Table 111: Properties of each reactant.

Id	Name	SBO
OvF	OvF	

Modifier

Table 112: Properties of each modifier.

Id	Name	SBO
OvF	OvF	

Product

Table 113: Properties of each product.

Id	Name	SBO
sa53_degraded	sa53_degraded	

Kinetic Law

Derived unit contains undeclared units

$$v_{36} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_36}\left(\left[\mathrm{OvF}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p36}\right) \tag{221}$$

$$\mathrm{function\_36}\left(\left[\mathrm{OvF}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p36}\right) = \frac{\mathrm{p36} \cdot \left[\mathrm{OvF}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{222}$$

$$\mathrm{function\_36}\left(\left[\mathrm{OvF}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p36}\right) = \frac{\mathrm{p36} \cdot \left[\mathrm{OvF}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{223}$$

9.37 Reaction re62

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

Name re62

Reaction equation

$$\mathrm{s71} \xrightarrow{\mathrm{OvF},\ \mathrm{OvF}} \mathrm{Sc1} \tag{224}$$

Reactant

Table 114: Properties of each reactant.

Id	Name	SBO
s71	s71	

Modifiers

Table 115: Properties of each modifier.

Id	Name	SBO
OvF	OvF	
OvF	OvF	

Product

Table 116: Properties of each product.

Id	Name	SBO
Sc1	Sc1	

Kinetic Law

Derived unit contains undeclared units

$$v_{37} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_37}\left(\left[\mathrm{OvF}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p26}, \mathrm{p56}, \mathrm{p57}\right) \tag{225}$$

$$\mathrm{function\_37}\left(\left[\mathrm{OvF}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p26}, \mathrm{p56}, \mathrm{p57}\right) = \frac{\frac{\mathrm{p26} \cdot \left(\frac{\left[\mathrm{OvF}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p56}}\right)^{\mathrm{p57}}}{1 + \left(\frac{\left[\mathrm{OvF}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p56}}\right)^{\mathrm{p57}}}}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{226}$$

$$\text{function\_37}\left([\text{OvF}], \text{vol}\left(\text{default}\right), \text{p26}, \text{p56}, \text{p57}\right) = \frac{\frac{\text{p26} \cdot \left(\frac{[\text{OvF}] \cdot \text{vol}(\text{default})}{\text{p56}}\right)^{\text{p57}}}{1 + \left(\frac{[\text{OvF}] \cdot \text{vol}(\text{default})}{\text{p56}}\right)^{\text{p57}}}}{\text{vol}\left(\text{default}\right)} \tag{227}$$

9.38 Reaction `re64`

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

Name re64

Reaction equation

$$\text{Lut4} \xrightarrow{\text{GnRH\_R\_a, Ago\_R\_a, Ago\_R\_a, GnRH\_R\_a, Lut4}} \text{s72} \tag{228}$$

Reactant

Table 117: Properties of each reactant.

Id	Name	SBO
`Lut4`	Lut4	

Modifiers

Table 118: Properties of each modifier.

Id	Name	SBO
`GnRH_R_a`	GnRH_R-a	
`Ago_R_a`	Ago_R-a	
`Ago_R_a`	Ago_R-a	
`GnRH_R_a`	GnRH_R-a	
`Lut4`	Lut4	

Product

Table 119: Properties of each product.

Id	Name	SBO
`s72`	s72	

Kinetic Law

Derived unit contains undeclared units

$$v_{38} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_38}\left(\left[\mathrm{Ago\_R\_a}\right], \left[\mathrm{GnRH\_R\_a}\right], \left[\mathrm{Lut4}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p42}, \mathrm{p80}, \mathrm{p83}, \mathrm{p84}\right) \tag{229}$$

$$\mathrm{function\_38}\left(\left[\mathrm{Ago\_R\_a}\right], \left[\mathrm{GnRH\_R\_a}\right], \left[\mathrm{Lut4}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p42}, \mathrm{p80}, \mathrm{p83}, \mathrm{p84}\right) = \frac{\mathrm{p42} \cdot \left(1 + \frac{\mathrm{p80} \cdot \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p83}}\right)^{\mathrm{p84}}}{1 + \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p83}}\right)^{\mathrm{p84}}}\right) \cdot \left[\mathrm{Lut4}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{230}$$

$$\mathrm{function\_38}\left(\left[\mathrm{Ago\_R\_a}\right], \left[\mathrm{GnRH\_R\_a}\right], \left[\mathrm{Lut4}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p42}, \mathrm{p80}, \mathrm{p83}, \mathrm{p84}\right) = \frac{\mathrm{p42} \cdot \left(1 + \frac{\mathrm{p80} \cdot \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p83}}\right)^{\mathrm{p84}}}{1 + \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p83}}\right)^{\mathrm{p84}}}\right) \cdot \left[\mathrm{Lut4}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{231}$$

9.39 Reaction `re65`

This is an irreversible reaction of one reactant forming one product influenced by 14 modifiers.

Name re65

Reaction equation

$$\mathrm{s74} \xrightarrow{\mathrm{AF3,\ AF4,\ Lut1,\ Lut4,\ AF2,\ PrF,\ LH\_bld,\ AF2,\ AF3,\ AF4,\ LH\_bld,\ Lut1,\ Lut4,\ PrF}} \mathrm{E2} \tag{232}$$

Reactant

Table 120: Properties of each reactant.

Id	Name	SBO
s74	s74	

Modifiers

Table 121: Properties of each modifier.

Id	Name	SBO
AF3	AF3	
AF4	AF4	
Lut1	Lut1	
Lut4	Lut4	
AF2	AF2	
PrF	PrF	
LH_bld	LH_bld	
AF2	AF2	
AF3	AF3	
AF4	AF4	
LH_bld	LH_bld	
Lut1	Lut1	
Lut4	Lut4	
PrF	PrF	

Product

Table 122: Properties of each product.

Id	Name	SBO
E2	E2	

Kinetic Law

Derived unit contains undeclared units

$$v_{39} = \mathrm{vol}\,(\mathrm{default}) \cdot \mathrm{function\_39}\,([\mathrm{AF2}], [\mathrm{AF3}], [\mathrm{AF4}], [\mathrm{LH\_bld}], [\mathrm{Lut1}], [\mathrm{Lut4}], [\mathrm{PrF}], \mathrm{vol}\,(\mathrm{default}), \mathrm{facE2}, \mathrm{p152}, \mathrm{p158}, \mathrm{p159}, \mathrm{p160}, \mathrm{p161}, \mathrm{p164}, \mathrm{p165}) \quad (233)$$

$$\mathrm{function\_39}\,([\mathrm{AF2}], [\mathrm{AF3}], [\mathrm{AF4}], [\mathrm{LH\_bld}], [\mathrm{Lut1}], [\mathrm{Lut4}], [\mathrm{PrF}], \mathrm{vol}\,(\mathrm{default}), \mathrm{facE2}, \mathrm{p152}, \mathrm{p158}, \mathrm{p159}, \mathrm{p160}, \mathrm{p161}, \mathrm{p164}, \mathrm{p165}) \quad (234)$$
$$= \frac{\mathrm{facE2} \cdot (\mathrm{p158} + \mathrm{p152} \cdot [\mathrm{AF2}] \cdot \mathrm{vol}\,(\mathrm{default}) + \mathrm{p159} \cdot [\mathrm{AF3}] \cdot \mathrm{vol}\,(\mathrm{default}) \cdot [\mathrm{LH\_bld}] \cdot \mathrm{vol}\,(\mathrm{default}) + \mathrm{p160} \cdot [\mathrm{AF4}]}{}$$

$$\mathrm{function\_39}\,([\mathrm{AF2}], [\mathrm{AF3}], [\mathrm{AF4}], [\mathrm{LH\_bld}], [\mathrm{Lut1}], [\mathrm{Lut4}], [\mathrm{PrF}], \mathrm{vol}\,(\mathrm{default}), \mathrm{facE2}, \mathrm{p152}, \mathrm{p158}, \mathrm{p159}, \mathrm{p160}, \mathrm{p161}, \mathrm{p164}, \mathrm{p165}) \quad (235)$$
$$= \frac{\mathrm{facE2} \cdot (\mathrm{p158} + \mathrm{p152} \cdot [\mathrm{AF2}] \cdot \mathrm{vol}\,(\mathrm{default}) + \mathrm{p159} \cdot [\mathrm{AF3}] \cdot \mathrm{vol}\,(\mathrm{default}) \cdot [\mathrm{LH\_bld}] \cdot \mathrm{vol}\,(\mathrm{default}) + \mathrm{p160} \cdot [\mathrm{AF4}]}{}$$

9.40 Reaction re66

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

Name re66

Reaction equation

$$\mathrm{E2} \xrightarrow{\mathrm{E2}} \mathrm{sa75\_degraded} \tag{236}$$

Reactant

Table 123: Properties of each reactant.

Id	Name	SBO
E2	E2	

Modifier

Table 124: Properties of each modifier.

Id	Name	SBO
E2	E2	

Product

Table 125: Properties of each product.

Id	Name	SBO
sa75_degraded	sa75_degraded	

Kinetic Law

Derived unit contains undeclared units

$$v_{40} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_40}\left(\left[\mathrm{E2}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p154}\right) \tag{237}$$

$$\mathrm{function\_40}\left(\left[\mathrm{E2}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p154}\right) = \frac{\mathrm{p154} \cdot \left[\mathrm{E2}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{238}$$

$$\mathrm{function\_40}\left(\left[\mathrm{E2}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p154}\right) = \frac{\mathrm{p154} \cdot \left[\mathrm{E2}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{239}$$

9.41 Reaction re67

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

Name re67

Reaction equation

$$\mathrm{s76} \xrightarrow{\mathrm{Lut4,\ Lut4}} \mathrm{P4} \tag{240}$$

Reactant

Table 126: Properties of each reactant.

