

SBML Model Report

Model name:
“Wajima2009_BloodCoagulation_PTtest”



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 Chelliah¹ and Michael Schubert² at July fifth 2011 at 5:07 p. m. and last time modified at February eighth 2016 at 2:36 p. 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	54
events	2	constraints	0
reactions	115	function definitions	5
global parameters	56	unit definitions	2
rules	4	initial assignments	25

Model Notes

This model is from the article:

A comprehensive model for the humoral coagulation network in humans.

Wajima T, Isbister GK, Duffull SB. Clinical Pharmacology and therapeutics Volume 86, Issue 3, 10 June 2009, EPub [19516255](#),

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Abstract:

Coagulation is an important process in hemostasis and comprises a complicated interaction of multiple enzymes and proteins. We have developed a mechanistic quantitative model of the coagulation network. The model accurately describes the time courses of coagulation factors following in vivo activation as well as in vitro blood coagulation tests of prothrombin time (PT, often reported as international normalized ratio (INR)) and activated partial thromboplastin time (aPTT). The model predicts the concentration-time and time-effect profiles of warfarin, heparins, and vitamin K in humans. The model can be applied to predict the time courses of coagulation kinetics in clinical situations (e.g., hemophilia) and for biomarker identification during drug development. The model developed in this study is the first quantitative description of the comprehensive coagulation network.

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 3600 s

2.2 Unit `substance`

Name `substance`

Definition nmol

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 m²

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
compartment_1	compartment_1		3	1	litre	<input type="checkbox"/>	

3.1 Compartment `compartment_1`

This is a three dimensional compartment with a not constant size of one litre.

Name `compartment_1`

4 Species

This model contains 54 species. The boundary condition of three of these species is set to `true` so that these species' amount cannot be changed by any reaction. Section 11 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
IIa	IIa	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
VIII	VIII	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
VIIIa	VIIIa	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
APC_PS	APC_PS	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
IX	IX	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
IXa	IXa	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
XIa	XIa	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
XI	XI	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
XIIa	XIIa	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
VII	VII	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
VIIa	VIIa	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
X	X	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Xa	Xa	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
IXa_VIIIa	IXa_VIIIa	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
V	V	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Va	Va	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
II	II	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
F	F	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Fg	Fg	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
DP	DP	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input checked="" type="checkbox"/>
P	P	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

Id	Name	Compartment	Derived Unit	Constant	Boundary Condi- tion
XF	XF	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
XIII	XIII	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Pg	Pg	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
APC	APC	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Ila_Tmod	Ila_Tmod	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
PC	PC	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Tmod	Tmod	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
TF	TF	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
VIIa_TF	VIIa_TF	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
VII_TF	VII_TF	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Xa_TFPI	Xa_TFPI	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
TFPI	TFPI	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
PS	PS	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
VKH2	VKH2	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Va_Xa	Va_Xa	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
CA	CA	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
XII	XII	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
K	K	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
ATIII_Heparin	ATIII_Heparin	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Xa_ATIII_Heparin	Xa_ATIII_Heparin	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
VK	VK	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
C_warf	C_warf	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input checked="" type="checkbox"/>
VKO	VKO	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Pk	Pk	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
FDP	FDP	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
D	D	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
TAT	TAT	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

Id	Name	Compartment	Derived Unit	Constant	Boundary Condi- tion
VIIa_TF_Xa_TFPI	VIIa_TF_Xa_TFPI	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
XIIIa	XIIIa	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
IIa_ATIII_Heparin	IIa_ATIII_Heparin	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
A_warf	A_warf	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input checked="" type="checkbox"/>
IXa_ATIII_Heparin	IXa_ATIII_Heparin	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
VK_p	VK_p	compartment_1	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

5 Parameters

This model contains 56 global parameters.

Table 4: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
I_max	I_max		1.000		<input checked="" type="checkbox"/>
IC50	IC50		0.340		<input checked="" type="checkbox"/>
II0	II(0)		1394.400		<input checked="" type="checkbox"/>
VII0	VII(0)		10.000		<input checked="" type="checkbox"/>
IX0	IX(0)		89.600		<input checked="" type="checkbox"/>
X0	X(0)		174.300		<input checked="" type="checkbox"/>
PC0	PC(0)		60.000		<input checked="" type="checkbox"/>
PS0	PS(0)		300.000		<input checked="" type="checkbox"/>
VKH20	VKH2(0)		0.100		<input checked="" type="checkbox"/>
d_II	d_II	0000035	0.010		<input checked="" type="checkbox"/>
d_VII	d_VII	0000035	0.120		<input checked="" type="checkbox"/>
d_IX	d_IX	0000035	0.029		<input checked="" type="checkbox"/>
d_X	d_X	0000035	0.018		<input checked="" type="checkbox"/>
d_PC	d_PC	0000035	0.050		<input checked="" type="checkbox"/>
d_PS	d_PS	0000035	0.017		<input checked="" type="checkbox"/>
VitaminK_Vc	VitaminK_Vc		24.000		<input checked="" type="checkbox"/>
d_VK2	d_VK2		0.023		<input checked="" type="checkbox"/>
d_VKH2	d_VKH2	0000035	0.228		<input checked="" type="checkbox"/>
d_VK0	d_VK0		0.228		<input checked="" type="checkbox"/>
VK0	VK(0)		1.000		<input checked="" type="checkbox"/>
VK00	VK0(0)		0.100		<input checked="" type="checkbox"/>
VitaminK_k21_Vc	VitaminK_k21/Vc	0000038	$5.08333333333333 \cdot 10^{-4}$		<input checked="" type="checkbox"/>
VitaminK_k12	VitaminK_k12	0000035	0.059		<input checked="" type="checkbox"/>
Heparin_ke	Heparin_ke	0000035	0.693		<input checked="" type="checkbox"/>
Warfarin_ka	Warfarin_ka		1.000		<input checked="" type="checkbox"/>
Warfarin_Vd	Warfarin_Vd		10.000		<input checked="" type="checkbox"/>
Warfarin_CL	Warfarin_CL		0.200		<input checked="" type="checkbox"/>
Warfarin_ke	Warfarin_ke		0.020		<input checked="" type="checkbox"/>
Integral-Fibrin	Integral.Fibrin		0.000		<input type="checkbox"/>
d_XII	d_XII	0000035	0.012		<input checked="" type="checkbox"/>
d_VIII	d_VIII	0000035	0.058		<input checked="" type="checkbox"/>
d_XI	d_XI		0.100		<input checked="" type="checkbox"/>
d_V	d_V	0000035	0.043		<input checked="" type="checkbox"/>
d_Fg	d_Fg	0000035	0.032		<input checked="" type="checkbox"/>
d_XIII	d_XIII	0000035	0.004		<input checked="" type="checkbox"/>

Id	Name	SBO	Value	Unit	Constant
d_Pg	d_Pg	0000035	0.050		<input checked="" type="checkbox"/>
d_Tmod	d_Tmod	0000035	0.050		<input checked="" type="checkbox"/>
d_TFPI	d_TFPI	0000035	20.000		<input checked="" type="checkbox"/>
d_Pk	d_Pk	0000035	0.050		<input checked="" type="checkbox"/>
XII0	XII(0)		375.000		<input checked="" type="checkbox"/>
VIII0	VIII(0)		0.700		<input checked="" type="checkbox"/>
XI0	XI(0)		30.600		<input checked="" type="checkbox"/>
V0	V(0)		26.700		<input checked="" type="checkbox"/>
Fg0	Fg(0)		8945.500		<input checked="" type="checkbox"/>
XIII0	XIII(0)		70.300		<input checked="" type="checkbox"/>
Pg0	Pg(0)		2154.300		<input checked="" type="checkbox"/>
Tmod0	Tmod(0)		50.000		<input checked="" type="checkbox"/>
TFPI0	TFPI(0)		2.500		<input checked="" type="checkbox"/>
Pk0	Pk(0)		450.000		<input checked="" type="checkbox"/>
R1	R1		0.141		<input checked="" type="checkbox"/>
R2	R2		1.000		<input checked="" type="checkbox"/>
c44	c44	0000036	0.120		<input checked="" type="checkbox"/>
c45	c45	0000036	0.850		<input checked="" type="checkbox"/>
c46	c46	0000036	0.850		<input checked="" type="checkbox"/>
clottingTime- _s	clottingTime [s]		0.000		<input type="checkbox"/>
d_VK	d_VK	0000035	0.205		<input checked="" type="checkbox"/>

6 Initialassignments

This is an overview of 25 initialassignments.

6.1 Initialassignment VIII

Derived unit contains undeclared units

Math VIII0

6.2 Initialassignment IX

Derived unit contains undeclared units

Math IX0

6.3 Initialassignment XI

Derived unit contains undeclared units

Math XI0

6.4 Initialassignment VII

Derived unit contains undeclared units

Math VII0

6.5 Initialassignment X

Derived unit contains undeclared units

Math X0

6.6 Initialassignment V

Derived unit contains undeclared units

Math V0

6.7 Initialassignment II

Derived unit contains undeclared units

Math II0

6.8 Initialassignment Fg

Derived unit contains undeclared units

Math Fg0

6.9 Initialassignment XIII

Derived unit contains undeclared units

Math XIII0

6.10 Initialassignment Pg

Derived unit contains undeclared units

Math Pg0

6.11 Initialassignment PC

Derived unit contains undeclared units

Math PC0

6.12 Initialassignment Tmod

Derived unit contains undeclared units

Math Tmod0

6.13 Initialassignment TFPI

Derived unit contains undeclared units

Math TFPI0

6.14 Initialassignment PS

Derived unit contains undeclared units

Math PS0

6.15 Initialassignment VKH2

Derived unit contains undeclared units

Math VKH20

6.16 Initialassignment XII

Derived unit contains undeclared units

Math XII0

6.17 Initialassignment VK

Derived unit contains undeclared units

Math VK0

6.18 Initialassignment VKO

Derived unit contains undeclared units

Math VKO0

6.19 Initialassignment Pk

Derived unit contains undeclared units

Math Pk0

6.20 Initialassignment d_VKH2

Derived unit contains undeclared units

Math $\frac{d_VK2 \cdot VK0}{VKH20}$

6.21 Initialassignment d_VK0

Derived unit contains undeclared units

Math $\frac{d_VK2 \cdot VK0}{VKO0}$

6.22 Initialassignment VitaminK_k21_Vc

Derived unit contains undeclared units

Math $\frac{0.0122}{VitaminK_Vc}$

6.23 Initialassignment Warfarin_ke

Derived unit contains undeclared units

Math $\frac{Warfarin_CL}{Warfarin_Vd}$

6.24 Initialassignment c44

Derived unit contains undeclared units

Math $c45 \cdot R1$

6.25 Initialassignment c46

Derived unit contains undeclared units

Math $c45 \cdot R2$

7 Function definitions

This is an overview of five function definitions.

7.1 Function definition Irreversible_association

Name Irreversible association

Arguments s1, s2, c

Mathematical Expression

$$\frac{s1 \cdot s2}{c} \quad (1)$$

7.2 Function definition `Hyperbolic_rate_law`

Name Hyperbolic rate law

Arguments `v`, `substrate`, `enzyme`, `k`

Mathematical Expression

$$\frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (2)$$

7.3 Function definition `Factor_production`

Name Factor production

Arguments `initial`, `degradation`

Mathematical Expression

$$\text{initial} \cdot \text{degradation} \quad (3)$$

7.4 Function definition `VKH2mediated_factor_production`

Name VKH2-mediated factor production

Arguments `d_factor`, `factor_initial`, `[VKH2]`, `VKH2_initial`

Mathematical Expression

$$\frac{d_factor \cdot factor_initial \cdot [VKH2]}{VKH2_initial} \quad (4)$$

7.5 Function definition `Warfarin_inhibited_first_order_kinetics`

Name Warfarin inhibited first order kinetics

Arguments `Imax`, `Cwarf`, `IC50`, `substrate`, `degradation`

Mathematical Expression

$$\text{degradation} \cdot \text{substrate} \cdot \left(1 - \frac{\text{Imax} \cdot \text{Cwarf}}{\text{IC50} + \text{Cwarf}}\right) \quad (5)$$

8 Rules

This is an overview of four rules.

8.1 Rule DP

Rule DP is an assignment rule for species DP:

$$DP = [FDP] + [D] \quad (6)$$

Derived unit $\text{nmol} \cdot \text{l}^{-1}$

8.2 Rule C_warf

Rule C_warf is a rate rule for species C_warf:

$$\frac{d}{dt}C_{\text{warf}} = \frac{\text{Warfarin_ka} \cdot [A_{\text{warf}}]}{\text{Warfarin_Vd}} - \text{Warfarin_ke} \cdot [C_{\text{warf}}] \quad (7)$$

8.3 Rule A_warf

Rule A_warf is a rate rule for species A_warf:

$$\frac{d}{dt}A_{\text{warf}} = \text{Warfarin_ka} \cdot [A_{\text{warf}}] \quad (8)$$

Derived unit $\text{nmol} \cdot \text{l}^{-1}$

8.4 Rule Integral_Fibrin

Rule Integral_Fibrin is a rate rule for parameter Integral_Fibrin:

$$\frac{d}{dt}\text{Integral_Fibrin} = [F] \quad (9)$$

Derived unit $\text{nmol} \cdot \text{l}^{-1}$

9 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.