Id	Name	SBO
s76	s76	

Modifiers

Table 127: Properties of each modifier.

Id	Name	SBO
Lut4	Lut4	
Lut4	Lut4	

Product

Table 128: Properties of each product.

Id	Name	SBO
P4	P4	

Kinetic Law

Derived unit contains undeclared units

$$v_{41} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_41}\left(\left[\mathrm{Lut4}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{facP4}, \mathrm{p166}, \mathrm{p167}\right) \tag{241}$$

$$\begin{aligned} &\mathrm{function\_41}\left(\left[\mathrm{Lut4}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{facP4}, \mathrm{p166}, \mathrm{p167}\right) \\ &= \frac{\mathrm{facP4} \cdot \left(\mathrm{p166} + \mathrm{p167} \cdot \left[\mathrm{Lut4}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{242}$$

$$\begin{aligned} &\text{function\_41}\left([\text{Lut4}], \text{vol}\left(\text{default}\right), \text{facP4}, \text{p166}, \text{p167}\right) \\ &= \frac{\text{facP4} \cdot \left(\text{p166} + \text{p167} \cdot [\text{Lut4}] \cdot \text{vol}\left(\text{default}\right)\right)}{\text{vol}\left(\text{default}\right)} \end{aligned} \tag{243}$$

9.42 Reaction `re69`

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

Name re69

Reaction equation

$$\text{s78} \xrightarrow{\text{PrF, Sc1, Lut1, Lut2, Lut3, Lut4, Lut1, Lut2, Lut3, Lut4, PrF, Sc1}} \text{InhA} \tag{244}$$

Reactant

Table 129: Properties of each reactant.

Id	Name	SBO
s78	s78	

Modifiers

Table 130: Properties of each modifier.

Id	Name	SBO
PrF	PrF	
Sc1	Sc1	
Lut1	Lut1	
Lut2	Lut2	
Lut3	Lut3	
Lut4	Lut4	
Lut1	Lut1	
Lut2	Lut2	
Lut3	Lut3	
Lut4	Lut4	
PrF	PrF	
Sc1	Sc1	

Product

Table 131: Properties of each product.

Id	Name	SBO
InhA	InhA	

Kinetic Law

Derived unit contains undeclared units

$$v_{42} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_42}\left(\left[\mathrm{Lut1}\right], \left[\mathrm{Lut2}\right], \left[\mathrm{Lut3}\right], \left[\mathrm{Lut4}\right], \left[\mathrm{PrF}\right], \left[\mathrm{Sc1}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p168}, \mathrm{p169}, \mathrm{p170}, \mathrm{p171}, \mathrm{p172}, \mathrm{p177}, \mathrm{p178}\right) \tag{245}$$

$$\mathrm{function\_42}\left(\left[\mathrm{Lut1}\right], \left[\mathrm{Lut2}\right], \left[\mathrm{Lut3}\right], \left[\mathrm{Lut4}\right], \left[\mathrm{PrF}\right], \left[\mathrm{Sc1}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p168}, \mathrm{p169}, \mathrm{p170}, \mathrm{p171}, \mathrm{p172}, \mathrm{p177}, \mathrm{p178}\right) \tag{246}$$
$$= \frac{\mathrm{p168} + \mathrm{p169} \cdot \left[\mathrm{PrF}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \mathrm{p177} \cdot \left[\mathrm{Sc1}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \mathrm{p178} \cdot \left[\mathrm{Lut1}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \mathrm{p170} \cdot \left[\mathrm{Lut2}\right] \cdot \mathrm{vo}}{\mathrm{vol}\left(\mathrm{default}\right)}$$

$$\mathrm{function\_42}\left(\left[\mathrm{Lut1}\right], \left[\mathrm{Lut2}\right], \left[\mathrm{Lut3}\right], \left[\mathrm{Lut4}\right], \left[\mathrm{PrF}\right], \left[\mathrm{Sc1}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p168}, \mathrm{p169}, \mathrm{p170}, \mathrm{p171}, \mathrm{p172}, \mathrm{p177}, \mathrm{p178}\right) \tag{247}$$
$$= \frac{\mathrm{p168} + \mathrm{p169} \cdot \left[\mathrm{PrF}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \mathrm{p177} \cdot \left[\mathrm{Sc1}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \mathrm{p178} \cdot \left[\mathrm{Lut1}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \mathrm{p170} \cdot \left[\mathrm{Lut2}\right] \cdot \mathrm{vo}}{\mathrm{vol}\left(\mathrm{default}\right)}$$

9.43 Reaction re71

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

Name re71

Reaction equation

$$\mathrm{P4} \xrightarrow{\mathrm{P4}} \mathrm{sa78\_degraded} \tag{248}$$

Reactant

Table 132: Properties of each reactant.

Id	Name	SBO
P4	P4	

Modifier

Table 133: Properties of each modifier.

Id	Name	SBO
P4	P4	

Product

Table 134: Properties of each product.

Id	Name	SBO
sa78_degraded	sa78_degraded	

Kinetic Law

Derived unit contains undeclared units

$$v_{43} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_43}\left(\left[\mathrm{P4}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p155}\right) \tag{249}$$

$$\mathrm{function\_43}\left(\left[\mathrm{P4}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p155}\right) = \frac{\mathrm{p155} \cdot \left[\mathrm{P4}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{250}$$

$$\mathrm{function\_43}\left(\left[\mathrm{P4}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p155}\right) = \frac{\mathrm{p155} \cdot \left[\mathrm{P4}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{251}$$

9.44 Reaction re72

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

Name re72

Reaction equation

$$\mathrm{s82} \xrightarrow{\mathrm{AF2,\ Sc2,\ AF2,\ Sc2}} \mathrm{InhB} \tag{252}$$

Reactant

Table 135: Properties of each reactant.

Id	Name	SBO
s82	s82	

Modifiers

Table 136: Properties of each modifier.

Id	Name	SBO
AF2	AF2	
Sc2	Sc2	
AF2	AF2	
Sc2	Sc2	

Product

Table 137: Properties of each product.

Id	Name	SBO
InhB	InhB	

Kinetic Law

Derived unit contains undeclared units

$$v_{44} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_44}\left(\left[\mathrm{AF2}\right], \left[\mathrm{Sc2}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p173}, \mathrm{p174}, \mathrm{p175}\right) \tag{253}$$

$$\begin{aligned} &\mathrm{function\_44}\left(\left[\mathrm{AF2}\right], \left[\mathrm{Sc2}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p173}, \mathrm{p174}, \mathrm{p175}\right) \\ &= \frac{\mathrm{p173} + \mathrm{p174} \cdot \left[\mathrm{AF2}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \mathrm{p175} \cdot \left[\mathrm{Sc2}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{254}$$

$$\begin{aligned} &\mathrm{function\_44}\left(\left[\mathrm{AF2}\right], \left[\mathrm{Sc2}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p173}, \mathrm{p174}, \mathrm{p175}\right) \\ &= \frac{\mathrm{p173} + \mathrm{p174} \cdot \left[\mathrm{AF2}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \mathrm{p175} \cdot \left[\mathrm{Sc2}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{255}$$

9.45 Reaction re73

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

Name re73

Reaction equation

$$\mathrm{InhB} \xrightarrow{\mathrm{InhB}} \mathrm{sa86\_degraded} \tag{256}$$

Reactant

Table 138: Properties of each reactant.

Id	Name	SBO
InhB	InhB	

Modifier

Table 139: Properties of each modifier.

Id	Name	SBO
InhB	InhB	

Product

Table 140: Properties of each product.

Id	Name	SBO
sa86_degraded	sa86_degraded	

Kinetic Law

Derived unit contains undeclared units

$$v_{45} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_45}\left(\left[\mathrm{InhB}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p157}\right) \tag{257}$$

$$\mathrm{function\_45}\left(\left[\mathrm{InhB}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p157}\right) = \frac{\mathrm{p157} \cdot \left[\mathrm{InhB}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{258}$$

$$\mathrm{function\_45}\left(\left[\mathrm{InhB}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p157}\right) = \frac{\mathrm{p157} \cdot \left[\mathrm{InhB}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{259}$$

9.46 Reaction re74

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

Name re74

Reaction equation

$$\mathrm{InhA\_delay} \xrightarrow{\mathrm{InhA\_delay}} \mathrm{sa35\_degraded} \tag{260}$$

Reactant

Table 141: Properties of each reactant.

Id	Name	SBO
InhA_delay	InhA_delay	

Modifier

Table 142: Properties of each modifier.

Id	Name	SBO
InhA_delay	InhA_delay	

Product

Table 143: Properties of each product.

Id	Name	SBO
sa35_degraded	sa35_degraded	

Kinetic Law

Derived unit contains undeclared units

$$v_{46} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_46}\left(\left[\mathrm{InhA\_delay}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p30}\right) \tag{261}$$

$$\mathrm{function\_46}\left(\left[\mathrm{InhA\_delay}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p30}\right) = \frac{\mathrm{p30} \cdot \left[\mathrm{InhA\_delay}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{262}$$

$$\mathrm{function\_46}\left(\left[\mathrm{InhA\_delay}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p30}\right) = \frac{\mathrm{p30} \cdot \left[\mathrm{InhA\_delay}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{263}$$

9.47 Reaction re75

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

Name re75

Reaction equation

$$\mathrm{s85} \longrightarrow \mathrm{R\_GnRH\_i} \tag{264}$$

Reactant

Table 144: Properties of each reactant.