9.1 Event clottingTime_event

Name clottingTime event

Trigger condition

$$\text{Integral_Fibrin} \cdot 3600 > 1500 \quad (10)$$

Assignment

$$\text{clottingTime_s} = \text{time} \cdot 3600 \quad (11)$$

9.2 Event `dilution_event`

Name `dilution event`

Trigger condition $\text{time} > 0$ (12)

Assignment $\text{vol}(\text{compartment_1}) = \text{vol}(\text{compartment_1}) \cdot 3$ (13)

10 Reactions

This model contains 115 reactions. All reactions are listed in the following table and are subsequently described in detail. If a reaction is affected by a modifier, the identifier of this species is written above the reaction arrow.

Table 5: Overview of all reactions

Nº	Id	Name	Reaction Equation	SBO
1	r1_	r1	$\text{VIII} \xrightarrow{\text{IIa}} \text{VIIIa}$	
2	r2_	r2	$\text{VIIIa} \xrightarrow{\text{APC_PS}} \emptyset$	
3	r3_	r3	$\text{IX} \xrightarrow{\text{XIa}} \text{IXa}$	
4	r4_	r4	$\text{XI} \xrightarrow{\text{XIIa}} \text{XIa}$	
5	r5_	r5	$\text{XI} \xrightarrow{\text{IIa}} \text{XIa}$	
6	r6_	r6	$\text{VII} \xrightarrow{\text{IIa}} \text{VIIa}$	
7	r7_	r7	$\text{X} \xrightarrow{\text{IXa}} \text{Xa}$	
8	r8_	r8	$\text{X} \xrightarrow{\text{IXa_VIIIa}} \text{Xa}$	
9	r9_	r9	$\text{X} \xrightarrow{\text{VIIa}} \text{Xa}$	
10	r10	r10	$\text{V} \xrightarrow{\text{IIa}} \text{Va}$	
11	r11	r11	$\text{Va} \xrightarrow{\text{APC_PS}} \emptyset$	
12	r12	r12	$\text{II} \xrightarrow{\text{Va_Xa}} \text{IIa}$	
13	r13	r13	$\text{II} \xrightarrow{\text{Xa}} \text{IIa}$	
14	r14	r14	$\text{Fg} \xrightarrow{\text{IIa}} \text{F}$	
15	r15	r15	$\text{Fg} \xrightarrow{\text{P}} \text{FDP}$	
16	r16	r16	$\text{F} \xrightarrow{\text{XIIIa}} \text{XF}$	

Nº	Id	Name	Reaction Equation	SBO
17	r17	r17	$F \xrightarrow{P} FDP$	
18	r18	r18	$XF \xrightarrow{P} D$	
19	r19	r19	$XF \xrightarrow{APC_PS} D$	
20	r20	r20	$XIII \xrightarrow{IIa} XIIIa$	
21	r21	r21	$Pg \xrightarrow{IIa} P$	
22	r22	r22	$Pg \xrightarrow{F} P$	
23	r23	r23	$Pg \xrightarrow{APC_PS} P$	
24	r24	r24	$PC \xrightarrow{IIa_Tmod} APC$	
25	r25	r25	$Va_Xa \xrightarrow{APC_PS} \emptyset$	
26	r26	r26	$IXa + VIIIa \longrightarrow IXa_VIIIa$	
27	r27	r27	$Va + Xa \longrightarrow Va_Xa$	
28	r28	r28	$IIa + Tmod \longrightarrow IIa_Tmod$	
29	r29	r29	$VIIa + TF \longrightarrow VIIa_TF$	
30	r30	r30	$VII + TF \longrightarrow VII_TF$	
31	r31	r31	$VIIa_TF + Xa_TFPI \longrightarrow VIIa_TF_Xa_TFPI$	
32	r32	r32	$Xa + TFPI \longrightarrow Xa_TFPI$	
33	r33	r33	$VII_TF \xrightarrow{Xa} VIIa_TF$	
34	r34	r34	$X \xrightarrow{VIIa_TF} Xa$	
35	r35	r35	$IX \xrightarrow{VIIa_TF} IXa$	
36	r36	r36	$VII_TF \xrightarrow{TF} VIIa_TF$	
37	r37	r37	$APC + PS \longrightarrow APC_PS$	
38	r38	r38	$VII \xrightarrow{Xa} VIIa$	
39	r39	r39	$VII \xrightarrow{VIIa_TF} VIIa$	

Nº	Id	Name	Reaction Equation	SBO
40	r40	r40	$\text{VII} \xrightarrow{\text{IXa}} \text{VIIa}$	
41	r41	r41	$\text{XII} \xrightarrow{\text{CA}} \text{XIIa}$	
42	r42	r42	$\text{XII} \xrightarrow{\text{K}} \text{XIIa}$	
43	r43	r43	$\text{Pk} \xrightarrow{\text{XIIa}} \text{K}$	
44	r44	r44	$\text{IIa} + \text{ATIII_Heparin} \longrightarrow \text{IIa_ATIII_Heparin}$	
45	r45	r45	$\text{Xa} + \text{ATIII_Heparin} \longrightarrow \text{Xa_ATIII_Heparin}$	
46	r46	r46	$\text{IXa} + \text{ATIII_Heparin} \longrightarrow \text{IXa_ATIII_Heparin}$	
47	r47	r47	$\text{VK} \xrightarrow{\text{C_warf}} \text{VKH2}$	
48	r48	r48	$\text{VKO} \xrightarrow{\text{C_warf}} \text{VK}$	
49	pII_VKH2	pII_VKH2	$\emptyset \xrightarrow{\text{VKH2}} \text{II}$	
50	pVII_VKH2	pVII_VKH2	$\emptyset \xrightarrow{\text{VKH2}} \text{VII}$	
51	pIX_VKH2	pIX_VKH2	$\emptyset \xrightarrow{\text{VKH2}} \text{IX}$	
52	pX_VKH2	pX_VKH2	$\emptyset \xrightarrow{\text{VKH2}} \text{X}$	
53	pPC_VKH2	pPC_VKH2	$\emptyset \xrightarrow{\text{VKH2}} \text{PC}$	
54	pPS_VKH2	pPS_VKH2	$\emptyset \xrightarrow{\text{VKH2}} \text{PS}$	
55	dFg	dFg	$\text{Fg} \longrightarrow \text{FDP}$	
56	dF	dF	$\text{F} \longrightarrow \text{FDP}$	
57	dXF	dXF	$\text{XF} \longrightarrow \text{D}$	
58	dII	dII	$\text{II} \longrightarrow \emptyset$	
59	dIIa	dIIa	$\text{IIa} \longrightarrow \text{TAT}$	
60	dTF	dTF	$\text{TF} \longrightarrow \emptyset$	
61	dV	dV	$\text{V} \longrightarrow \emptyset$	
62	dVa	dVa	$\text{Va} \longrightarrow \emptyset$	
63	dVII	dVII	$\text{VII} \longrightarrow \emptyset$	

Nº	Id	Name	Reaction Equation	SBO
64	dVIIa	dVIIa	$\text{VIIa} \longrightarrow \emptyset$	
65	dVIII	dVIII	$\text{VIII} \longrightarrow \emptyset$	
66	dVIIIa	dVIIIa	$\text{VIIIa} \longrightarrow \emptyset$	
67	dX	dX	$\text{X} \longrightarrow \emptyset$	
68	dXa	dXa	$\text{Xa} \longrightarrow \emptyset$	
69	dIX	dIX	$\text{IX} \longrightarrow \emptyset$	
70	dIXa	dIXa	$\text{IXa} \longrightarrow \emptyset$	
71	dXII	dXII	$\text{XII} \longrightarrow \emptyset$	
72	dXIIa	dXIIa	$\text{XIIa} \longrightarrow \emptyset$	
73	dXIII	dXIII	$\text{XIII} \longrightarrow \emptyset$	
74	dXIIIa	dXIIIa	$\text{XIIIa} \longrightarrow \emptyset$	
75	dPk	dPk	$\text{Pk} \longrightarrow \emptyset$	
76	dK	dK	$\text{K} \longrightarrow \emptyset$	
77	dPg	dPg	$\text{Pg} \longrightarrow \emptyset$	
78	dP	dP	$\text{P} \longrightarrow \emptyset$	
79	dPC	dPC	$\text{PC} \longrightarrow \emptyset$	
80	dAPC	dAPC	$\text{APC} \longrightarrow \emptyset$	
81	dPS	dPS	$\text{PS} \longrightarrow \emptyset$	
82	dFDP	dFDP	$\text{FDP} \longrightarrow \emptyset$	
83	dD	dD	$\text{D} \longrightarrow \emptyset$	
84	dTFPI	dTFPI	$\text{TFPI} \longrightarrow \emptyset$	
85	dVIIa_TF	dVIIa_TF	$\text{VIIa_TF} \longrightarrow \emptyset$	
86	dVII_TF	dVII_TF	$\text{VII_TF} \longrightarrow \emptyset$	
87	dAPC_PS	dAPC_PS	$\text{APC_PS} \longrightarrow \emptyset$	
88	dVa_Xa	dVa_Xa	$\text{Va_Xa} \longrightarrow \emptyset$	
89	dIXa_VIIIa	dIXa_VIIIa	$\text{IXa_VIIIa} \longrightarrow \emptyset$	
90	dTmod	dTmod	$\text{Tmod} \longrightarrow \emptyset$	
91	dIIa_Tmod	dIIa_Tmod	$\text{IIa_Tmod} \longrightarrow \emptyset$	
92	dXa_TFPI	dXa_TFPI	$\text{Xa_TFPI} \longrightarrow \emptyset$	

Nº	Id	Name	Reaction Equation	SBO
93	dVIIa_TF_Xa- _TFPI	dVIIa_TF_Xa_TFPI	VIIa_TF_Xa_TFPI $\longrightarrow \emptyset$	
94	dTAT	dTAT	TAT $\longrightarrow \emptyset$	
95	dCA	dCA	CA $\longrightarrow \emptyset$	
96	dXIa	dXIa	XIa $\longrightarrow \emptyset$	
97	dVKH2	dVKH2	VKH2 \longrightarrow VKO	
98	VK_transport	VK_transport	VK \rightleftharpoons VK_p	
99	eHeparin	eHeparin	ATIII_Heparin $\longrightarrow \emptyset$	
100	eHeparinXa	eHeparinXa	Xa_ATIII_Heparin $\longrightarrow \emptyset$	
101	eHeparinIXa	eHeparinIXa	IXa_ATIII_Heparin $\longrightarrow \emptyset$	
102	eHeparinIIa	eHeparinIIa	IIa_ATIII_Heparin $\longrightarrow \emptyset$	
103	dXI	dXI	XI $\longrightarrow \emptyset$	
104	pXII	pXII	$\emptyset \longrightarrow$ XII	
105	pVIII	pVIII	$\emptyset \longrightarrow$ VIII	
106	pXI	pXI	$\emptyset \longrightarrow$ XI	
107	pV	pV	$\emptyset \longrightarrow$ V	
108	pFg	pFg	$\emptyset \longrightarrow$ Fg	
109	pXIII	pXIII	$\emptyset \longrightarrow$ XIII	
110	pPg	pPg	$\emptyset \longrightarrow$ Pg	
111	pTmod	pTmod	$\emptyset \longrightarrow$ Tmod	
112	pTFPI	pTFPI	$\emptyset \longrightarrow$ TFPI	
113	pPk	pPk	$\emptyset \longrightarrow$ Pk	
114	pVK	pVK	$\emptyset \longrightarrow$ VK	
115	dVK	dVK	VK $\longrightarrow \emptyset$	

10.1 Reaction r1_

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

Name r1

Reaction equation



Reactant

Table 6: Properties of each reactant.

Id	Name	SBO
VIII	VIII	0000010

Modifier

Table 7: Properties of each modifier.

Id	Name	SBO
IIa	IIa	0000461

Product

Table 8: Properties of each product.

Id	Name	SBO
VIIIa	VIIIa	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_1 = \text{vol}(\text{compartment}_1) \cdot \text{Hyperbolic_rate_law}(v, [\text{VIII}], [\text{IIa}], k) \quad (15)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (16)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (17)$$

Table 9: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	50000.000		<input checked="" type="checkbox"/>
k	k	0000371	10^{-6}		<input checked="" type="checkbox"/>

10.2 Reaction r2_

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

Name r2

Reaction equation



Reactant

Table 10: Properties of each reactant.

Id	Name	SBO
VIIIa	VIIIa	0000010

Modifier

Table 11: Properties of each modifier.

Id	Name	SBO
APC_PS	APC_PS	0000461

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_2 = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{VIIIa}], [\text{APC_PS}], k) \quad (19)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (20)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (21)$$

Table 12: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	50.0		<input checked="" type="checkbox"/>
k	k	0000371	1.0		<input checked="" type="checkbox"/>

10.3 Reaction r3_

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

Name r3

Reaction equation



Reactant

Table 13: Properties of each reactant.

Id	Name	SBO
IX	IX	0000010

Modifier

Table 14: Properties of each modifier.

Id	Name	SBO
XIa	XIa	0000461

Product

Table 15: Properties of each product.

Id	Name	SBO
IXa	IXa	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_3 = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{IX}], [\text{XIa}], k) \quad (23)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (24)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (25)$$

Table 16: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		<input checked="" type="checkbox"/>
k	k	0000371	10.0		<input checked="" type="checkbox"/>

10.4 Reaction r4_

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

Name r4

Reaction equation



Reactant

Table 17: Properties of each reactant.

Id	Name	SBO
XI	XI	0000010

Modifier

Table 18: Properties of each modifier.

Id	Name	SBO
XIIa	XIIa	0000461

Product

Table 19: Properties of each product.

Id	Name	SBO
XIa	XIa	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_4 = \text{vol}(\text{compartment}_1) \cdot \text{Hyperbolic_rate_law}(v, [\text{XI}], [\text{XIIa}], k) \quad (27)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (28)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (29)$$

Table 20: Properties of each parameter.

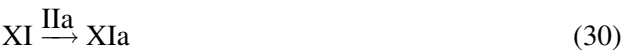
Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		<input checked="" type="checkbox"/>
k	k	0000371	1.0		<input checked="" type="checkbox"/>

10.5 Reaction r5_

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

Name r5

Reaction equation



Reactant

Table 21: Properties of each reactant.

Id	Name	SBO
XI	XI	0000010

Modifier

Table 22: Properties of each modifier.

Id	Name	SBO
IIa	IIa	0000461

Product

Table 23: Properties of each product.

Id	Name	SBO
XIa	XIa	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_5 = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{XI}], [\text{IIa}], k)$$

(31)

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}}$$

(32)

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (33)$$

Table 24: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	10.0		<input checked="" type="checkbox"/>
k	k	0000371	10.0		<input checked="" type="checkbox"/>

10.6 Reaction r6_

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

Name r6

Reaction equation



Reactant

Table 25: Properties of each reactant.

Id	Name	SBO
VII	VII	0000010

Modifier

Table 26: Properties of each modifier.

Id	Name	SBO
IIa	IIa	0000461

Product

Table 27: Properties of each product.

Id	Name	SBO
VIIa	VIIa	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_6 = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{VII}], [\text{IIa}], k) \quad (35)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (36)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (37)$$

Table 28: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	0.1		<input checked="" type="checkbox"/>
k	k	0000371	10.0		<input checked="" type="checkbox"/>

10.7 Reaction r7_

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

Name r7

Reaction equation



Reactant

Table 29: Properties of each reactant.

Id	Name	SBO
X	X	0000010

Modifier

Table 30: Properties of each modifier.

Id	Name	SBO
IXa	IXa	0000461

Product

Table 31: Properties of each product.

Id	Name	SBO
Xa	Xa	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_7 = \text{vol}(\text{compartment}_1) \cdot \text{Hyperbolic_rate_law}(v, [X], [IXa], k) \quad (39)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (40)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (41)$$

Table 32: Properties of each parameter.

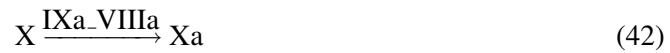
Id	Name	SBO	Value	Unit	Constant
v	v	0000025	0.02		✓
k	k	0000371	10.00		✓

10.8 Reaction r8_

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

Name r8

Reaction equation



Reactant

Table 33: Properties of each reactant.

Id	Name	SBO
X	X	0000010

Modifier

Table 34: Properties of each modifier.

Id	Name	SBO
IXa_VIIIa	IXa_VIIIa	0000461

Product

Table 35: Properties of each product.

Id	Name	SBO
Xa	Xa	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_8 = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [X], [\text{IXa_VIIIa}], k) \quad (43)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (44)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (45)$$

Table 36: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	2.0		<input checked="" type="checkbox"/>
k	k	0000371	0.1		<input checked="" type="checkbox"/>

10.9 Reaction r9_

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

Name r9

Reaction equation



Reactant

Table 37: Properties of each reactant.

Id	Name	SBO
x	X	0000010

Modifier

Table 38: Properties of each modifier.

Id	Name	SBO
VIIa	VIIa	0000461

Product

Table 39: Properties of each product.

Id	Name	SBO
x _a	X _a	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_9 = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [X], [\text{VIIa}], k) \quad (47)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (48)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (49)$$

Table 40: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	10^{-9}		<input checked="" type="checkbox"/>
k	k	0000371	10.000		<input checked="" type="checkbox"/>

10.10 Reaction r10

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

Name r10

Reaction equation



Reactant

Table 41: Properties of each reactant.

Id	Name	SBO
v	V	0000010

Modifier

Table 42: Properties of each modifier.

Id	Name	SBO
IIa	IIa	0000461

Product

Table 43: Properties of each product.

Id	Name	SBO
Va	Va	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{10} = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [V], [\text{IIa}], k) \quad (51)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (52)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (53)$$

Table 44: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	50000.0		<input checked="" type="checkbox"/>
k	k	0000371	10.0		<input checked="" type="checkbox"/>

10.11 Reaction r11

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

Name r11

Reaction equation



Reactant

Table 45: Properties of each reactant.

Id	Name	SBO
Va	Va	0000010

Modifier

Table 46: Properties of each modifier.

Id	Name	SBO
APC_PS	APC_PS	0000461

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{11} = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{Va}], [\text{APC_PS}], k) \quad (55)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (56)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (57)$$

Table 47: Properties of each parameter.

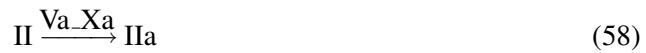
Id	Name	SBO	Value	Unit	Constant
v	v	0000025	50.0		☑
k	k	0000371	1.0		☑

10.12 Reaction r12

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

Name r12

Reaction equation



Reactant

Table 48: Properties of each reactant.

Id	Name	SBO
II	II	0000010

Modifier

Table 49: Properties of each modifier.

Id	Name	SBO
Va_Xa	Va_Xa	0000461

Product

Table 50: Properties of each product.

Id	Name	SBO
IIa	IIa	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{12} = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{II}], [\text{Va_Xa}], k) \quad (59)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (60)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (61)$$

Table 51: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	100.0		<input checked="" type="checkbox"/>
k	k	0000371	10.0		<input checked="" type="checkbox"/>

10.13 Reaction r13

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

Name r13

Reaction equation



Reactant

Table 52: Properties of each reactant.

Id	Name	SBO
II	II	0000010

Modifier

Table 53: Properties of each modifier.

Id	Name	SBO
Xa	Xa	0000461

Product

Table 54: Properties of each product.

Id	Name	SBO
IIa	IIa	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{13} = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{II}], [\text{Xa}], k) \quad (63)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (64)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (65)$$

Table 55: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	9.0		<input checked="" type="checkbox"/>
k	k	0000371	500.0		<input checked="" type="checkbox"/>

10.14 Reaction r14

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

Name r14

Reaction equation



Reactant

Table 56: Properties of each reactant.

Id	Name	SBO
Fg	Fg	0000010

Modifier

Table 57: Properties of each modifier.

Id	Name	SBO
IIa	IIa	0000461

Product

Table 58: Properties of each product.

Id	Name	SBO
F	F	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{14} = \text{vol}(\text{compartment}_1) \cdot \text{Hyperbolic_rate_law}(v, [\text{Fg}], [\text{IIa}], k) \quad (67)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (68)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (69)$$

Table 59: Properties of each parameter.

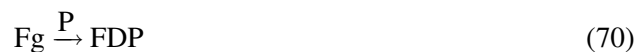
Id	Name	SBO	Value	Unit	Constant
v	v	0000025	20000.0		<input checked="" type="checkbox"/>
k	k	0000371	0.5		<input checked="" type="checkbox"/>

10.15 Reaction r15

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

Name r15

Reaction equation



Reactant

Table 60: Properties of each reactant.

Id	Name	SBO
Fg	Fg	0000010

Modifier

Table 61: Properties of each modifier.

Id	Name	SBO
P	P	0000461

Product

Table 62: Properties of each product.

Id	Name	SBO
FDP	FDP	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{15} = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{Fg}], [\text{P}], k) \quad (71)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (72)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (73)$$

Table 63: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	500.0		<input checked="" type="checkbox"/>
k	k	0000371	500.0		<input checked="" type="checkbox"/>

10.16 Reaction r16

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

Name r16

Reaction equation



Reactant

Table 64: Properties of each reactant.

Id	Name	SBO
F	F	0000010

Modifier

Table 65: Properties of each modifier.

Id	Name	SBO
XIIIa	XIIIa	0000461

Product

Table 66: Properties of each product.

Id	Name	SBO
XF	XF	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{16} = \text{vol}(\text{compartment}_1) \cdot \text{Hyperbolic_rate_law}(v, [F], [\text{XIIIa}], k) \quad (75)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (76)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (77)$$

Table 67: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		<input checked="" type="checkbox"/>
k	k	0000371	10.0		<input checked="" type="checkbox"/>

10.17 Reaction r17

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

Name r17

Reaction equation



Reactant

Table 68: Properties of each reactant.

Id	Name	SBO
F	F	0000010

Modifier

Table 69: Properties of each modifier.

Id	Name	SBO
P	P	0000461

Product

Table 70: Properties of each product.

Id	Name	SBO
FDP	FDP	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{17} = \text{vol}(\text{compartment}_1) \cdot \text{Hyperbolic_rate_law}(v, [F], [P], k) \quad (79)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (80)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (81)$$

Table 71: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		<input checked="" type="checkbox"/>
k	k	0000371	10.0		<input checked="" type="checkbox"/>

10.18 Reaction r18

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

Name r18

Reaction equation



Reactant

Table 72: Properties of each reactant.

Id	Name	SBO
XF	XF	0000010

Modifier

Table 73: Properties of each modifier.

Id	Name	SBO
P	P	0000461

Product

Table 74: Properties of each product.

Id	Name	SBO
D	D	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{18} = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{XF}], [\text{P}], k) \quad (83)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (84)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (85)$$

Table 75: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		✓
k	k	0000371	100.0		✓

10.19 Reaction r19

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

Name r19

Reaction equation



Reactant

Table 76: Properties of each reactant.

Id	Name	SBO
XF	XF	0000010

Modifier

Table 77: Properties of each modifier.

Id	Name	SBO
APC_PS	APC_PS	0000461

Product

Table 78: Properties of each product.

Id	Name	SBO
D	D	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{19} = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{XF}], [\text{APC_PS}], k) \quad (87)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (88)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (89)$$

Table 79: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	1.0		<input checked="" type="checkbox"/>
k	k	0000371	1.0		<input checked="" type="checkbox"/>

10.20 Reaction r20

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

Name r20

Reaction equation



Reactant

Table 80: Properties of each reactant.

Id	Name	SBO
XIII	XIII	0000010

Modifier

Table 81: Properties of each modifier.

Id	Name	SBO
IIa	IIa	0000461

Product

Table 82: Properties of each product.

Id	Name	SBO
XIIIa	XIIIa	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{20} = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{XIII}], [\text{IIa}], k) \quad (91)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (92)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (93)$$

Table 83: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		<input checked="" type="checkbox"/>
k	k	0000371	1.0		<input checked="" type="checkbox"/>

10.21 Reaction r21

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

Name r21

Reaction equation



Reactant

Table 84: Properties of each reactant.

Id	Name	SBO
Pg	Pg	0000010

Modifier

Table 85: Properties of each modifier.

Id	Name	SBO
IIa	IIa	0000461

Product

Table 86: Properties of each product.

Id	Name	SBO
P	P	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{21} = \text{vol}(\text{compartment}_1) \cdot \text{Hyperbolic_rate_law}(v, [\text{Pg}], [\text{IIa}], k) \quad (95)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (96)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (97)$$

Table 87: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		<input checked="" type="checkbox"/>
k	k	0000371	5000.0		<input checked="" type="checkbox"/>

10.22 Reaction r22

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

Name r22

Reaction equation



Reactant

Table 88: Properties of each reactant.

Id	Name	SBO
Pg	Pg	0000010

Modifier

Table 89: Properties of each modifier.

Id	Name	SBO
F	F	0000461

Product

Table 90: Properties of each product.

Id	Name	SBO
P	P	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{22} = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{Pg}], [\text{F}], k) \quad (99)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (100)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (101)$$

Table 91: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	5.0		<input checked="" type="checkbox"/>
k	k	0000371	10000.0		<input checked="" type="checkbox"/>

10.23 Reaction r23

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

Name r23

Reaction equation



Reactant

Table 92: Properties of each reactant.

Id	Name	SBO
Pg	Pg	0000010

Modifier

Table 93: Properties of each modifier.

Id	Name	SBO
APC_PS	APC_PS	0000461

Product

Table 94: Properties of each product.

Id	Name	SBO
P	P	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{23} = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{Pg}], [\text{APC_PS}], k) \quad (103)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (104)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (105)$$

Table 95: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	2.0		<input checked="" type="checkbox"/>
k	k	0000371	1.0		<input checked="" type="checkbox"/>

10.24 Reaction r24

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

Name r24

Reaction equation



Reactant

Table 96: Properties of each reactant.