Id	Name	SBO
s85	s85	

Product

Table 145: Properties of each product.

Id	Name	SBO
R_GnRH_i	R_GnRH-i	

Kinetic Law

Derived unit contains undeclared units

$$v_{47} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_47}\left(\mathrm{vol}\left(\mathrm{default}\right), \mathrm{p311}\right) \tag{265}$$

$$\mathrm{function\_47}\left(\mathrm{vol}\left(\mathrm{default}\right), \mathrm{p311}\right) = \frac{\mathrm{p311}}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{266}$$

$$\mathrm{function\_47}\left(\mathrm{vol}\left(\mathrm{default}\right), \mathrm{p311}\right) = \frac{\mathrm{p311}}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{267}$$

9.48 Reaction re76

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

Name re76

Reaction equation

$$\mathrm{GnRH\_R\_i} \xrightarrow{\mathrm{GnRH\_R\_i}} \mathrm{csa1\_degraded} \tag{268}$$

Reactant

Table 146: Properties of each reactant.

Id	Name	SBO
GnRH_R_i	GnRH_R-i	

Modifier

Table 147: Properties of each modifier.

Id	Name	SBO
GnRH_R_i	GnRH_R-i	

Product

Table 148: Properties of each product.

Id	Name	SBO
csa1_degraded	csa1_degraded	

Kinetic Law

Derived unit contains undeclared units

$$v_{48} = \text{vol}\left(\text{default}\right) \cdot \text{function\_48}\left(\left[\text{GnRH\_R\_i}\right], \text{vol}\left(\text{default}\right), \text{p304}\right) \tag{269}$$

$$\text{function\_48}\left(\left[\text{GnRH\_R\_i}\right], \text{vol}\left(\text{default}\right), \text{p304}\right) = \frac{\text{p304} \cdot \left[\text{GnRH\_R\_i}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{270}$$

$$\text{function\_48}\left(\left[\text{GnRH\_R\_i}\right], \text{vol}\left(\text{default}\right), \text{p304}\right) = \frac{\text{p304} \cdot \left[\text{GnRH\_R\_i}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{271}$$

9.49 Reaction re78

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

Name re78

Reaction equation

$$\text{s87} \xrightarrow{\text{E2, P4}} \text{GnRH} \tag{272}$$

Reactant

Table 149: Properties of each reactant.

Id	Name	SBO
s87	s87	

Modifiers

Table 150: Properties of each modifier.

Id	Name	SBO
E2	E2	
P4	P4	

Product

Table 151: Properties of each product.

Id	Name	SBO
GnRH	GnRH	

Kinetic Law

Derived unit contains undeclared units

$$v_{49} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_49}\left(\mathrm{vol}\left(\mathrm{default}\right), \mathrm{freq}, \mathrm{mass}\right) \tag{273}$$

$$\mathrm{function\_49}\left(\mathrm{vol}\left(\mathrm{default}\right), \mathrm{freq}, \mathrm{mass}\right) = \frac{\mathrm{freq} \cdot \mathrm{mass}}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{274}$$

$$\mathrm{function\_49}\left(\mathrm{vol}\left(\mathrm{default}\right), \mathrm{freq}, \mathrm{mass}\right) = \frac{\mathrm{freq} \cdot \mathrm{mass}}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{275}$$

9.50 Reaction re82

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

Name re82

Reaction equation

$$\mathrm{FSH\_bld} \xrightarrow{\mathrm{FSH\_bld}} \mathrm{sa31\_degraded} \tag{276}$$

Reactant

Table 152: Properties of each reactant.

Id	Name	SBO
FSH_bld	FSH_bld	

Modifier

Table 153: Properties of each modifier.

Id	Name	SBO
FSH_bld	FSH_bld	

Product

Table 154: Properties of each product.

Id	Name	SBO
sa31_degraded	sa31_degraded	

Kinetic Law

Derived unit contains undeclared units

$$v_{50} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_50}\left(\left[\mathrm{FSH\_bld}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p241}\right) \tag{277}$$

$$\mathrm{function\_50}\left(\left[\mathrm{FSH\_bld}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p241}\right) = \frac{\mathrm{p241} \cdot \left[\mathrm{FSH\_bld}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{278}$$

$$\mathrm{function\_50}\left(\left[\mathrm{FSH\_bld}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p241}\right) = \frac{\mathrm{p241} \cdot \left[\mathrm{FSH\_bld}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{279}$$

9.51 Reaction re83

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

Name re83

Reaction equation

$$\mathrm{s93} \xrightarrow{\mathrm{GnRH\_R\_a,\ LH\_Pit,\ Ago\_R\_a,\ Ago\_R\_a,\ GnRH\_R\_a,\ LH\_Pit}} \mathrm{LH\_bld} \tag{280}$$

Reactant

Table 155: Properties of each reactant.

Id	Name	SBO
s93	s93	

Modifiers

Table 156: Properties of each modifier.

Id	Name	SBO
GnRH_R_a	GnRH_R-a	
LH_Pit	LH_Pit	
Ago_R_a	Ago_R-a	
Ago_R_a	Ago_R-a	
GnRH_R_a	GnRH_R-a	
LH_Pit	LH_Pit	

Product

Table 157: Properties of each product.

Id	Name	SBO
LH_bld	LH_bld	

Kinetic Law

Derived unit contains undeclared units

$$v_{51} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_51}\left(\left[\mathrm{Ago\_R\_a}\right], \left[\mathrm{GnRH\_R\_a}\right], \left[\mathrm{LH\_Pit}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{facLH}, \mathrm{p12}, \mathrm{p16}, \mathrm{p5}, \mathrm{p8}, \mathrm{p9}\right) \tag{281}$$

$$\begin{aligned}&\mathrm{function\_51}\left(\left[\mathrm{Ago\_R\_a}\right], \left[\mathrm{GnRH\_R\_a}\right], \left[\mathrm{LH\_Pit}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{facLH}, \mathrm{p12}, \mathrm{p16}, \mathrm{p5}, \mathrm{p8}, \mathrm{p9}\right)\\ &= \frac{\frac{\mathrm{facLH}}{\mathrm{p12}} \cdot \left(\mathrm{p16} + \frac{\mathrm{p5} \cdot \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p8}}\right)^{\mathrm{p9}}}{1 + \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p8}}\right)^{\mathrm{p9}}}\right) \cdot \left[\mathrm{LH\_Pit}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)}\end{aligned} \tag{282}$$

$$\begin{aligned}&\mathrm{function\_51}\left(\left[\mathrm{Ago\_R\_a}\right], \left[\mathrm{GnRH\_R\_a}\right], \left[\mathrm{LH\_Pit}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{facLH}, \mathrm{p12}, \mathrm{p16}, \mathrm{p5}, \mathrm{p8}, \mathrm{p9}\right)\\ &= \frac{\frac{\mathrm{facLH}}{\mathrm{p12}} \cdot \left(\mathrm{p16} + \frac{\mathrm{p5} \cdot \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p8}}\right)^{\mathrm{p9}}}{1 + \left(\frac{\left[\mathrm{GnRH\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) + \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{p8}}\right)^{\mathrm{p9}}}\right) \cdot \left[\mathrm{LH\_Pit}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)}\end{aligned} \tag{283}$$

9.52 Reaction re84

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

Name re84

Reaction equation

$$\text{s95} \xrightarrow{\text{GnRH\_R\_a, FSH\_pit, Ago\_R\_a, Ago\_R\_a, FSH\_pit, GnRH\_R\_a}} \text{FSH\_bld} \tag{284}$$

Reactant

Table 158: Properties of each reactant.

Id	Name	SBO
s95	s95	

Modifiers

Table 159: Properties of each modifier.

Id	Name	SBO
GnRH_R_a	GnRH_R-a	
FSH_pit	FSH_pit	
Ago_R_a	Ago_R-a	
Ago_R_a	Ago_R-a	
FSH_pit	FSH_pit	
GnRH_R_a	GnRH_R-a	

Product

Table 160: Properties of each product.

Id	Name	SBO
FSH_bld	FSH_bld	

Kinetic Law

Derived unit contains undeclared units

$$v_{52} = \text{vol}\left(\text{default}\right) \cdot \text{function\_52}\left(\left[\text{Ago\_R\_a}\right], \left[\text{FSH\_pit}\right], \left[\text{GnRH\_R\_a}\right], \text{vol}\left(\text{default}\right), \text{facFSH}, \text{p12}, \text{p17}, \text{p18}, \text{p20}, \text{p28}\right) \tag{285}$$

$$\begin{aligned}&\text{function\_52}\left(\left[\text{Ago\_R\_a}\right],\left[\text{FSH\_pit}\right],\left[\text{GnRH\_R\_a}\right],\text{vol}\left(\text{default}\right),\text{facFSH},\text{p12},\text{p17},\text{p18},\text{p20},\text{p28}\right)\\&=\frac{\frac{\text{facFSH}}{\text{p12}}\cdot\left(\text{p17}+\frac{\text{p28}\cdot\left(\frac{\left[\text{GnRH\_R\_a}\right]\cdot\text{vol}(\text{default})+\left[\text{Ago\_R\_a}\right]\cdot\text{vol}(\text{default})}{\text{p18}}\right)^{\text{p20}}}{1+\left(\frac{\left[\text{GnRH\_R\_a}\right]\cdot\text{vol}(\text{default})+\left[\text{Ago\_R\_a}\right]\cdot\text{vol}(\text{default})}{\text{p18}}\right)^{\text{p20}}}\right)\cdot\left[\text{FSH\_pit}\right]\cdot\text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)}\end{aligned}\tag{286}$$

$$\begin{aligned}&\text{function\_52}\left(\left[\text{Ago\_R\_a}\right],\left[\text{FSH\_pit}\right],\left[\text{GnRH\_R\_a}\right],\text{vol}\left(\text{default}\right),\text{facFSH},\text{p12},\text{p17},\text{p18},\text{p20},\text{p28}\right)\\&=\frac{\frac{\text{facFSH}}{\text{p12}}\cdot\left(\text{p17}+\frac{\text{p28}\cdot\left(\frac{\left[\text{GnRH\_R\_a}\right]\cdot\text{vol}(\text{default})+\left[\text{Ago\_R\_a}\right]\cdot\text{vol}(\text{default})}{\text{p18}}\right)^{\text{p20}}}{1+\left(\frac{\left[\text{GnRH\_R\_a}\right]\cdot\text{vol}(\text{default})+\left[\text{Ago\_R\_a}\right]\cdot\text{vol}(\text{default})}{\text{p18}}\right)^{\text{p20}}}\right)\cdot\left[\text{FSH\_pit}\right]\cdot\text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)}\end{aligned}\tag{287}$$

9.53 Reaction `re85`

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

Name re85

Reaction equation

$$\text{FSH\_bld}+\text{R\_FSH}\xrightarrow{\text{FSH\_bld, R\_FSH}}\text{FSH\_R}\tag{288}$$

Reactants

Table 161: Properties of each reactant.

Id	Name	SBO
`FSH_bld`	FSH_bld	
`R_FSH`	R_FSH	

Modifiers

Table 162: Properties of each modifier.

Id	Name	SBO
`FSH_bld`	FSH_bld	
`R_FSH`	R_FSH	

Product

Table 163: Properties of each product.

Id	Name	SBO
FSH_R	FSH_R	

Kinetic Law

Derived unit contains undeclared units

$$v_{53} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_53}\left(\left[\mathrm{FSH\_bld}\right], \left[\mathrm{R\_FSH}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{facFSH}, \mathrm{p240}\right) \tag{289}$$

$$\begin{aligned} &\mathrm{function\_53}\left(\left[\mathrm{FSH\_bld}\right], \left[\mathrm{R\_FSH}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{facFSH}, \mathrm{p240}\right) \\ &= \frac{\frac{\mathrm{p240}}{\mathrm{facFSH}} \cdot \left[\mathrm{FSH\_bld}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) \cdot \left[\mathrm{R\_FSH}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{290}$$

$$\begin{aligned} &\mathrm{function\_53}\left(\left[\mathrm{FSH\_bld}\right], \left[\mathrm{R\_FSH}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{facFSH}, \mathrm{p240}\right) \\ &= \frac{\frac{\mathrm{p240}}{\mathrm{facFSH}} \cdot \left[\mathrm{FSH\_bld}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) \cdot \left[\mathrm{R\_FSH}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{291}$$

9.54 Reaction re87

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

Name re87

Reaction equation

$$\mathrm{InhA} \xrightarrow{\mathrm{InhA}} \mathrm{InhA\_delay} \tag{292}$$

Reactant

Table 164: Properties of each reactant.

Id	Name	SBO
InhA	InhA	

Modifier

Table 165: Properties of each modifier.

Id	Name	SBO
InhA	InhA	

Product

Table 166: Properties of each product.

Id	Name	SBO
InhA_delay	InhA_delay	

Kinetic Law

Derived unit contains undeclared units

$$v_{54} = \text{vol}\left(\text{default}\right) \cdot \text{function\_54}\left(\left[\text{InhA}\right], \text{vol}\left(\text{default}\right), \text{p156}\right) \tag{293}$$

$$\text{function\_54}\left(\left[\text{InhA}\right], \text{vol}\left(\text{default}\right), \text{p156}\right) = \frac{\text{p156} \cdot \left[\text{InhA}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{294}$$

$$\text{function\_54}\left(\left[\text{InhA}\right], \text{vol}\left(\text{default}\right), \text{p156}\right) = \frac{\text{p156} \cdot \left[\text{InhA}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{295}$$

9.55 Reaction re90

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

Name re90

Reaction equation

$$\text{Ago\_c} \xrightarrow{\text{Ago\_c}} \text{s102} \tag{296}$$

Reactant

Table 167: Properties of each reactant.

Id	Name	SBO
Ago_c	Ago_c	

Modifier

Table 168: Properties of each modifier.

Id	Name	SBO
Ago_c	Ago_c	

Product

Table 169: Properties of each product.

Id	Name	SBO
s102	s102	

Kinetic Law

Derived unit contains undeclared units

$$v_{55} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_55}\left(\left[\mathrm{Ago\_c}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p275}\right) \tag{297}$$

$$\mathrm{function\_55}\left(\left[\mathrm{Ago\_c}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p275}\right) = \frac{\mathrm{p275} \cdot \left[\mathrm{Ago\_c}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{298}$$

$$\mathrm{function\_55}\left(\left[\mathrm{Ago\_c}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p275}\right) = \frac{\mathrm{p275} \cdot \left[\mathrm{Ago\_c}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{299}$$

9.56 Reaction re93

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

Name re93

Reaction equation

$$\mathrm{Ago\_R\_a} \xrightarrow{\mathrm{Ago\_R\_a}} \mathrm{Ago\_R\_i} \tag{300}$$

Reactant

Table 170: Properties of each reactant.

Id	Name	SBO
Ago_R_a	Ago_R-a	

Modifier

Table 171: Properties of each modifier.

Id	Name	SBO
Ago_R_a	Ago_R-a	

Product

Table 172: Properties of each product.

Id	Name	SBO
Ago_R_i	Ago_R-i	

Kinetic Law

Derived unit contains undeclared units

$$v_{56} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_56}\left(\left[\mathrm{Ago\_R\_a}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p319}\right) \tag{301}$$

$$\mathrm{function\_56}\left(\left[\mathrm{Ago\_R\_a}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p319}\right) = \frac{\mathrm{p319} \cdot \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{302}$$

$$\mathrm{function\_56}\left(\left[\mathrm{Ago\_R\_a}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p319}\right) = \frac{\mathrm{p319} \cdot \left[\mathrm{Ago\_R\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{303}$$

9.57 Reaction re94

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

Name re94

Reaction equation

$$\mathrm{Ago\_R\_i} \xrightarrow{\mathrm{Ago\_R\_i}} \mathrm{Ago\_R\_a} \tag{304}$$

Reactant

Table 173: Properties of each reactant.

Id	Name	SBO
Ago_R_i	Ago_R-i	

Modifier

Table 174: Properties of each modifier.

Id	Name	SBO
Ago_R_i	Ago_R-i	

Product

Table 175: Properties of each product.

Id	Name	SBO
Ago_R_a	Ago_R-a	

Kinetic Law

Derived unit contains undeclared units

$$v_{57} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_57}\left(\left[\mathrm{Ago\_R\_i}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p320}\right) \tag{305}$$

$$\mathrm{function\_57}\left(\left[\mathrm{Ago\_R\_i}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p320}\right) = \frac{\mathrm{p320} \cdot \left[\mathrm{Ago\_R\_i}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{306}$$

$$\mathrm{function\_57}\left(\left[\mathrm{Ago\_R\_i}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p320}\right) = \frac{\mathrm{p320} \cdot \left[\mathrm{Ago\_R\_i}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{307}$$

9.58 Reaction re95

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

Name re95

Reaction equation

$$\mathrm{Ago\_R\_i} \xrightarrow{\mathrm{Ago\_R\_i}} \mathrm{s106} \tag{308}$$

Reactant

Table 176: Properties of each reactant.

Id	Name	SBO
Ago_R_i	Ago_R-i	

Modifier

Table 177: Properties of each modifier.

Id	Name	SBO
Ago_R_i	Ago_R-i	

Product

Table 178: Properties of each product.

Id	Name	SBO
s106	s106	

Kinetic Law

Derived unit contains undeclared units

$$v_{58} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_58}\left(\left[\mathrm{Ago\_R\_i}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p314}\right) \tag{309}$$

$$\mathrm{function\_58}\left(\left[\mathrm{Ago\_R\_i}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p314}\right) = \frac{\mathrm{p314} \cdot \left[\mathrm{Ago\_R\_i}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{310}$$

$$\mathrm{function\_58}\left(\left[\mathrm{Ago\_R\_i}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p314}\right) = \frac{\mathrm{p314} \cdot \left[\mathrm{Ago\_R\_i}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{311}$$

9.59 Reaction re97

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

Name re97

Reaction equation

$$\mathrm{R\_GnRH\_a} + \mathrm{Ago\_c} \xrightarrow{\mathrm{Ago\_c,\ R\_GnRH\_a}} \mathrm{Ago\_R\_a} \tag{312}$$

Reactants

Table 179: Properties of each reactant.

Id	Name	SBO
R_GnRH_a	R_GnRH-a	
Ago_c	Ago_c	

Modifiers

Table 180: Properties of each modifier.

Id	Name	SBO
Ago_c	Ago_c	
R_GnRH_a	R_GnRH-a	

Product

Table 181: Properties of each product.