Id	Name	SBO
PC	PC	0000010

Modifier

Table 97: Properties of each modifier.

Id	Name	SBO
IIa_Tmod	IIa_Tmod	0000461

Product

Table 98: Properties of each product.

Id	Name	SBO
APC	APC	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{24} = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{PC}], [\text{IIa_Tmod}], k) \quad (107)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (108)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (109)$$

Table 99: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		<input checked="" type="checkbox"/>
k	k	0000371	1.0		<input checked="" type="checkbox"/>

10.25 Reaction r25

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

Name r25

Reaction equation



Reactant

Table 100: Properties of each reactant.

Id	Name	SBO
Va_Xa	Va_Xa	0000010

Modifier

Table 101: Properties of each modifier.

Id	Name	SBO
APC_PS	APC_PS	0000461

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{25} = \text{vol}(\text{compartment}_1) \cdot \text{Hyperbolic_rate_law}(v, [\text{Va_Xa}], [\text{APC_PS}], k) \quad (111)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (112)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (113)$$

Table 102: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	2.0		<input checked="" type="checkbox"/>
k	k	0000371	1.0		<input checked="" type="checkbox"/>

10.26 Reaction r26

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

Name r26

Reaction equation



Reactants

Table 103: Properties of each reactant.

Id	Name	SBO
IXa	IXa	0000010

Id	Name	SBO
VIIIa	VIIIa	0000010

Product

Table 104: Properties of each product.

Id	Name	SBO
IXa_VIIIa	IXa_VIIIa	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{26} = \text{vol}(\text{compartment_1}) \cdot \text{Irreversible_association}([\text{IXa}], [\text{VIIIa}], c) \quad (115)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (116)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (117)$$

Table 105: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
c	c	0000036	0.01		<input checked="" type="checkbox"/>

10.27 Reaction r27

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

Name r27

Reaction equation



Reactants

Table 106: Properties of each reactant.

Id	Name	SBO
Va	Va	0000010
Xa	Xa	0000010

Product

Table 107: Properties of each product.

Id	Name	SBO
Va_Xa	Va_Xa	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{27} = \text{vol}(\text{compartment}_1) \cdot \text{Irreversible_association}([Va], [Xa], c) \quad (119)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (120)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (121)$$

Table 108: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
c	c	0000036	0.5		<input checked="" type="checkbox"/>

10.28 Reaction r28

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

Name r28

Reaction equation



Reactants

Table 109: Properties of each reactant.

Id	Name	SBO
IIa	IIa	0000010
Tmod	Tmod	0000010

Product

Table 110: Properties of each product.

Id	Name	SBO
IIa_Tmod	IIa_Tmod	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{28} = \text{vol}(\text{compartment}_1) \cdot \text{Irreversible_association}([\text{IIa}], [\text{Tmod}], c) \quad (123)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (124)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (125)$$

Table 111: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
c	c	0000036	0.5		<input checked="" type="checkbox"/>

10.29 Reaction r29

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

Name r29

Reaction equation



Reactants

Table 112: Properties of each reactant.

Id	Name	SBO
VIIa	VIIa	0000010
TF	TF	0000010

Product

Table 113: Properties of each product.

Id	Name	SBO
VIIa_TF	VIIa_TF	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{29} = \text{vol}(\text{compartment_1}) \cdot \text{Irreversible_association}([\text{VIIa}], [\text{TF}], c) \quad (127)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (128)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (129)$$

Table 114: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
c	c	0000036	0.5		<input checked="" type="checkbox"/>

10.30 Reaction r30

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

Name r30

Reaction equation



Reactants

Table 115: Properties of each reactant.

Id	Name	SBO
VII	VII	0000010
TF	TF	0000010

Product

Table 116: Properties of each product.

Id	Name	SBO
VII_TF	VII_TF	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{30} = \text{vol}(\text{compartment_1}) \cdot \text{Irreversible_association}([\text{VII}], [\text{TF}], c) \quad (131)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (132)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (133)$$

Table 117: Properties of each parameter.

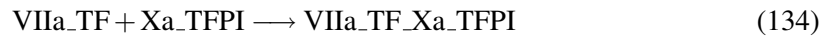
Id	Name	SBO	Value	Unit	Constant
c	c	0000036	0.1		<input checked="" type="checkbox"/>

10.31 Reaction r31

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

Name r31

Reaction equation



Reactants

Table 118: Properties of each reactant.

Id	Name	SBO
VIIa_TF	VIIa_TF	0000010
Xa_TFPI	Xa_TFPI	0000010

Product

Table 119: Properties of each product.

Id	Name	SBO
VIIa_TF_Xa_TFPI	VIIa_TF_Xa_TFPI	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{31} = \text{vol}(\text{compartment_1}) \cdot \text{Irreversible_association}([\text{VIIa_TF}], [\text{Xa_TFPI}], c) \quad (135)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (136)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (137)$$

Table 120: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
c	c	0000036	0.5		<input checked="" type="checkbox"/>

10.32 Reaction r32

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

Name r32

Reaction equation



Reactants

Table 121: Properties of each reactant.

Id	Name	SBO
Xa	Xa	0000010
TFPI	TFPI	0000010

Product

Table 122: Properties of each product.

Id	Name	SBO
Xa_TFPI	Xa_TFPI	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{32} = \text{vol}(\text{compartment_1}) \cdot \text{Irreversible_association}([Xa], [TFPI], c) \quad (139)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (140)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (141)$$

Table 123: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
c	c	0000036	0.5		<input checked="" type="checkbox"/>

10.33 Reaction r33

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

Name r33

Reaction equation



Reactant

Table 124: Properties of each reactant.

Id	Name	SBO
VII_TF	VII_TF	0000010

Modifier

Table 125: Properties of each modifier.

Id	Name	SBO
Xa	Xa	0000461

Product

Table 126: Properties of each product.

Id	Name	SBO
VIIa_TF	VIIa_TF	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{33} = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{VII_TF}], [\text{Xa}], k) \quad (143)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (144)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (145)$$

Table 127: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	70.0		<input checked="" type="checkbox"/>
k	k	0000371	1.0		<input checked="" type="checkbox"/>

10.34 Reaction r34

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

Name r34

Reaction equation



Reactant

Table 128: Properties of each reactant.

Id	Name	SBO
x	X	0000010

Modifier

Table 129: Properties of each modifier.

Id	Name	SBO
VIIa_TF	VIIa_TF	0000461

Product

Table 130: Properties of each product.

Id	Name	SBO
Xa	Xa	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{34} = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [X], [\text{VIIa_TF}], k) \quad (147)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (148)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (149)$$

Table 131: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	900.0		<input checked="" type="checkbox"/>
k	k	0000371	200.0		<input checked="" type="checkbox"/>

10.35 Reaction r35

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

Name r35

Reaction equation



Reactant

Table 132: Properties of each reactant.

Id	Name	SBO
IX	IX	0000010

Modifier

Table 133: Properties of each modifier.

Id	Name	SBO
VIIa_TF	VIIa_TF	0000461

Product

Table 134: Properties of each product.

Id	Name	SBO
IXa	IXa	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{35} = \text{vol}(\text{compartment}_1) \cdot \text{Hyperbolic_rate_law}(v, [\text{IX}], [\text{VIIa_TF}], k) \quad (151)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (152)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (153)$$

Table 135: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	70.0		<input checked="" type="checkbox"/>
k	k	0000371	1.0		<input checked="" type="checkbox"/>

10.36 Reaction r36

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

Name r36

Reaction equation



Reactant

Table 136: Properties of each reactant.

Id	Name	SBO
VII_TF	VII_TF	0000010

Modifier

Table 137: Properties of each modifier.

Id	Name	SBO
TF	TF	0000461

Product

Table 138: Properties of each product.

Id	Name	SBO
VIIa_TF	VIIa_TF	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{36} = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{VII_TF}], [\text{TF}], k) \quad (155)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (156)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (157)$$

Table 139: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	1000.0		<input checked="" type="checkbox"/>
k	k	0000371	1.0		<input checked="" type="checkbox"/>

10.37 Reaction r37

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

Name r37

Reaction equation



Reactants

Table 140: Properties of each reactant.

Id	Name	SBO
APC	APC	0000010
PS	PS	0000010

Product

Table 141: Properties of each product.

Id	Name	SBO
APC_PS	APC_PS	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{37} = \text{vol}(\text{compartment_1}) \cdot \text{Irreversible_association}([\text{APC}], [\text{PS}], c) \quad (159)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (160)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (161)$$

Table 142: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
c	c	0000036	0.5		<input checked="" type="checkbox"/>

10.38 Reaction r38

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

Name r38

Reaction equation



Reactant

Table 143: Properties of each reactant.

Id	Name	SBO
VII	VII	0000010

Modifier

Table 144: Properties of each modifier.

Id	Name	SBO
Xa	Xa	0000461

Product

Table 145: Properties of each product.

Id	Name	SBO
VIIa	VIIa	0000011

Id	Name	SBO
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Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{38} = \text{vol}(\text{compartment}_1) \cdot \text{Hyperbolic_rate_law}(v, [\text{VII}], [\text{Xa}], k) \quad (163)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (164)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (165)$$

Table 146: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	1.0		<input checked="" type="checkbox"/>
k	k	0000371	10.0		<input checked="" type="checkbox"/>

10.39 Reaction r39

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

Name r39

Reaction equation



Reactant

Table 147: Properties of each reactant.

Id	Name	SBO
VII	VII	0000010

Modifier

Table 148: Properties of each modifier.

Id	Name	SBO
VIIa_TF	VIIa_TF	0000461

Product

Table 149: Properties of each product.

Id	Name	SBO
VIIa	VIIa	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{39} = \text{vol}(\text{compartment}_1) \cdot \text{Hyperbolic_rate_law}(v, [\text{VII}], [\text{VIIa_TF}], k) \quad (167)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (168)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (169)$$

Table 150: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	1.0		✓
k	k	0000371	10.0		✓

10.40 Reaction r40

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

Name r40

Reaction equation



Reactant

Table 151: Properties of each reactant.

Id	Name	SBO
VII	VII	0000010

Modifier

Table 152: Properties of each modifier.

Id	Name	SBO
IXa	IXa	0000461

Product

Table 153: Properties of each product.

Id	Name	SBO
VIIa	VIIa	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{40} = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{VII}], [\text{IXa}], k) \quad (171)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (172)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (173)$$

Table 154: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	0.2		<input checked="" type="checkbox"/>
k	k	0000371	10.0		<input checked="" type="checkbox"/>

10.41 Reaction r41

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

Name r41

Reaction equation



Reactant

Table 155: Properties of each reactant.

Id	Name	SBO
XII	XII	0000010

Modifier

Table 156: Properties of each modifier.

Id	Name	SBO
CA	CA	0000461

Product

Table 157: Properties of each product.

Id	Name	SBO
XIIa	XIIa	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{41} = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{XII}], [\text{CA}], k) \quad (175)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (176)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (177)$$

Table 158: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		<input checked="" type="checkbox"/>
k	k	0000371	1.0		<input checked="" type="checkbox"/>

10.42 Reaction r42

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

Name r42

Reaction equation



Reactant

Table 159: Properties of each reactant.

Id	Name	SBO
XII	XII	0000010

Modifier

Table 160: Properties of each modifier.

Id	Name	SBO
K	K	0000461

Product

Table 161: Properties of each product.

Id	Name	SBO
XIIa	XIIa	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{42} = \text{vol}(\text{compartment}_1) \cdot \text{Hyperbolic_rate_law}(v, [\text{XII}], [\text{K}], k) \quad (179)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (180)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (181)$$

Table 162: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	70.0		<input checked="" type="checkbox"/>
k	k	0000371	1.0		<input checked="" type="checkbox"/>

10.43 Reaction r43

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

Name r43

Reaction equation



Reactant

Table 163: Properties of each reactant.

Id	Name	SBO
Pk	Pk	0000010

Modifier

Table 164: Properties of each modifier.

Id	Name	SBO
XIIa	XIIa	0000461

Product

Table 165: Properties of each product.

Id	Name	SBO
K	K	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{43} = \text{vol}(\text{compartment_1}) \cdot \text{Hyperbolic_rate_law}(v, [\text{Pk}], [\text{XIIa}], k) \quad (183)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (184)$$

$$\text{Hyperbolic_rate_law}(v, \text{substrate}, \text{enzyme}, k) = \frac{v \cdot \text{substrate} \cdot \text{enzyme}}{k + \text{enzyme}} \quad (185)$$

Table 166: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		<input checked="" type="checkbox"/>
k	k	0000371	1.0		<input checked="" type="checkbox"/>

10.44 Reaction r44

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

Name r44

Reaction equation



Reactants

Table 167: Properties of each reactant.

Id	Name	SBO
IIa	IIa	0000010
ATIII_Heparin	ATIII_Heparin	0000010

Product

Table 168: Properties of each product.

Id	Name	SBO
IIa_ATIII_Heparin	IIa_ATIII_Heparin	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{44} = \text{vol}(\text{compartment_1}) \cdot \text{Irreversible_association}([\text{IIa}], [\text{ATIII_Heparin}], c_{44}) \quad (187)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (188)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (189)$$

10.45 Reaction r45

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

Name r45

Reaction equation



Reactants

Table 169: Properties of each reactant.