Id	Name	SBO
Ago_R_a	Ago_R-a	

Kinetic Law

Derived unit contains undeclared units

$$v_{59} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_59}\left(\left[\mathrm{Ago\_c}\right], \left[\mathrm{R\_GnRH\_a}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p312}\right) \tag{313}$$

$$\begin{aligned} &\mathrm{function\_59}\left(\left[\mathrm{Ago\_c}\right], \left[\mathrm{R\_GnRH\_a}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p312}\right) \\ &= \frac{\mathrm{p312} \cdot \left[\mathrm{R\_GnRH\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) \cdot \left[\mathrm{Ago\_c}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{314}$$

$$\begin{aligned} &\mathrm{function\_59}\left(\left[\mathrm{Ago\_c}\right], \left[\mathrm{R\_GnRH\_a}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p312}\right) \\ &= \frac{\mathrm{p312} \cdot \left[\mathrm{R\_GnRH\_a}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right) \cdot \left[\mathrm{Ago\_c}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \end{aligned} \tag{315}$$

9.60 Reaction re98

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

Name re98

Reaction equation

$$\text{Ago\_R\_a} \xrightarrow{\text{Ago\_R\_a}} \text{Ago\_c} + \text{R\_GnRH\_a} \tag{316}$$

Reactant

Table 182: Properties of each reactant.

Id	Name	SBO
Ago_R_a	Ago_R-a	

Modifier

Table 183: Properties of each modifier.

Id	Name	SBO
Ago_R_a	Ago_R-a	

Products

Table 184: Properties of each product.

Id	Name	SBO
Ago_c	Ago_c	
R_GnRH_a	R_GnRH-a	

Kinetic Law

Derived unit contains undeclared units

$$v_{60} = \text{vol}\left(\text{default}\right) \cdot \text{function\_60}\left(\left[\text{Ago\_R\_a}\right], \text{vol}\left(\text{default}\right), \text{p313}\right) \tag{317}$$

$$\text{function\_60}\left(\left[\text{Ago\_R\_a}\right], \text{vol}\left(\text{default}\right), \text{p313}\right) = \frac{\text{p313} \cdot \left[\text{Ago\_R\_a}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{318}$$

$$\text{function\_60}\left(\left[\text{Ago\_R\_a}\right], \text{vol}\left(\text{default}\right), \text{p313}\right) = \frac{\text{p313} \cdot \left[\text{Ago\_R\_a}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{319}$$

9.61 Reaction re99

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

Name re99

Reaction equation

$$\text{Ago\_R\_i} \xrightarrow{\text{Ago\_R\_i}} \text{R\_GnRH\_i} \tag{320}$$

Reactant

Table 185: Properties of each reactant.

Id	Name	SBO
Ago_R_i	Ago_R-i	

Modifier

Table 186: Properties of each modifier.

Id	Name	SBO
Ago_R_i	Ago_R-i	

Product

Table 187: Properties of each product.

Id	Name	SBO
R_GnRH_i	R_GnRH-i	

Kinetic Law

Derived unit contains undeclared units

$$v_{61} = \text{vol}\left(\text{default}\right) \cdot \text{function\_61}\left(\left[\text{Ago\_R\_i}\right], \text{vol}\left(\text{default}\right), \text{p315}\right) \tag{321}$$

$$\text{function\_61}\left(\left[\text{Ago\_R\_i}\right], \text{vol}\left(\text{default}\right), \text{p315}\right) = \frac{\text{p315} \cdot \left[\text{Ago\_R\_i}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{322}$$

$$\text{function\_61}\left(\left[\text{Ago\_R\_i}\right], \text{vol}\left(\text{default}\right), \text{p315}\right) = \frac{\text{p315} \cdot \left[\text{Ago\_R\_i}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{323}$$

9.62 Reaction re100

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

Name re100

Reaction equation

$$\text{Ago\_d} \xrightarrow{\text{Ago\_d}} \text{s107} \tag{324}$$

Reactant

Table 188: Properties of each reactant.

Id	Name	SBO
Ago_d	Ago_d	

Modifier

Table 189: Properties of each modifier.

Id	Name	SBO
Ago_d	Ago_d	

Product

Table 190: Properties of each product.

Id	Name	SBO
s107	s107	

Kinetic Law

Derived unit contains undeclared units

$$v_{62} = \text{vol}\left(\text{default}\right) \cdot \text{function\_62}\left(\left[\text{Ago\_d}\right], \text{vol}\left(\text{default}\right), \text{p274}\right) \tag{325}$$

$$\text{function\_62}\left(\left[\text{Ago\_d}\right], \text{vol}\left(\text{default}\right), \text{p274}\right) = \frac{\text{p274} \cdot \left[\text{Ago\_d}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{326}$$

$$\text{function\_62}\left(\left[\text{Ago\_d}\right], \text{vol}\left(\text{default}\right), \text{p274}\right) = \frac{\text{p274} \cdot \left[\text{Ago\_d}\right] \cdot \text{vol}\left(\text{default}\right)}{\text{vol}\left(\text{default}\right)} \tag{327}$$

9.63 Reaction re101

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

Name re101

Reaction equation

$$\mathrm{s108} \xrightarrow{\mathrm{Ago\_d,\ Ago\_d}} \mathrm{Ago\_c} \tag{328}$$

Reactant

Table 191: Properties of each reactant.

Id	Name	SBO
s108	s108	

Modifiers

Table 192: Properties of each modifier.

Id	Name	SBO
Ago_d	Ago_d	
Ago_d	Ago_d	

Product

Table 193: Properties of each product.

Id	Name	SBO
Ago_c	Ago_c	

Kinetic Law

Derived unit contains undeclared units

$$v_{63} = \mathrm{vol}\left(\mathrm{default}\right) \cdot \mathrm{function\_63}\left(\left[\mathrm{Ago\_d}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p273}, \mathrm{p274}\right) \tag{329}$$

$$\mathrm{function\_63}\left(\left[\mathrm{Ago\_d}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p273}, \mathrm{p274}\right) = \frac{\frac{\mathrm{p274}}{\mathrm{p273}} \cdot \left[\mathrm{Ago\_d}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{330}$$

$$\mathrm{function\_63}\left(\left[\mathrm{Ago\_d}\right], \mathrm{vol}\left(\mathrm{default}\right), \mathrm{p273}, \mathrm{p274}\right) = \frac{\frac{\mathrm{p274}}{\mathrm{p273}} \cdot \left[\mathrm{Ago\_d}\right] \cdot \mathrm{vol}\left(\mathrm{default}\right)}{\mathrm{vol}\left(\mathrm{default}\right)} \tag{331}$$

9.64 Reaction re102

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

Name re102

Reaction equation

$$\text{Ant\_d} \xrightarrow{\text{Ant\_d}} \text{s113} \tag{332}$$

Reactant

Table 194: Properties of each reactant.

Id	Name	SBO
Ant_d	Ant_d	

Modifier

Table 195: Properties of each modifier.

Id	Name	SBO
Ant_d	Ant_d	

Product

Table 196: Properties of each product.

Id	Name	SBO
s113	s113	

Kinetic Law

Derived unit contains undeclared units

$$v_{64} = \text{vol}\left(\text{default}\right) \cdot \text{function\_64}\left(\left[\text{Ant\_d}\right], \text{vol}\left(\text{default}\right), \text{p474}\right) \tag{333}$$

$$\text{function\_64}\left(\left[\text{Ant\_d}\right], \text{vol}\left(\text{default}\right), \text{p474}\right) = \frac{\text{p474} \cdot \left[\text{Ant\_d}\right]}{\text{vol}\left(\text{default}\right)} \tag{334}$$

$$\text{function\_64}\left(\left[\text{Ant\_d}\right], \text{vol}\left(\text{default}\right), \text{p474}\right) = \frac{\text{p474} \cdot \left[\text{Ant\_d}\right]}{\text{vol}\left(\text{default}\right)} \tag{335}$$

9.65 Reaction re103

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

Name re103

Reaction equation

$$\text{s114} \xrightarrow{\text{Ant\_d, Ant\_d}} \text{Ant\_c} \tag{336}$$

Reactant

Table 197: Properties of each reactant.

Id	Name	SBO
s114	s114	

Modifiers

Table 198: Properties of each modifier.

Id	Name	SBO
Ant_d	Ant_d	
Ant_d	Ant_d	

Product

Table 199: Properties of each product.

Id	Name	SBO
Ant_c	Ant_c	

Kinetic Law

Derived unit contains undeclared units

$$v_{65} = \text{vol}\left(\text{default}\right) \cdot \text{function\_65}\left(\left[\text{Ant\_d}\right], \text{vol}\left(\text{default}\right), \text{p473}, \text{p474}\right) \tag{337}$$

$$\text{function\_65}\left(\left[\text{Ant\_d}\right], \text{vol}\left(\text{default}\right), \text{p473}, \text{p474}\right) = \frac{\frac{\text{p474}}{\text{p473}} \cdot \left[\text{Ant\_d}\right]}{\text{vol}\left(\text{default}\right)} \tag{338}$$

$$\text{function\_65}\left(\left[\text{Ant\_d}\right], \text{vol}\left(\text{default}\right), \text{p473}, \text{p474}\right) = \frac{\frac{\text{p474}}{\text{p473}} \cdot \left[\text{Ant\_d}\right]}{\text{vol}\left(\text{default}\right)} \tag{339}$$

9.66 Reaction re104

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

Name re104

Reaction equation

$$\text{Ant\_c} \xrightarrow{\text{Ant\_c}} \text{s115} \tag{340}$$

Reactant

Table 200: Properties of each reactant.

Id	Name	SBO
Ant_c	Ant_c	

Modifier

Table 201: Properties of each modifier.

Id	Name	SBO
Ant_c	Ant_c	

Product

Table 202: Properties of each product.

Id	Name	SBO
s115	s115	

Kinetic Law

Derived unit contains undeclared units

$$v_{66} = \text{vol}\left(\text{default}\right) \cdot \text{function\_66}\left(\left[\text{Ant\_c}\right], \text{vol}\left(\text{default}\right), \text{p475}\right) \tag{341}$$

$$\text{function\_66}\left(\left[\text{Ant\_c}\right], \text{vol}\left(\text{default}\right), \text{p475}\right) = \frac{\text{p475} \cdot \left[\text{Ant\_c}\right]}{\text{vol}\left(\text{default}\right)} \tag{342}$$

$$\text{function\_66}\left(\left[\text{Ant\_c}\right], \text{vol}\left(\text{default}\right), \text{p475}\right) = \frac{\text{p475} \cdot \left[\text{Ant\_c}\right]}{\text{vol}\left(\text{default}\right)} \tag{343}$$

9.67 Reaction re105

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

Name re105

Reaction equation

$$\text{Ant\_R} \xrightarrow{\text{Ant\_R}} \text{R\_GnRH\_a} + \text{Ant\_c} \tag{344}$$

Reactant

Table 203: Properties of each reactant.

Id	Name	SBO
Ant_R	Ant_R	

Modifier

Table 204: Properties of each modifier.

Id	Name	SBO
Ant_R	Ant_R	

Products

Table 205: Properties of each product.

Id	Name	SBO
R_GnRH_a	R_GnRH-a	
Ant_c	Ant_c	

Kinetic Law

Derived unit contains undeclared units

$$v_{67} = \text{vol}\left(\text{default}\right) \cdot \text{function\_67}\left(\left[\text{Ant\_R}\right], \text{vol}\left(\text{default}\right), \text{p513}\right) \tag{345}$$

$$\text{function\_67}\left(\left[\text{Ant\_R}\right], \text{vol}\left(\text{default}\right), \text{p513}\right) = \frac{\text{p513} \cdot \left[\text{Ant\_R}\right]}{\text{vol}\left(\text{default}\right)} \tag{346}$$

$$\text{function\_67}\left(\left[\text{Ant\_R}\right], \text{vol}\left(\text{default}\right), \text{p513}\right) = \frac{\text{p513} \cdot \left[\text{Ant\_R}\right]}{\text{vol}\left(\text{default}\right)} \tag{347}$$

9.68 Reaction re106

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

Name re106

Reaction equation

$$\text{R\_GnRH\_a} + \text{Ant\_c} \xrightarrow{\text{Ant\_c, R\_GnRH\_a}} \text{Ant\_R} \tag{348}$$

Reactants

Table 206: Properties of each reactant.

Id	Name	SBO
R_GnRH_a	R_GnRH-a	
Ant_c	Ant_c	

Modifiers

Table 207: Properties of each modifier.

Id	Name	SBO
Ant_c	Ant_c	
R_GnRH_a	R_GnRH-a	

Product

Table 208: Properties of each product.

Id	Name	SBO
Ant_R	Ant_R	

Kinetic Law

Derived unit contains undeclared units

$$v_{68} = \text{vol}\left(\text{default}\right) \cdot \text{function\_68}\left(\left[\text{Ant\_c}\right], \left[\text{R\_GnRH\_a}\right], \text{vol}\left(\text{default}\right), \text{p512}\right) \tag{349}$$

$$\begin{aligned} &\text{function\_68}\left(\left[\text{Ant\_c}\right], \left[\text{R\_GnRH\_a}\right], \text{vol}\left(\text{default}\right), \text{p512}\right) \\ &= \frac{\text{p512} \cdot \left[\text{R\_GnRH\_a}\right] \cdot \text{vol}\left(\text{default}\right) \cdot \left[\text{Ant\_c}\right]}{\text{vol}\left(\text{default}\right)} \end{aligned} \tag{350}$$

$$\begin{aligned} &\text{function\_68}\left(\left[\text{Ant\_c}\right], \left[\text{R\_GnRH\_a}\right], \text{vol}\left(\text{default}\right), \text{p512}\right) \\ &= \frac{\text{p512} \cdot \left[\text{R\_GnRH\_a}\right] \cdot \text{vol}\left(\text{default}\right) \cdot \left[\text{Ant\_c}\right]}{\text{vol}\left(\text{default}\right)} \end{aligned} \tag{351}$$

9.69 Reaction re107

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

Name re107

Reaction equation

$$\text{Ant\_R} \xrightarrow{\text{Ant\_R}} \text{s116} \tag{352}$$

Reactant

Table 209: Properties of each reactant.

Id	Name	SBO
Ant_R	Ant_R	

Modifier

Table 210: Properties of each modifier.

Id	Name	SBO
Ant_R	Ant_R	

Product

Table 211: Properties of each product.

Id	Name	SBO
s116	s116	

Kinetic Law

Derived unit contains undeclared units

$$v_{69} = \text{vol}\left(\text{default}\right) \cdot \text{function\_69}\left(\left[\text{Ant\_R}\right], \text{vol}\left(\text{default}\right), \text{p514}\right) \tag{353}$$

$$\text{function\_69}\left(\left[\text{Ant\_R}\right], \text{vol}\left(\text{default}\right), \text{p514}\right) = \frac{\text{p514} \cdot \left[\text{Ant\_R}\right]}{\text{vol}\left(\text{default}\right)} \tag{354}$$

$$\text{function\_69}\left(\left[\text{Ant\_R}\right], \text{vol}\left(\text{default}\right), \text{p514}\right) = \frac{\text{p514} \cdot \left[\text{Ant\_R}\right]}{\text{vol}\left(\text{default}\right)} \tag{355}$$

9.70 Reaction re108

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

Name re108

Reaction equation

$$\text{Ant\_c} \xrightarrow{\text{Ant\_c}} \text{Ant\_p} \tag{356}$$

Reactant

Table 212: Properties of each reactant.

Id	Name	SBO
Ant_c	Ant_c	

Modifier

Table 213: Properties of each modifier.

Id	Name	SBO
Ant_c	Ant_c	

Product

Table 214: Properties of each product.

Id	Name	SBO
Ant_p	Ant_p	

Kinetic Law

Derived unit contains undeclared units

$$v_{70} = \text{vol}\left(\text{default}\right) \cdot \text{function\_70}\left(\left[\text{Ant\_c}\right], \text{vol}\left(\text{default}\right), \text{p476}\right) \tag{357}$$

$$\text{function\_70}\left(\left[\text{Ant\_c}\right], \text{vol}\left(\text{default}\right), \text{p476}\right) = \frac{\text{p476} \cdot \left[\text{Ant\_c}\right]}{\text{vol}\left(\text{default}\right)} \tag{358}$$

$$\text{function\_70}\left(\left[\text{Ant\_c}\right], \text{vol}\left(\text{default}\right), \text{p476}\right) = \frac{\text{p476} \cdot \left[\text{Ant\_c}\right]}{\text{vol}\left(\text{default}\right)} \tag{359}$$

9.71 Reaction re109

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

Name re109

Reaction equation

$$\text{Ant\_p} \xrightarrow{\text{Ant\_p}} \text{Ant\_c} \tag{360}$$

Reactant

Table 215: Properties of each reactant.

Id	Name	SBO
Ant_p	Ant_p	

Modifier

Table 216: Properties of each modifier.

Id	Name	SBO
Ant_p	Ant_p	

Product

Table 217: Properties of each product.

Id	Name	SBO
Ant_c	Ant_c	

Kinetic Law

Derived unit contains undeclared units

$$v_{71} = \text{vol}\left(\text{default}\right) \cdot \text{function\_71}\left(\left[\text{Ant\_p}\right], \text{vol}\left(\text{default}\right), \text{p477}\right) \tag{361}$$

$$\text{function\_71}\left(\left[\text{Ant\_p}\right], \text{vol}\left(\text{default}\right), \text{p477}\right) = \frac{\text{p477} \cdot \left[\text{Ant\_p}\right]}{\text{vol}\left(\text{default}\right)} \tag{362}$$

$$\text{function\_71}\left(\left[\text{Ant\_p}\right], \text{vol}\left(\text{default}\right), \text{p477}\right) = \frac{\text{p477} \cdot \left[\text{Ant\_p}\right]}{\text{vol}\left(\text{default}\right)} \tag{363}$$

10 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.