Id	Name	SBO
Xa	Xa	0000010
ATIII_Heparin	ATIII_Heparin	0000010

Product

Table 170: Properties of each product.

Id	Name	SBO
Xa_ATIII_Heparin	Xa_ATIII_Heparin	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{45} = \text{vol}(\text{compartment_1}) \cdot \text{Irreversible_association}([\text{Xa}], [\text{ATIII_Heparin}], c_{45}) \quad (191)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (192)$$

$$\text{Irreversible_association}(s1, s2, c) = \frac{s1 \cdot s2}{c} \quad (193)$$

10.46 Reaction r46

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

Name r46

Reaction equation



Reactants

Table 171: Properties of each reactant.

Id	Name	SBO
IXa	IXa	0000010
ATIII_Heparin	ATIII_Heparin	0000010

Product

Table 172: Properties of each product.

Id	Name	SBO
IXa_ATIII_Heparin	IXa_ATIII_Heparin	0000011

Kinetic Law

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes

Derived unit contains undeclared units

$$v_{46} = \text{vol}(\text{compartment}_1) \cdot \text{Irreversible_association}([\text{IXa}], [\text{ATIII_Heparin}], c_{46}) \quad (195)$$

$$\text{Irreversible_association}(s_1, s_2, c) = \frac{s_1 \cdot s_2}{c} \quad (196)$$

$$\text{Irreversible_association}(s_1, s_2, c) = \frac{s_1 \cdot s_2}{c} \quad (197)$$

10.47 Reaction r47

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

Name r47

Reaction equation



Reactant

Table 173: Properties of each reactant.

Id	Name	SBO
VK	VK	0000010

Modifier

Table 174: Properties of each modifier.

Id	Name	SBO
C_warf	C_warf	0000019

Product

Table 175: Properties of each product.

Id	Name	SBO
VKH2	VKH2	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{47} = \text{vol}(\text{compartment}_1) \cdot \text{Warfarin_inhibited_first_order_kinetics}(\text{I}_{\max}, [\text{C_warf}], \text{IC}_{50}, [\text{VK}], \text{d_VK2}) \quad (199)$$

$$\begin{aligned} & \text{Warfarin_inhibited_first_order_kinetics}(\text{I}_{\max}, \text{C_warf}, \text{IC}_{50}, \text{substrate}, \text{degradation}) \\ &= \text{degradation} \cdot \text{substrate} \cdot \left(1 - \frac{\text{I}_{\max} \cdot \text{C_warf}}{\text{IC}_{50} + \text{C_warf}} \right) \end{aligned} \quad (200)$$

$$\begin{aligned} & \text{Warfarin_inhibited_first_order_kinetics}(\text{I}_{\max}, \text{C_warf}, \text{IC}_{50}, \text{substrate}, \text{degradation}) \\ &= \text{degradation} \cdot \text{substrate} \cdot \left(1 - \frac{\text{I}_{\max} \cdot \text{C_warf}}{\text{IC}_{50} + \text{C_warf}} \right) \end{aligned} \quad (201)$$

10.48 Reaction r48

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

Name r48

Reaction equation



Reactant

Table 176: Properties of each reactant.

Id	Name	SBO
VKO	VKO	0000010

Modifier

Table 177: Properties of each modifier.

Id	Name	SBO
C_warf	C_warf	0000019

Product

Table 178: Properties of each product.

Id	Name	SBO
VK	VK	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{48} = \text{vol}(\text{compartment_1}) \cdot \text{Warfarin_inhibited_first_order_kinetics}(\text{I_max}, [\text{C_warf}], \text{IC50}, [\text{VKO}], \text{d_VKO}) \quad (203)$$

$$\begin{aligned} & \text{Warfarin_inhibited_first_order_kinetics}(\text{I_max}, \text{C_warf}, \text{IC50}, \text{substrate}, \text{degradation}) \\ &= \text{degradation} \cdot \text{substrate} \cdot \left(1 - \frac{\text{I_max} \cdot \text{C_warf}}{\text{IC50} + \text{C_warf}} \right) \end{aligned} \quad (204)$$

$$\begin{aligned} & \text{Warfarin_inhibited_first_order_kinetics}(\text{I_max}, \text{C_warf}, \text{IC50}, \text{substrate}, \text{degradation}) \\ &= \text{degradation} \cdot \text{substrate} \cdot \left(1 - \frac{\text{I_max} \cdot \text{C_warf}}{\text{IC50} + \text{C_warf}} \right) \end{aligned} \quad (205)$$

10.49 Reaction pII_VKH2

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

Name pII_VKH2

Reaction equation



Modifier

Table 179: Properties of each modifier.

Id	Name	SBO
VKH2	VKH2	0000019

Product

Table 180: Properties of each product.

Id	Name	SBO
II	II	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{49} = \text{vol}(\text{compartment_1}) \cdot \text{VKH2mediated_factor_production}(\text{d_II}, \text{II0}, [\text{VKH2}], \text{VKH20}) \quad (207)$$

$$\begin{aligned} & \text{VKH2mediated_factor_production}(\text{d_factor}, \text{factor_initial}, [\text{VKH2}], \text{VKH2_initial}) \\ &= \frac{\text{d_factor} \cdot \text{factor_initial} \cdot [\text{VKH2}]}{\text{VKH2_initial}} \end{aligned} \quad (208)$$

$$\begin{aligned} & \text{VKH2mediated_factor_production}(\text{d_factor}, \text{factor_initial}, [\text{VKH2}], \text{VKH2_initial}) \\ &= \frac{\text{d_factor} \cdot \text{factor_initial} \cdot [\text{VKH2}]}{\text{VKH2_initial}} \end{aligned} \quad (209)$$

10.50 Reaction pVII_VKH2

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

Name pVII_VKH2

Reaction equation



Modifier

Table 181: Properties of each modifier.

Id	Name	SBO
VKH2	VKH2	0000019

Product

Table 182: Properties of each product.

Id	Name	SBO
VII	VII	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{50} = \text{vol}(\text{compartment_1}) \cdot \text{VKH2mediated_factor_production}(\text{d_VII}, \text{VII0}, [\text{VKH2}], \text{VKH20}) \quad (211)$$

$$\begin{aligned} & \text{VKH2mediated_factor_production}(\text{d_factor}, \text{factor_initial}, [\text{VKH2}], \text{VKH2_initial}) \\ &= \frac{\text{d_factor} \cdot \text{factor_initial} \cdot [\text{VKH2}]}{\text{VKH2_initial}} \end{aligned} \quad (212)$$

$$\begin{aligned} & \text{VKH2mediated_factor_production}(\text{d_factor}, \text{factor_initial}, [\text{VKH2}], \text{VKH2_initial}) \\ &= \frac{\text{d_factor} \cdot \text{factor_initial} \cdot [\text{VKH2}]}{\text{VKH2_initial}} \end{aligned} \quad (213)$$

10.51 Reaction pIX_VKH2

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

Name pIX_VKH2

Reaction equation



Modifier

Table 183: Properties of each modifier.

Id	Name	SBO
VKH2	VKH2	0000019

Product

Table 184: Properties of each product.

Id	Name	SBO
IX	IX	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{51} = \text{vol}(\text{compartment_1}) \cdot \text{VKH2mediated_factor_production}(\text{d_IX}, \text{IX0}, [\text{VKH2}], \text{VKH20}) \quad (215)$$

$$\begin{aligned} & \text{VKH2mediated_factor_production}(\text{d_factor}, \text{factor_initial}, [\text{VKH2}], \text{VKH2_initial}) \\ &= \frac{\text{d_factor} \cdot \text{factor_initial} \cdot [\text{VKH2}]}{\text{VKH2_initial}} \end{aligned} \quad (216)$$

$$\begin{aligned} & \text{VKH2mediated_factor_production}(\text{d_factor}, \text{factor_initial}, [\text{VKH2}], \text{VKH2_initial}) \\ &= \frac{\text{d_factor} \cdot \text{factor_initial} \cdot [\text{VKH2}]}{\text{VKH2_initial}} \end{aligned} \quad (217)$$

10.52 Reaction pX_VKH2

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

Name pX_VKH2

Reaction equation



Modifier

Table 185: Properties of each modifier.

Id	Name	SBO
VKH2	VKH2	0000019

Product

Table 186: Properties of each product.

Id	Name	SBO
x	X	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{52} = \text{vol}(\text{compartment_1}) \cdot \text{VKH2mediated_factor_production}(\text{d_X}, \text{X0}, [\text{VKH2}], \text{VKH20}) \quad (219)$$

$$\begin{aligned} & \text{VKH2mediated_factor_production}(\text{d_factor}, \text{factor_initial}, [\text{VKH2}], \text{VKH2_initial}) \\ &= \frac{\text{d_factor} \cdot \text{factor_initial} \cdot [\text{VKH2}]}{\text{VKH2_initial}} \end{aligned} \quad (220)$$

$$\begin{aligned} & \text{VKH2mediated_factor_production}(\text{d_factor}, \text{factor_initial}, [\text{VKH2}], \text{VKH2_initial}) \\ &= \frac{\text{d_factor} \cdot \text{factor_initial} \cdot [\text{VKH2}]}{\text{VKH2_initial}} \end{aligned} \quad (221)$$

10.53 Reaction pPC_VKH2

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

Name pPC_VKH2

Reaction equation



Modifier

Table 187: Properties of each modifier.

Id	Name	SBO
VKH2	VKH2	0000019

Product

Table 188: Properties of each product.

Id	Name	SBO
PC	PC	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{53} = \text{vol}(\text{compartment_1}) \cdot \text{VKH2mediated_factor_production}(\text{d_PC}, \text{PC0}, [\text{VKH2}], \text{VKH20}) \quad (223)$$

$$\begin{aligned} & \text{VKH2mediated_factor_production}(\text{d_factor}, \text{factor_initial}, [\text{VKH2}], \text{VKH2_initial}) \\ &= \frac{\text{d_factor} \cdot \text{factor_initial} \cdot [\text{VKH2}]}{\text{VKH2_initial}} \end{aligned} \quad (224)$$

$$\begin{aligned} & \text{VKH2mediated_factor_production}(\text{d_factor}, \text{factor_initial}, [\text{VKH2}], \text{VKH2_initial}) \\ &= \frac{\text{d_factor} \cdot \text{factor_initial} \cdot [\text{VKH2}]}{\text{VKH2_initial}} \end{aligned} \quad (225)$$

10.54 Reaction pPS_VKH2

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

Name pPS_VKH2

Reaction equation



Modifier

Table 189: Properties of each modifier.

Id	Name	SBO
VKH2	VKH2	0000019

Product

Table 190: Properties of each product.

Id	Name	SBO
PS	PS	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{54} = \text{vol}(\text{compartment_1}) \cdot \text{VKH2mediated_factor_production}(\text{d_PS}, \text{PS0}, [\text{VKH2}], \text{VKH20}) \quad (227)$$

$$\begin{aligned} & \text{VKH2mediated_factor_production}(\text{d_factor}, \text{factor_initial}, [\text{VKH2}], \text{VKH2_initial}) \\ &= \frac{\text{d_factor} \cdot \text{factor_initial} \cdot [\text{VKH2}]}{\text{VKH2_initial}} \end{aligned} \quad (228)$$

$$\begin{aligned} & \text{VKH2mediated_factor_production}(\text{d_factor}, \text{factor_initial}, [\text{VKH2}], \text{VKH2_initial}) \\ &= \frac{\text{d_factor} \cdot \text{factor_initial} \cdot [\text{VKH2}]}{\text{VKH2_initial}} \end{aligned} \quad (229)$$

10.55 Reaction dFg

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

Name dFg

Reaction equation



Reactant

Table 191: Properties of each reactant.

Id	Name	SBO
Fg	Fg	0000010

Product

Table 192: Properties of each product.

Id	Name	SBO
FDP	FDP	0000011

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{55} = \text{vol}(\text{compartment_1}) \cdot d_Fg \cdot [Fg] \quad (231)$$

10.56 Reaction dF

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

Name dF

Reaction equation



Reactant

Table 193: Properties of each reactant.

Id	Name	SBO
F	F	0000010

Product

Table 194: Properties of each product.

Id	Name	SBO
FDP	FDP	0000011

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{56} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [\text{F}] \quad (233)$$

Table 195: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	0.05		<input checked="" type="checkbox"/>

10.57 Reaction dXF

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

Name dXF

Reaction equation**Reactant**

Table 196: Properties of each reactant.

Id	Name	SBO
XF	XF	0000010

Product

Table 197: Properties of each product.

Id	Name	SBO
D	D	0000011

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{57} = \text{vol}(\text{compartment}_1) \cdot k1 \cdot [\text{XF}] \quad (235)$$

Table 198: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	0.05		<input checked="" type="checkbox"/>

10.58 Reaction dII

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

Name dII

Reaction equation



Reactant

Table 199: Properties of each reactant.

Id	Name	SBO
II	II	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{58} = \text{vol}(\text{compartment}_1) \cdot d_{II} \cdot [\text{II}] \quad (237)$$

10.59 Reaction dIIa

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

Name dIIa

Reaction equation



Reactant

Table 200: Properties of each reactant.

Id	Name	SBO
IIa	IIa	0000010

Product

Table 201: Properties of each product.

Id	Name	SBO
TAT	TAT	0000011

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{59} = \text{vol}(\text{compartment.1}) \cdot k1 \cdot [\text{IIa}] \quad (239)$$

Table 202: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	67.4		<input checked="" type="checkbox"/>

10.60 Reaction dTF

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

Name dTF

Reaction equation



Reactant

Table 203: Properties of each reactant.

Id	Name	SBO
TF	TF	0000010

Kinetic Law**SBO:0000049** mass action rate law for first order irreversible reactions, continuous scheme**Derived unit** contains undeclared units

$$v_{60} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [\text{TF}] \quad (241)$$

Table 204: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	0.05		<input checked="" type="checkbox"/>

10.61 Reaction dV

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

Name dV**Reaction equation****Reactant**

Table 205: Properties of each reactant.

Id	Name	SBO
V	V	0000010

Kinetic Law**SBO:0000049** mass action rate law for first order irreversible reactions, continuous scheme**Derived unit** contains undeclared units

$$v_{61} = \text{vol}(\text{compartment_1}) \cdot d_V \cdot [V] \quad (243)$$

10.62 Reaction dVa

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

Name dVa

Reaction equation



Reactant

Table 206: Properties of each reactant.

Id	Name	SBO
Va	Va	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{62} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [Va] \quad (245)$$

Table 207: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		<input checked="" type="checkbox"/>

10.63 Reaction dVII

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

Name dVII

Reaction equation



Reactant

Table 208: Properties of each reactant.

Id	Name	SBO
VII	VII	0000010

Kinetic Law**SBO:0000049** mass action rate law for first order irreversible reactions, continuous scheme**Derived unit** contains undeclared units

$$v_{63} = \text{vol}(\text{compartment_1}) \cdot d_VII \cdot [VII] \quad (247)$$

10.64 Reaction dVIIa

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

Name dVIIa**Reaction equation****Reactant**

Table 209: Properties of each reactant.

Id	Name	SBO
VIIa	VIIa	0000010

Kinetic Law**SBO:0000049** mass action rate law for first order irreversible reactions, continuous scheme**Derived unit** contains undeclared units

$$v_{64} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [VIIa] \quad (249)$$

Table 210: Properties of each parameter.

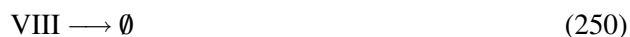
Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		✓

10.65 Reaction dVIII

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

Name dVIII

Reaction equation



Reactant

Table 211: Properties of each reactant.

Id	Name	SBO
VIII	VIII	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{65} = \text{vol}(\text{compartment_1}) \cdot d_VIII \cdot [\text{VIII}] \quad (251)$$

10.66 Reaction dVIIIa

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

Name dVIIIa

Reaction equation



Reactant

Table 212: Properties of each reactant.

Id	Name	SBO
VIIIa	VIIIa	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{66} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [\text{VIIIa}] \quad (253)$$

Table 213: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		<input checked="" type="checkbox"/>

10.67 Reaction dX

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

Name dX

Reaction equation



Reactant

Table 214: Properties of each reactant.

Id	Name	SBO
X	X	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{67} = \text{vol}(\text{compartment_1}) \cdot d_X \cdot [X] \quad (255)$$

10.68 Reaction dXa

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

Name dXa

Reaction equation



Reactant

Table 215: Properties of each reactant.

Id	Name	SBO
Xa	Xa	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{68} = \text{vol}(\text{compartment}_1) \cdot k1 \cdot [Xa] \quad (257)$$

Table 216: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		<input checked="" type="checkbox"/>

10.69 Reaction dIX

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

Name dIX

Reaction equation



Reactant

Table 217: Properties of each reactant.

Id	Name	SBO
IX	IX	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{69} = \text{vol}(\text{compartment_1}) \cdot d_{IX} \cdot [IX] \quad (259)$$

10.70 Reaction dIXa

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

Name dIXa

Reaction equation



Reactant

Table 218: Properties of each reactant.

Id	Name	SBO
IXa	IXa	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{70} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [IXa] \quad (261)$$

Table 219: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		<input checked="" type="checkbox"/>

10.71 Reaction dXII

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

Name dXII

Reaction equation



Reactant

Table 220: Properties of each reactant.

Id	Name	SBO
XII	XII	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{71} = \text{vol}(\text{compartment_1}) \cdot d_X\text{XII} \cdot [\text{XII}] \quad (263)$$

10.72 Reaction dXIIa

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

Name dXIIa

Reaction equation



Reactant

Table 221: Properties of each reactant.

Id	Name	SBO
XIIa	XIIa	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{72} = \text{vol}(\text{compartment_1}) \cdot k_1 \cdot [\text{XIIa}] \quad (265)$$

Table 222: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		<input checked="" type="checkbox"/>

10.73 Reaction dXIII

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

Name dXIII

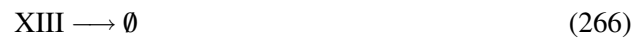
Reaction equation**Reactant**

Table 223: Properties of each reactant.

Id	Name	SBO
XIII	XIII	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{73} = \text{vol}(\text{compartment}_1) \cdot d_{\text{XIII}} \cdot [\text{XIII}] \quad (267)$$

10.74 Reaction dXIIIa

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

Name dXIIIa

Reaction equation**Reactant**

Table 224: Properties of each reactant.

Id	Name	SBO
XIIIIa	XIIIIa	0000010

Kinetic Law**SBO:0000049** mass action rate law for first order irreversible reactions, continuous scheme**Derived unit** contains undeclared units

$$v_{74} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [\text{XIIIIa}] \quad (269)$$

Table 225: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	0.69		<input checked="" type="checkbox"/>

10.75 Reaction dPk

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

Name dPk**Reaction equation****Reactant**

Table 226: Properties of each reactant.

Id	Name	SBO
Pk	Pk	0000010

Kinetic Law**SBO:0000049** mass action rate law for first order irreversible reactions, continuous scheme**Derived unit** contains undeclared units

$$v_{75} = \text{vol}(\text{compartment_1}) \cdot d_Pk \cdot [\text{Pk}] \quad (271)$$

10.76 Reaction dK

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

Name dK

Reaction equation



Reactant

Table 227: Properties of each reactant.

Id	Name	SBO
K	K	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{76} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [K] \quad (273)$$

Table 228: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		<input checked="" type="checkbox"/>

10.77 Reaction dPg

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

Name dPg

Reaction equation



Reactant

Table 229: Properties of each reactant.

Id	Name	SBO
Pg	Pg	0000010

Kinetic Law**SBO:0000049** mass action rate law for first order irreversible reactions, continuous scheme**Derived unit** contains undeclared units

$$v_{77} = \text{vol}(\text{compartment_1}) \cdot d_Pg \cdot [Pg] \quad (275)$$

10.78 Reaction dP

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

Name dP**Reaction equation****Reactant**

Table 230: Properties of each reactant.

Id	Name	SBO
P	P	0000010

Kinetic Law**SBO:0000049** mass action rate law for first order irreversible reactions, continuous scheme**Derived unit** contains undeclared units

$$v_{78} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [P] \quad (277)$$

Table 231: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		✓

10.79 Reaction dPC

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

Name dPC

Reaction equation



Reactant

Table 232: Properties of each reactant.

Id	Name	SBO
PC	PC	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

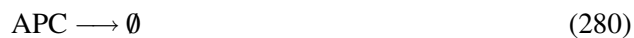
$$v_{79} = \text{vol}(\text{compartment}_1) \cdot d_PC \cdot [\text{PC}] \quad (279)$$

10.80 Reaction dAPC

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

Name dAPC

Reaction equation



Reactant

Table 233: Properties of each reactant.

Id	Name	SBO
APC	APC	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{80} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [\text{APC}] \quad (281)$$

Table 234: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.4		<input checked="" type="checkbox"/>

10.81 Reaction dPS

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

Name dPS

Reaction equation



Reactant

Table 235: Properties of each reactant.

Id	Name	SBO
PS	PS	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

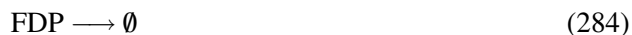
$$v_{81} = \text{vol}(\text{compartment_1}) \cdot d_PS \cdot [\text{PS}] \quad (283)$$

10.82 Reaction dFDP

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

Name dFDP

Reaction equation



Reactant

Table 236: Properties of each reactant.

Id	Name	SBO
FDP	FDP	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{82} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [\text{FDP}] \quad (285)$$

Table 237: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	3.5		<input checked="" type="checkbox"/>

10.83 Reaction dD

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

Name dD

Reaction equation



Reactant

Table 238: Properties of each reactant.

Id	Name	SBO
D	D	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{83} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [D] \quad (287)$$

Table 239: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	0.1		<input checked="" type="checkbox"/>

10.84 Reaction dTFPI

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

Name dTFPI

Reaction equation



Reactant

Table 240: Properties of each reactant.

Id	Name	SBO
TFPI	TFPI	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{84} = \text{vol}(\text{compartment_1}) \cdot d_TFPI \cdot [\text{TFPI}] \quad (289)$$

10.85 Reaction dVIIa_TF

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

Name dVIIa_TF

Reaction equation



Reactant

Table 241: Properties of each reactant.

Id	Name	SBO
VIIa_TF	VIIa_TF	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{85} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [\text{VIIa_TF}] \quad (291)$$

Table 242: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		<input checked="" type="checkbox"/>

10.86 Reaction dVII_TF

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

Name dVII_TF

Reaction equation



Reactant

Table 243: Properties of each reactant.

Id	Name	SBO
VII_TF	VII_TF	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{86} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [\text{VII_TF}] \quad (293)$$

Table 244: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	0.7		<input checked="" type="checkbox"/>

10.87 Reaction dAPC_PS

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

Name dAPC_PS

Reaction equation



Reactant

Table 245: Properties of each reactant.

Id	Name	SBO
APC_PS	APC_PS	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{87} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [\text{APC_PS}] \quad (295)$$

Table 246: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		<input checked="" type="checkbox"/>

10.88 Reaction dVa_Xa

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

Name dVa_Xa

Reaction equation



Reactant

Table 247: Properties of each reactant.

Id	Name	SBO
Va_Xa	Va_Xa	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{88} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [\text{Va_Xa}] \quad (297)$$

Table 248: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		<input checked="" type="checkbox"/>

10.89 Reaction dIXa_VIIIa

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

Name dIXa_VIIIa

Reaction equation



Reactant

Table 249: Properties of each reactant.

Id	Name	SBO
IXa.VIIIa	IXa.VIIIa	0000010

Kinetic Law**SBO:0000049** mass action rate law for first order irreversible reactions, continuous scheme**Derived unit** contains undeclared units

$$v_{89} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [\text{IXa.VIIIa}] \quad (299)$$

Table 250: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		<input checked="" type="checkbox"/>

10.90 Reaction dTmod

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

Name dTmod**Reaction equation****Reactant**

Table 251: Properties of each reactant.

Id	Name	SBO
Tmod	Tmod	0000010

Kinetic Law**SBO:0000049** mass action rate law for first order irreversible reactions, continuous scheme**Derived unit** contains undeclared units

$$v_{90} = \text{vol}(\text{compartment_1}) \cdot d_T\text{mod} \cdot [\text{Tmod}] \quad (301)$$

10.91 Reaction dIIa_Tmod

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

Name dIIa_Tmod

Reaction equation



Reactant

Table 252: Properties of each reactant.

Id	Name	SBO
IIa_Tmod	IIa_Tmod	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{91} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [\text{IIa_Tmod}] \quad (303)$$

Table 253: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		<input checked="" type="checkbox"/>

10.92 Reaction dXa_TFPI

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

Name dXa_TFPI

Reaction equation



Reactant

Table 254: Properties of each reactant.

Id	Name	SBO
Xa_TFPI	Xa_TFPI	0000010

Kinetic Law**SBO:0000049** mass action rate law for first order irreversible reactions, continuous scheme**Derived unit** contains undeclared units

$$v_{92} = \text{vol}(\text{compartment}_1) \cdot k1 \cdot [\text{Xa_TFPI}] \quad (305)$$

Table 255: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		<input checked="" type="checkbox"/>

10.93 Reaction dVIIa_TF_Xa_TFPI

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

Name dVIIa_TF_Xa_TFPI**Reaction equation****Reactant**

Table 256: Properties of each reactant.

Id	Name	SBO
VIIa_TF_Xa_TFPI	VIIa_TF_Xa_TFPI	0000010

Kinetic Law**SBO:0000049** mass action rate law for first order irreversible reactions, continuous scheme**Derived unit** contains undeclared units

$$v_{93} = \text{vol}(\text{compartment}_1) \cdot k1 \cdot [\text{VIIa_TF_Xa_TFPI}] \quad (307)$$

Table 257: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		<input checked="" type="checkbox"/>

10.94 Reaction dTAT

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

Name dTAT

Reaction equation



Reactant

Table 258: Properties of each reactant.