10.1 Species AF1

Name AF1

Initial concentration 2.26 dimensionless $\cdot\, 1^{-1}$

This species takes part in three reactions (as a reactant in re42 and as a product in re43 and as a modifier in re42).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{AF1} = v_{21} - v_{20} \tag{364}$$

10.2 Species AF2

Name AF2

Initial concentration 19.92 dimensionless $\cdot\, 1^{-1}$

This species takes part in seven reactions (as a reactant in re44 and as a product in re42 and as a modifier in re44, re65, re65, re72, re72).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{AF2} = v_{20} - v_{22} \tag{365}$$

10.3 Species E2

Name E2

Initial concentration 45 dimensionless $\cdot\, 1^{-1}$

This species takes part in six reactions (as a reactant in re66 and as a product in re65 and as a modifier in re25, re25, re66, re78).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{E2} = v_{39} - v_{40} \tag{366}$$

10.4 Species FSH_R

Name FSH_R

Initial concentration 0.662 dimensionless $\cdot 1^{-1}$

This species takes part in nine reactions (as a reactant in re39 and as a product in re85 and as a modifier in re39, re42, re42, re43, re43, re57, re57).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{FSH\_R} = v_{53} - v_{18} \tag{367}$$

10.5 Species FSH_bld

Name FSH_bld

Initial concentration 4.1 dimensionless $\cdot 1^{-1}$

This species takes part in seven reactions (as a reactant in re82, re85 and as a product in re84 and as a modifier in re54, re54, re82, re85).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{FSH\_bld} = v_{52} - v_{50} - v_{53} \tag{368}$$

10.6 Species FSH_pit

Name FSH_pit

Initial concentration 48627.2 dimensionless $\cdot 1^{-1}$

This species takes part in five reactions (as a reactant in re29 and as a product in re26 and as a modifier in re29, re84, re84).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{FSH\_pit} = v_{11} - v_{13} \tag{369}$$

10.7 Species GnRH

Name GnRH

Initial concentration 0.00326 dimensionless $\cdot 1^{-1}$

This species takes part in six reactions (as a reactant in re8, re24 and as a product in re15, re78 and as a modifier in re8, re24).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{GnRH} = v_{8} + v_{49} - v_{6} - v_{9} \tag{370}$$

10.8 Species GnRH_R_a

Name GnRH_R-a

Initial concentration $1.447 \cdot 10^{-5}$ dimensionless $\cdot\, l^{-1}$

This species takes part in 22 reactions (as a reactant in re2, re15 and as a product in re3, re8 and as a modifier in re2, re15, re28, re28, re29, re29, re51, re51, re52, re52, re53, re53, re64, re64, re83, re83, re84, re84).

$$\frac{d}{dt}\text{GnRH\_R\_a} = v_2 + v_6 - v_1 - v_8 \tag{371}$$

10.9 Species GnRH_R_i

Name GnRH_R-i

Initial concentration $1.294 \cdot 10^{-5}$ dimensionless $\cdot\, l^{-1}$

This species takes part in seven reactions (as a reactant in re3, re6, re76 and as a product in re2 and as a modifier in re3, re6, re76).

$$\frac{d}{dt}\text{GnRH\_R\_i} = v_1 - v_2 - v_5 - v_{48} \tag{372}$$

10.10 Species InhA

Name InhA

Initial concentration 1.07 dimensionless $\cdot\, l^{-1}$

This species takes part in three reactions (as a reactant in re87 and as a product in re69 and as a modifier in re87).

$$\frac{d}{dt}\text{InhA} = v_{42} - v_{54} \tag{373}$$

10.11 Species InhA_delay

Name InhA_delay

Initial concentration 86.84 dimensionless $\cdot\, l^{-1}$

This species takes part in five reactions (as a reactant in re74 and as a product in re87 and as a modifier in re26, re26, re74).

$$\frac{d}{dt}\text{InhA\_delay} = v_{54} - v_{46} \tag{374}$$

10.12 Species InhB

Name InhB

Initial concentration 52.18 dimensionless $\cdot\, l^{-1}$

This species takes part in five reactions (as a reactant in re73 and as a product in re72 and as a modifier in re26, re26, re73).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{InhB} = v_{44} - v_{45} \tag{375}$$

10.13 Species LH_Pit

Name LH_Pit

Initial concentration 261119 dimensionless $\cdot\, l^{-1}$

This species takes part in five reactions (as a reactant in re28 and as a product in re25 and as a modifier in re28, re83, re83).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{LH\_Pit} = v_{10} - v_{12} \tag{376}$$

10.14 Species LH_R

Name LH_R

Initial concentration 0.263 dimensionless $\cdot\, l^{-1}$

This species takes part in 15 reactions (as a reactant in re36 and as a product in re35 and as a modifier in re36, re44, re44, re45, re45, re46, re46, re58, re58, re59, re59, re60, re60).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{LH\_R} = v_{14} - v_{15} \tag{377}$$

10.15 Species LH_bld

Name LH_bld

Initial concentration 2.667 dimensionless $\cdot\, l^{-1}$

This species takes part in seven reactions (as a reactant in re35, re38 and as a product in re83 and as a modifier in re35, re38, re65, re65).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{LH\_bld} = v_{51} - v_{14} - v_{17} \tag{378}$$

10.16 Species Lut1

Name Lut1

Initial concentration $2.762 \cdot 10^{-5}$ dimensionless $\cdot\, l^{-1}$

This species takes part in seven reactions (as a reactant in re51 and as a product in re50 and as a modifier in re51, re65, re65, re69, re69).

$$\frac{d}{dt}\text{Lut1} = v_{26} - v_{27} \tag{379}$$

10.17 Species Lut2

Name Lut2

Initial concentration $3.772 \cdot 10^{-4}$ dimensionless $\cdot\, l^{-1}$

This species takes part in five reactions (as a reactant in re52 and as a product in re51 and as a modifier in re52, re69, re69).

$$\frac{d}{dt}\text{Lut2} = v_{27} - v_{28} \tag{380}$$

10.18 Species Lut3

Name Lut3

Initial concentration 0.00334 dimensionless $\cdot\, l^{-1}$

This species takes part in five reactions (as a reactant in re53 and as a product in re52 and as a modifier in re53, re69, re69).

$$\frac{d}{dt}\text{Lut3} = v_{28} - v_{29} \tag{381}$$

10.19 Species Lut4

Name Lut4

Initial concentration 0.01385 dimensionless $\cdot\, l^{-1}$

This species takes part in nine reactions (as a reactant in re64 and as a product in re53 and as a modifier in re64, re65, re65, re67, re67, re69, re69).

$$\frac{d}{dt}\text{Lut4} = v_{29} - v_{38} \tag{382}$$

10.20 Species OvF

Name OvF

Initial concentration $7.652 \cdot 10^{-19}$ dimensionless $\cdot\, l^{-1}$

This species takes part in five reactions (as a reactant in re61 and as a product in re60 and as a modifier in re61, re62, re62).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{OvF} = v_{35} - v_{36} \tag{383}$$

10.21 Species P4

Name P4

Initial concentration 2.41 dimensionless $\cdot\, l^{-1}$

This species takes part in eight reactions (as a reactant in re71 and as a product in re67 and as a modifier in re25, re25, re56, re56, re71, re78).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{P4} = v_{41} - v_{43} \tag{384}$$

10.22 Species PrF

Name PrF

Initial concentration 0.244 dimensionless $\cdot\, l^{-1}$

This species takes part in nine reactions (as a reactant in re59 and as a product in re46 and as a modifier in re59, re60, re60, re65, re65, re69, re69).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{PrF} = v_{24} - v_{34} \tag{385}$$

10.23 Species R_FSH

Name R_FSH

Initial concentration 6.341 dimensionless $\cdot\, l^{-1}$

This species takes part in three reactions (as a reactant in re85 and as a product in re40 and as a modifier in re85).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{R\_FSH} = v_{19} - v_{53} \tag{386}$$

10.24 Species R_FSH_des

Name R_FSH_des

Initial concentration $1.497\ \text{dimensionless} \cdot \text{l}^{-1}$

This species takes part in three reactions (as a reactant in re40 and as a product in re39 and as a modifier in re40).

$$\frac{\text{d}}{\text{d}t}\text{R\_FSH\_des} = v_{18} - v_{19} \tag{387}$$

10.25 Species R_Foll

Name R_Foll

Initial concentration $0.119\ \text{dimensionless} \cdot \text{l}^{-1}$

This species takes part in 13 reactions (as a reactant in re56 and as a product in re54 and as a modifier in re44, re44, re45, re45, re46, re46, re56, re59, re59, re60, re60).

$$\frac{\text{d}}{\text{d}t}\text{R\_Foll} = v_{30} - v_{31} \tag{388}$$

10.26 Species R_GnRH_a

Name R_GnRH-a

Initial concentration $0.00928\ \text{dimensionless} \cdot \text{l}^{-1}$

This species takes part in twelve reactions (as a reactant in re5, re8, re97, re106 and as a product in re4, re15, re98, re105 and as a modifier in re5, re8, re97, re106).

$$\frac{\text{d}}{\text{d}t}\text{R\_GnRH\_a} = v_3 + v_8 + v_{60} + v_{67} - v_4 - v_6 - v_{59} - v_{68} \tag{389}$$

10.27 Species R_GnRH_i

Name R_GnRH-i

Initial concentration $9.409 \cdot 10^{-4}\ \text{dimensionless} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in re4, re11 and as a product in re5, re6, re75, re99 and as a modifier in re4, re11).

$$\frac{\text{d}}{\text{d}t}\text{R\_GnRH\_i} = v_4 + v_5 + v_{47} + v_{61} - v_3 - v_7 \tag{390}$$

10.28 Species R_LH

Name R_LH

Initial concentration 8.41 dimensionless $\cdot$ l^{-1}

This species takes part in three reactions (as a reactant in re35 and as a product in re37 and as a modifier in re35).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{R\_LH} = v_{16} - v_{14} \tag{391}$$

10.29 Species R_LH_des

Name R_LH_des

Initial concentration 0.699 dimensionless $\cdot$ l^{-1}

This species takes part in three reactions (as a reactant in re37 and as a product in re36 and as a modifier in re37).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{R\_LH\_des} = v_{15} - v_{16} \tag{392}$$

10.30 Species csa1_degraded

Name csa1_degraded

Initial concentration 1 dimensionless $\cdot$ l^{-1}

This species takes part in one reaction (as a product in re76), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{csa1\_degraded} = 0 \tag{393}$$

10.31 Species s33

Name s33

SBO:0000291 empty set

Initial concentration 1 dimensionless $\cdot$ l^{-1}

This species takes part in one reaction (as a reactant in re25), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s33} = 0 \tag{394}$$

10.32 Species s38

Name s38

SBO:0000291 empty set

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

This species takes part in one reaction (as a reactant in re26), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s38} = 0 \tag{395}$$