Id	Name	SBO
TAT	TAT	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{94} = \text{vol}(\text{compartment}_1) \cdot k1 \cdot [\text{TAT}] \quad (309)$$

Table 259: Properties of each parameter.

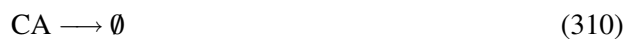
Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	0.2		<input checked="" type="checkbox"/>

10.95 Reaction dCA

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

Name dCA

Reaction equation



Reactant

Table 260: Properties of each reactant.

Id	Name	SBO
CA	CA	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{95} = \text{vol}(\text{compartment}_1) \cdot k_1 \cdot [CA] \quad (311)$$

Table 261: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	0.05		<input checked="" type="checkbox"/>

10.96 Reaction dXIa

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

Name dXIa

Reaction equation



Reactant

Table 262: Properties of each reactant.

Id	Name	SBO
XIa	XIa	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{96} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [\text{XIa}] \quad (313)$$

Table 263: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		<input checked="" type="checkbox"/>

10.97 Reaction dVKH2

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

Name dVKH2

Reaction equation



Reactant

Table 264: Properties of each reactant.

Id	Name	SBO
VKH2	VKH2	0000010

Product

Table 265: Properties of each product.

Id	Name	SBO
VKO	VKO	0000011

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{97} = \text{vol}(\text{compartment}_1) \cdot d_VKH2 \cdot [VKH2] \quad (315)$$

10.98 Reaction VK_transport

This is a reversible reaction of one reactant forming one product.

Name VK_transport

Reaction equation



Reactant

Table 266: Properties of each reactant.

Id	Name	SBO
VK	VK	0000010

Product

Table 267: Properties of each product.

Id	Name	SBO
VK_p	VK_p	0000011

Kinetic Law

SBO:0000080 mass action rate law for first order forward, first order reverse, reversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{98} = \text{vol}(\text{compartment}_1) \cdot (\text{VitaminK_k12} \cdot [VK] - \text{VitaminK_k21_Vc} \cdot [VK_p]) \quad (317)$$

10.99 Reaction eHeparin

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

Name eHeparin

Reaction equation



Reactant

Table 268: Properties of each reactant.

Id	Name	SBO
ATIII_Heparin	ATIII_Heparin	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{99} = \text{vol}(\text{compartment}_1) \cdot \text{Heparin}_{\text{ke}} \cdot [\text{ATIII_Heparin}] \quad (319)$$

10.100 Reaction eHeparinXa

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

Name eHeparinXa

Reaction equation



Reactant

Table 269: Properties of each reactant.

Id	Name	SBO
Xa_ATIII_Heparin	Xa_ATIII_Heparin	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{100} = \text{vol}(\text{compartment}_1) \cdot \text{Heparin}_{\text{ke}} \cdot [\text{Xa_ATIII_Heparin}] \quad (321)$$

10.101 Reaction eHeparinIXa

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

Name eHeparinIXa

Reaction equation



Reactant

Table 270: Properties of each reactant.

Id	Name	SBO
IXa_ATIII_Heparin	IXa_ATIII_Heparin	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{101} = \text{vol}(\text{compartment_1}) \cdot \text{Heparin_ke} \cdot [\text{IXa_ATIII_Heparin}] \quad (323)$$

10.102 Reaction eHeparinIIa

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

Name eHeparinIIa

Reaction equation



Reactant

Table 271: Properties of each reactant.

Id	Name	SBO
IIa_ATIII_Heparin	IIa_ATIII_Heparin	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{102} = \text{vol}(\text{compartment_1}) \cdot \text{Heparin_ke} \cdot [\text{IIa_ATIII_Heparin}] \quad (325)$$

10.103 Reaction dXI

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

Name dXI

Reaction equation



Reactant

Table 272: Properties of each reactant.

Id	Name	SBO
XI	XI	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{103} = \text{vol}(\text{compartment_1}) \cdot k1 \cdot [\text{XI}] \quad (327)$$

Table 273: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	0.1		<input checked="" type="checkbox"/>

10.104 Reaction pXII

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

Name pXII

Reaction equation



Product

Table 274: Properties of each product.

Id	Name	SBO
XII	XII	0000011

Kinetic Law**Derived unit** contains undeclared units

$$v_{104} = \text{vol}(\text{compartment_1}) \cdot \text{Factor_production}(\text{XII0}, \text{d_XII}) \quad (329)$$

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \quad (330)$$

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \quad (331)$$

10.105 Reaction pVIII

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

Name pVIII**Reaction equation****Product**

Table 275: Properties of each product.

Id	Name	SBO
VIII	VIII	0000011

Kinetic Law**Derived unit** contains undeclared units

$$v_{105} = \text{vol}(\text{compartment_1}) \cdot \text{Factor_production}(\text{VIII0}, \text{d_VIII}) \quad (333)$$

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \quad (334)$$

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \quad (335)$$

10.106 Reaction pXI

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

Name pXI

Reaction equation



Product

Table 276: Properties of each product.

Id	Name	SBO
XI	XI	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{106} = \text{vol}(\text{compartment_1}) \cdot \text{Factor_production}(\text{XI0}, \text{d_XI})$$

(337)

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation}$$

(338)

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation}$$

(339)

10.107 Reaction pV

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

Name pV

Reaction equation



Product

Table 277: Properties of each product.

Id	Name	SBO
V	V	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{107} = \text{vol}(\text{compartment_1}) \cdot \text{Factor_production}(\text{V0}, d.V) \quad (341)$$

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \quad (342)$$

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \quad (343)$$

10.108 Reaction pFg

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

Name pFg

Reaction equation



Product

Table 278: Properties of each product.

Id	Name	SBO
Fg	Fg	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{108} = \text{vol}(\text{compartment_1}) \cdot \text{Factor_production}(\text{Fg0}, d.Fg) \quad (345)$$

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \quad (346)$$

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \quad (347)$$

10.109 Reaction pXIII

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

Name pXIII

Reaction equation



Product

Table 279: Properties of each product.

Id	Name	SBO
XIII	XIII	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{109} = \text{vol}(\text{compartment_1}) \cdot \text{Factor_production}(\text{XIII0}, \text{d_XIII}) \quad (349)$$

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \quad (350)$$

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \quad (351)$$

10.110 Reaction pPg

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

Name pPg

Reaction equation



Product

Table 280: Properties of each product.

Id	Name	SBO
Pg	Pg	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{110} = \text{vol}(\text{compartment_1}) \cdot \text{Factor_production}(\text{Pg0}, \text{d_Pg}) \quad (353)$$

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \quad (354)$$

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \quad (355)$$

10.111 Reaction pTmod

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

Name pTmod

Reaction equation



Product

Table 281: Properties of each product.

Id	Name	SBO
Tmod	Tmod	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{111} = \text{vol}(\text{compartment_1}) \cdot \text{Factor_production}(\text{Tmod0}, d.\text{Tmod}) \quad (357)$$

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \quad (358)$$

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \quad (359)$$

10.112 Reaction pTFPI

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

Name pTFPI

Reaction equation



Product

Table 282: Properties of each product.

Id	Name	SBO
TFPI	TFPI	0000011

Kinetic Law**Derived unit** contains undeclared units

$$v_{112} = \text{vol}(\text{compartment_1}) \cdot \text{Factor_production}(\text{TFPI0}, d_{\text{TFPI}}) \quad (361)$$

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \quad (362)$$

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \quad (363)$$

10.113 Reaction pPk

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

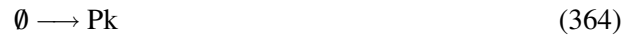
Name pPk**Reaction equation****Product**

Table 283: Properties of each product.

Id	Name	SBO
Pk	Pk	0000011

Kinetic Law**Derived unit** contains undeclared units

$$v_{113} = \text{vol}(\text{compartment_1}) \cdot \text{Factor_production}(\text{Pk0}, d_{\text{Pk}}) \quad (365)$$

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \quad (366)$$

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \quad (367)$$

10.114 Reaction pVK

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

Name pVK

Reaction equation



Product

Table 284: Properties of each product.

Id	Name	SBO
VK	VK	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{114} = \text{vol}(\text{compartment_1}) \cdot \text{Factor_production}(\text{VK0}, \text{d_VK})$$

(369)

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation}$$

(370)

$$\text{Factor_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation}$$

(371)

10.115 Reaction dVK

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

Name dVK

Reaction equation



Reactant

Table 285: Properties of each reactant.

Id	Name	SBO
VK	VK	0000010

Kinetic Law

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{115} = \text{vol}(\text{compartment}_1) \cdot d_VK \cdot [VK] \quad (373)$$

11 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.

11.1 Species IIa

Name IIa

Initial concentration 0 nmol · l⁻¹

This species takes part in twelve reactions (as a reactant in [r28](#), [r44](#), [dIIa](#) and as a product in [r12](#), [r13](#) and as a modifier in [r1_](#), [r5_](#), [r6_](#), [r10](#), [r14](#), [r20](#), [r21](#)).

$$\frac{d}{dt} \text{IIa} = v_{12} + v_{13} - v_{28} - v_{44} - v_{59} \quad (374)$$

11.2 Species VIII

Name VIII

Initial concentration 0.7 nmol · l⁻¹

Initial assignment VIII

This species takes part in three reactions (as a reactant in [r1_](#), [dVIII](#) and as a product in [pVIII](#)).

$$\frac{d}{dt} \text{VIII} = v_{105} - v_1 - v_{65} \quad (375)$$

11.3 Species VIIIa

Name VIIIa

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [r2_](#), [r26](#), [dVIIIa](#) and as a product in [r1_](#)).

$$\frac{d}{dt}\text{VIIIa} = v_1 - v_2 - v_{26} - v_{66} \quad (376)$$

11.4 Species APC_PS

Name APC_PS

Initial concentration 0 nmol · l⁻¹

This species takes part in seven reactions (as a reactant in [dAPC_PS](#) and as a product in [r37](#) and as a modifier in [r2_](#), [r11](#), [r19](#), [r23](#), [r25](#)).

$$\frac{d}{dt}\text{APC_PS} = v_{37} - v_{87} \quad (377)$$

11.5 Species IX

Name IX

Initial concentration 89.6 nmol · l⁻¹

Initial assignment IX

This species takes part in four reactions (as a reactant in [r3_](#), [r35](#), [dIX](#) and as a product in [pIX_VKH2](#)).

$$\frac{d}{dt}\text{IX} = v_{51} - v_3 - v_{35} - v_{69} \quad (378)$$

11.6 Species IXa

Name IXa

Initial concentration 0 nmol · l⁻¹

This species takes part in seven reactions (as a reactant in [r26](#), [r46](#), [dIXa](#) and as a product in [r3_](#), [r35](#) and as a modifier in [r7_](#), [r40](#)).

$$\frac{d}{dt}\text{IXa} = v_3 + v_{35} - v_{26} - v_{46} - v_{70} \quad (379)$$

11.7 Species XIa

Name XIa

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in dXIa and as a product in r4_, r5_ and as a modifier in r3_).

$$\frac{d}{dt} \text{XIa} = v_4 + v_5 - v_{96} \quad (380)$$

11.8 Species XI

Name XI

Initial concentration 30.6 nmol · l⁻¹

Initial assignment XI

This species takes part in four reactions (as a reactant in r4_, r5_, dXI and as a product in pXI).

$$\frac{d}{dt} \text{XI} = v_{106} - v_4 - v_5 - v_{103} \quad (381)$$

11.9 Species XIIa

Name XIIa

Initial concentration 0 nmol · l⁻¹

This species takes part in five reactions (as a reactant in dXIIa and as a product in r41, r42 and as a modifier in r4_, r43).

$$\frac{d}{dt} \text{XIIa} = v_{41} + v_{42} - v_{72} \quad (382)$$

11.10 Species VII

Name VII

Initial concentration 10 nmol · l⁻¹

Initial assignment VII

This species takes part in seven reactions (as a reactant in r6_, r30, r38, r39, r40, dVII and as a product in pVII.VKH2).

$$\frac{d}{dt} \text{VII} = v_{50} - v_6 - v_{30} - v_{38} - v_{39} - v_{40} - v_{63} \quad (383)$$

11.11 Species VIIa

Name VIIa

Initial concentration 0 nmol · l⁻¹

This species takes part in seven reactions (as a reactant in [r29](#), [dVIIa](#) and as a product in [r6_](#), [r38](#), [r39](#), [r40](#) and as a modifier in [r9_](#)).

$$\frac{d}{dt}VIIa = v_6 + v_{38} + v_{39} + v_{40} - v_{29} - v_{64} \quad (384)$$

11.12 Species X

Name X

Initial concentration 174.3 nmol · l⁻¹

Initial assignment X

This species takes part in six reactions (as a reactant in [r7_](#), [r8_](#), [r9_](#), [r34](#), [dX](#) and as a product in [pX_VKH2](#)).

$$\frac{d}{dt}X = v_{52} - v_7 - v_8 - v_9 - v_{34} - v_{67} \quad (385)$$

11.13 Species Xa

Name Xa

Initial concentration 0 nmol · l⁻¹

This species takes part in eleven reactions (as a reactant in [r27](#), [r32](#), [r45](#), [dXa](#) and as a product in [r7_](#), [r8_](#), [r9_](#), [r34](#) and as a modifier in [r13](#), [r33](#), [r38](#)).