10.33 Species s62

Name s62

SBO:0000291 empty set

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

This species takes part in one reaction (as a reactant in re43), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s62} = 0 \tag{396}$$

10.34 Species s64

Name s64

SBO:0000291 empty set

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

This species takes part in one reaction (as a reactant in re54), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s64} = 0 \tag{397}$$

10.35 Species s66

Name s66

SBO:0000291 empty set

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

This species takes part in one reaction (as a reactant in re57), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s66} = 0 \tag{398}$$

10.36 Species s67

Name s67

SBO:0000291 empty set

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

This species takes part in one reaction (as a reactant in re58), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s67} = 0 \tag{399}$$

10.37 Species s69

Name s69

SBO:0000291 empty set

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

This species takes part in one reaction (as a reactant in re60), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s69} = 0 \tag{400}$$

10.38 Species s71

Name s71

SBO:0000291 empty set

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

This species takes part in one reaction (as a reactant in re62), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s71} = 0 \tag{401}$$

10.39 Species s72

Name s72

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re64), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s72} = 0 \tag{402}$$

10.40 Species s74

Name s74

SBO:0000291 empty set

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

This species takes part in one reaction (as a reactant in re65), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s74} = 0 \tag{403}$$

10.41 Species s76

Name s76

SBO:0000291 empty set

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

This species takes part in one reaction (as a reactant in re67), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s76} = 0 \tag{404}$$

10.42 Species s78

Name s78

SBO:0000291 empty set

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

This species takes part in one reaction (as a reactant in re69), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s78} = 0 \tag{405}$$

10.43 Species s82

Name s82

SBO:0000291 empty set

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

This species takes part in one reaction (as a reactant in re72), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s82} = 0 \tag{406}$$

10.44 Species s85

Name s85

SBO:0000291 empty set

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

This species takes part in one reaction (as a reactant in re75), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s85} = 0 \tag{407}$$

10.45 Species s87

Name s87

SBO:0000291 empty set

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

This species takes part in one reaction (as a reactant in re78), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s87} = 0 \tag{408}$$

10.46 Species s92

Name s92

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re28), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s92} = 0 \tag{409}$$

10.47 Species s93

Name s93

SBO:0000291 empty set

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

This species takes part in one reaction (as a reactant in re83), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s93} = 0 \tag{410}$$

10.48 Species s94

Name s94

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re29), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s94} = 0 \tag{411}$$

10.49 Species s95

Name s95

SBO:0000291 empty set

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

This species takes part in one reaction (as a reactant in re84), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s95} = 0 \tag{412}$$

10.50 Species sa1_degraded

Name sa1_degraded

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re11), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{sa1\_degraded} = 0 \tag{413}$$

10.51 Species sa28_degraded

Name sa28_degraded

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re38), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{sa28\_degraded} = 0 \tag{414}$$

10.52 Species sa31_degraded

Name sa31_degraded

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re82), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{sa31\_degraded} = 0 \tag{415}$$

10.53 Species sa35_degraded

Name sa35_degraded

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re74), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{sa35\_degraded} = 0 \tag{416}$$

10.54 Species sa3_degraded

Name sa3_degraded

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re24), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{sa3\_degraded} = 0 \tag{417}$$

10.55 Species sa52_degraded

Name sa52_degraded

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re59), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{sa52\_degraded} = 0 \tag{418}$$

10.56 Species sa53_degraded

Name sa53_degraded

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re61), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{sa53\_degraded} = 0 \tag{419}$$

10.57 Species sa61_degraded

Name sa61_degraded

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re56), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{sa61\_degraded} = 0 \tag{420}$$

10.58 Species sa75_degraded

Name sa75_degraded

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re66), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{sa75\_degraded} = 0 \tag{421}$$

10.59 Species sa78_degraded

Name sa78_degraded

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re71), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{sa78\_degraded} = 0 \tag{422}$$

10.60 Species sa86_degraded

Name sa86_degraded

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re73), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\text{d}}{\text{d}t}\text{sa86\_degraded} = 0 \tag{423}$$

10.61 Species Sc1

Name Sc1

Initial concentration $1.098 \cdot 10^{-8}\ \text{dimensionless} \cdot \text{l}^{-1}$

This species takes part in five reactions (as a reactant in re49 and as a product in re62 and as a modifier in re49, re69, re69).

$$\frac{\text{d}}{\text{d}t}\text{Sc1} = v_{37} - v_{25} \tag{424}$$

10.62 Species Sc2

Name Sc2

Initial concentration $2.171 \cdot 10^{-6}\ \text{dimensionless} \cdot \text{l}^{-1}$

This species takes part in five reactions (as a reactant in re50 and as a product in re49 and as a modifier in re50, re72, re72).

$$\frac{\text{d}}{\text{d}t}\text{Sc2} = v_{25} - v_{26} \tag{425}$$

10.63 Species AF3

Name AF3

Initial concentration $0.504\ \text{dimensionless} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in re45 and as a product in re44, re57 and as a modifier in re45, re57, re57, re65, re65).

$$\frac{\text{d}}{\text{d}t}\text{AF3} = v_{22} + v_{32} - v_{23} \tag{426}$$

10.64 Species AF4

Name AF4

Initial concentration $1.604 \cdot 10^{-5}$ dimensionless $\cdot\, l^{-1}$

This species takes part in eight reactions (as a reactant in re46 and as a product in re45, re58 and as a modifier in re46, re58, re58, re65, re65).

$$\frac{d}{dt}\mathrm{AF4} = v_{23} + v_{33} - v_{24} \tag{427}$$

10.65 Species Ago_c

Name Ago_c

Notes GnRH agonist in central compartment

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

This species takes part in six reactions (as a reactant in re90, re97 and as a product in re98, re101 and as a modifier in re90, re97).

$$\frac{d}{dt}\mathrm{Ago\_c} = v_{60} + v_{63} - v_{55} - v_{59} \tag{428}$$

10.66 Species Ago_d

Name Ago_d

Notes GnRH agonist in dosing compartment

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

Involved in event event_1

This species takes part in four reactions (as a reactant in re100 and as a modifier in re100, re101, re101).

$$\frac{d}{dt}\mathrm{Ago\_d} = -v_{62} \tag{429}$$

Furthermore, one event influences this species' rate of change.

10.67 Species s102

Name s102

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re90), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s102} = 0 \tag{430}$$

10.68 Species s106

Name s106

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re95), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s106} = 0 \tag{431}$$

10.69 Species s108

Name s108

SBO:0000291 empty set

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

This species takes part in one reaction (as a reactant in re101), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s108} = 0 \tag{432}$$

10.70 Species s107

Name s107

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re100), which does not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s107} = 0 \tag{433}$$

10.71 Species Ago_R_i

Name Ago_R-i

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

This species takes part in seven reactions (as a reactant in re94, re95, re99 and as a product in re93 and as a modifier in re94, re95, re99).

$$\frac{\text{d}}{\text{d}t}\text{Ago\_R\_i} = v_{56} - v_{57} - v_{58} - v_{61} \tag{434}$$

10.72 Species Ago_R_a

Name Ago_R-a

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

This species takes part in 22 reactions (as a reactant in re93, re98 and as a product in re94, re97 and as a modifier in re28, re28, re29, re29, re51, re51, re52, re52, re53, re53, re64, re64, re83, re83, re84, re84, re93, re98).

$$\frac{\text{d}}{\text{d}t}\text{Ago\_R\_a} = v_{57} + v_{59} - v_{56} - v_{60} \tag{435}$$

10.73 Species Ant_d

Name Ant_d

Notes GnRH antagonist in dosing compartment

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

Involved in event event_2

This species takes part in four reactions (as a reactant in re102 and as a modifier in re102, re103, re103).

$$\frac{\text{d}}{\text{d}t}\text{Ant\_d} = -v_{64} \tag{436}$$

Furthermore, one event influences this species' rate of change.

10.74 Species Ant_c

Name Ant_c

Notes GnRH antagonist in central compartment

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

This species takes part in nine reactions (as a reactant in re104, re106, re108 and as a product in re103, re105, re109 and as a modifier in re104, re106, re108).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Ant\_c} = v_{65} + v_{67} + v_{71} - v_{66} - v_{68} - v_{70} \tag{437}$$

10.75 Species Ant_p

Name Ant_p

Notes GnRH antagonist in peripheral compartment

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

This species takes part in three reactions (as a reactant in re109 and as a product in re108 and as a modifier in re109).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Ant\_p} = v_{70} - v_{71} \tag{438}$$

10.76 Species Ant_R

Name Ant_R

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

This species takes part in five reactions (as a reactant in re105, re107 and as a product in re106 and as a modifier in re105, re107).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Ant\_R} = v_{68} - v_{67} - v_{69} \tag{439}$$

10.77 Species s113

Name s113

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re102).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{s113} = v_{64} \tag{440}$$

10.78 Species s114

Name s114

SBO:0000291 empty set

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

This species takes part in one reaction (as a reactant in re103).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s114} = -v_{65} \tag{441}$$

10.79 Species s115

Name s115

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re104).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s115} = v_{66} \tag{442}$$

10.80 Species s116

Name s116

SBO:0000291 empty set

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

This species takes part in one reaction (as a product in re107).

$$\frac{\mathrm{d}}{\mathrm{d}t}\text{s116} = v_{69} \tag{443}$$

A Glossary of Systems Biology Ontology Terms

SBO:0000291 empty set: Entity defined by the absence of any actual object. An empty set is often used to represent the source of a creation process or the result of a degradation process.

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