$$\frac{d}{dt}Xa = v_7 + v_8 + v_9 + v_{34} - v_{27} - v_{32} - v_{45} - v_{68} \quad (386)$$

11.14 Species IXa_VIIIa

Name IXa_VIIIa

Initial concentration 0 nmol · l⁻¹

This species takes part in three reactions (as a reactant in [dIXa_VIIIa](#) and as a product in [r26](#) and as a modifier in [r8_](#)).

$$\frac{d}{dt}IXa_VIIIa = v_{26} - v_{89} \quad (387)$$

11.15 Species V

Name V

Initial concentration 26.7 nmol · l⁻¹

Initial assignment V

This species takes part in three reactions (as a reactant in [r10](#), [dV](#) and as a product in [pV](#)).

$$\frac{d}{dt}V = v_{107} - v_{10} - v_{61} \quad (388)$$

11.16 Species Va

Name Va

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [r11](#), [r27](#), [dVa](#) and as a product in [r10](#)).

$$\frac{d}{dt}Va = v_{10} - v_{11} - v_{27} - v_{62} \quad (389)$$

11.17 Species II

Name II

Initial concentration 1394.4 nmol · l⁻¹

Initial assignment II

This species takes part in four reactions (as a reactant in [r12](#), [r13](#), [dII](#) and as a product in [pII_VKH2](#)).

$$\frac{d}{dt}II = v_{49} - v_{12} - v_{13} - v_{58} \quad (390)$$

11.18 Species F

Name F

Initial concentration 0 nmol · l⁻¹

This species takes part in five reactions (as a reactant in [r16](#), [r17](#), [dF](#) and as a product in [r14](#) and as a modifier in [r22](#)).

$$\frac{d}{dt}F = v_{14} - v_{16} - v_{17} - v_{56} \quad (391)$$

11.19 Species Fg

Name Fg

Initial concentration 8945.5 nmol · l⁻¹

Initial assignment Fg

This species takes part in four reactions (as a reactant in [r14](#), [r15](#), [dFg](#) and as a product in [pFg](#)).

$$\frac{d}{dt}Fg = v_{108} - v_{14} - v_{15} - v_{55} \quad (392)$$

11.20 Species DP

Name DP

Initial concentration 0 nmol · l⁻¹

Involved in rule [DP](#)

One rule determines the species' quantity.

11.21 Species P

Name P

Initial concentration 0 nmol · l⁻¹

This species takes part in seven reactions (as a reactant in [dP](#) and as a product in [r21](#), [r22](#), [r23](#) and as a modifier in [r15](#), [r17](#), [r18](#)).

$$\frac{d}{dt}P = v_{21} + v_{22} + v_{23} - v_{78} \quad (393)$$

11.22 Species XF

Name XF

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [r18](#), [r19](#), [dXF](#) and as a product in [r16](#)).

$$\frac{d}{dt}XF = v_{16} - v_{18} - v_{19} - v_{57} \quad (394)$$

11.23 Species XIII

Name XIII

Initial concentration 70.3 nmol · l⁻¹

Initial assignment XIII

This species takes part in three reactions (as a reactant in [r20](#), [dXIII](#) and as a product in [pXIII](#)).

$$\frac{d}{dt}XIII = v_{109} - v_{20} - v_{73} \quad (395)$$

11.24 Species Pg

Name Pg

Initial concentration 2154.3 nmol · l⁻¹

Initial assignment Pg

This species takes part in five reactions (as a reactant in [r21](#), [r22](#), [r23](#), [dPg](#) and as a product in [pPg](#)).

$$\frac{d}{dt}Pg = v_{110} - v_{21} - v_{22} - v_{23} - v_{77} \quad (396)$$

11.25 Species APC

Name APC

Initial concentration 0 nmol · l⁻¹

This species takes part in three reactions (as a reactant in [r37](#), [dAPC](#) and as a product in [r24](#)).

$$\frac{d}{dt}APC = v_{24} - v_{37} - v_{80} \quad (397)$$

11.26 Species IIa_Tmod

Name IIa_Tmod

Initial concentration 0 nmol · l⁻¹

This species takes part in three reactions (as a reactant in [dIIa_Tmod](#) and as a product in [r28](#) and as a modifier in [r24](#)).

$$\frac{d}{dt}IIa_Tmod = v_{28} - v_{91} \quad (398)$$

11.27 Species PC

Name PC

Initial concentration 60 nmol · l⁻¹

Initial assignment PC

This species takes part in three reactions (as a reactant in [r24](#), [dPC](#) and as a product in [pPC-VKH2](#)).

$$\frac{d}{dt}PC = v_{53} - v_{24} - v_{79} \quad (399)$$

11.28 Species Tmod

Name Tmod

Initial concentration 50 nmol · l⁻¹

Initial assignment Tmod

This species takes part in three reactions (as a reactant in [r28](#), [dTmod](#) and as a product in [pTmod](#)).

$$\frac{d}{dt}Tmod = v_{111} - v_{28} - v_{90} \quad (400)$$

11.29 Species TF

Name TF

Initial concentration 300 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [r29](#), [r30](#), [dTF](#) and as a modifier in [r36](#)).

$$\frac{d}{dt}TF = -v_{29} - v_{30} - v_{60} \quad (401)$$

11.30 Species VIIa_TF

Name VIIa_TF

Initial concentration 0 nmol · l⁻¹

This species takes part in eight reactions (as a reactant in [r31](#), [dVIIa_TF](#) and as a product in [r29](#), [r33](#), [r36](#) and as a modifier in [r34](#), [r35](#), [r39](#)).

$$\frac{d}{dt}VIIa_TF = v_{29} + v_{33} + v_{36} - v_{31} - v_{85} \quad (402)$$

11.31 Species VII_TF

Name VII_TF

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [r33](#), [r36](#), [dVII_TF](#) and as a product in [r30](#)).

$$\frac{d}{dt} \text{VII_TF} = v_{30} - v_{33} - v_{36} - v_{86} \quad (403)$$

11.32 Species Xa_TFPI

Name Xa_TFPI

Initial concentration 0 nmol · l⁻¹

This species takes part in three reactions (as a reactant in [r31](#), [dXa_TFPI](#) and as a product in [r32](#)).

$$\frac{d}{dt} \text{Xa_TFPI} = v_{32} - v_{31} - v_{92} \quad (404)$$

11.33 Species TFPI

Name TFPI

Initial concentration 2.5 nmol · l⁻¹

Initial assignment TFPI

This species takes part in three reactions (as a reactant in [r32](#), [dTFPI](#) and as a product in [pTFPI](#)).

$$\frac{d}{dt} \text{TFPI} = v_{112} - v_{32} - v_{84} \quad (405)$$

11.34 Species PS

Name PS

Initial concentration 300 nmol · l⁻¹

Initial assignment PS

This species takes part in three reactions (as a reactant in [r37](#), [dPS](#) and as a product in [pPS-VKH2](#)).

$$\frac{d}{dt} \text{PS} = v_{54} - v_{37} - v_{81} \quad (406)$$

11.35 Species VKH2

Name VKH2

Initial concentration 0.1 nmol · l⁻¹

Initial assignment VKH2

This species takes part in eight reactions (as a reactant in [dVKH2](#) and as a product in [r47](#) and as a modifier in [pII_VKH2](#), [pVII_VKH2](#), [pIX_VKH2](#), [pX_VKH2](#), [pPC_VKH2](#), [pPS_VKH2](#)).

$$\frac{d}{dt}VKH2 = v_{47} - v_{97} \quad (407)$$

11.36 Species Va_Xa

Name Va_Xa

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [r25](#), [dVa_Xa](#) and as a product in [r27](#) and as a modifier in [r12](#)).

$$\frac{d}{dt}Va_Xa = v_{27} - v_{25} - v_{88} \quad (408)$$

11.37 Species CA

Name CA

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in [dCA](#) and as a modifier in [r41](#)).

$$\frac{d}{dt}CA = -v_{95} \quad (409)$$

11.38 Species XII

Name XII

Initial concentration 375 nmol · l⁻¹

Initial assignment XII

This species takes part in four reactions (as a reactant in [r41](#), [r42](#), [dXII](#) and as a product in [pXII](#)).

$$\frac{d}{dt}XII = v_{104} - v_{41} - v_{42} - v_{71} \quad (410)$$

11.39 Species K

Name K

Initial concentration 0 nmol · l⁻¹

This species takes part in three reactions (as a reactant in [dK](#) and as a product in [r43](#) and as a modifier in [r42](#)).

$$\frac{d}{dt}K = v_{43} - v_{76} \quad (411)$$

11.40 Species ATIII_Heparin

Name ATIII_Heparin

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [r44](#), [r45](#), [r46](#), [eHeparin](#)).

$$\frac{d}{dt}ATIII_Heparin = -v_{44} - v_{45} - v_{46} - v_{99} \quad (412)$$

11.41 Species Xa_ATIII_Heparin

Name Xa_ATIII_Heparin

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in [eHeparinXa](#) and as a product in [r45](#)).

$$\frac{d}{dt}Xa_ATIII_Heparin = v_{45} - v_{100} \quad (413)$$

11.42 Species VK

Name VK

Initial concentration 1 nmol · l⁻¹

Initial assignment VK

This species takes part in five reactions (as a reactant in [r47](#), [VK_transport](#), [dVK](#) and as a product in [r48](#), [pVK](#)).

$$\frac{d}{dt}VK = v_{48} + v_{114} - v_{47} - v_{98} - v_{115} \quad (414)$$

11.43 Species C_warf

Name C_warf

Initial concentration 0 nmol · l⁻¹

Involved in rule C_warf

This species takes part in two reactions (as a modifier in [r47](#), [r48](#)). Not these but one rule determines the species' quantity because this species is on the boundary of the reaction system.

11.44 Species VKO

Name VKO

Initial concentration 0.1 nmol · l⁻¹

Initial assignment VKO

This species takes part in two reactions (as a reactant in [r48](#) and as a product in [dVKH2](#)).

$$\frac{d}{dt}VKO = v_{97} - v_{48} \quad (415)$$

11.45 Species Pk

Name Pk

Initial concentration 450 nmol · l⁻¹

Initial assignment Pk

This species takes part in three reactions (as a reactant in [r43](#), [dPk](#) and as a product in [pPk](#)).

$$\frac{d}{dt}Pk = v_{113} - v_{43} - v_{75} \quad (416)$$

11.46 Species FDP

Name FDP

Initial concentration 0 nmol · l⁻¹

This species takes part in five reactions (as a reactant in [dFDP](#) and as a product in [r15](#), [r17](#), [dFg](#), [dF](#)).

$$\frac{d}{dt}FDP = v_{15} + v_{17} + v_{55} + v_{56} - v_{82} \quad (417)$$

11.47 Species D

Name D

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [dD](#) and as a product in [r18](#), [r19](#), [dXF](#)).

$$\frac{d}{dt}D = v_{18} + v_{19} + v_{57} - v_{83} \quad (418)$$

11.48 Species TAT

Name TAT

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in [dTAT](#) and as a product in [dIIa](#)).

$$\frac{d}{dt}TAT = v_{59} - v_{94} \quad (419)$$

11.49 Species VIIa_TF_Xa_TFPI

Name VIIa_TF_Xa_TFPI

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in [dVIIa_TF_Xa_TFPI](#) and as a product in [r31](#)).

$$\frac{d}{dt}VIIa_TF_Xa_TFPI = v_{31} - v_{93} \quad (420)$$

11.50 Species XIIIa

Name XIIIa

Initial concentration 0 nmol · l⁻¹

This species takes part in three reactions (as a reactant in [dXIIIa](#) and as a product in [r20](#) and as a modifier in [r16](#)).

$$\frac{d}{dt}XIIIa = v_{20} - v_{74} \quad (421)$$

11.51 Species [IIa_ATIII_Heparin](#)

Name IIa_ATIII_Heparin

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in [eHeparinIIa](#) and as a product in [r44](#)).

$$\frac{d}{dt} \text{IIa_ATIII_Heparin} = v_{44} - v_{102} \quad (422)$$

11.52 Species [A_warf](#)

Name A_warf

Initial concentration 0 nmol · l⁻¹

Involved in rule [A_warf](#)

One rule determines the species' quantity.

11.53 Species [IXa_ATIII_Heparin](#)

Name IXa_ATIII_Heparin

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in [eHeparinIXa](#) and as a product in [r46](#)).

$$\frac{d}{dt} \text{IXa_ATIII_Heparin} = v_{46} - v_{101} \quad (423)$$

11.54 Species [VK_p](#)

Name VK_p

Initial concentration 0 nmol · l⁻¹

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

$$\frac{d}{dt} \text{VK_p} = v_{98} \quad (424)$$

A Glossary of Systems Biology Ontology Terms

SBO:0000010 reactant: Substance consumed by a chemical reaction. Reactants react with each other to form the products of a chemical reaction. In a chemical equation the Reactants are the elements or compounds on the left hand side of the reaction equation. A reactant can be consumed and produced by the same reaction, its global quantity remaining unchanged

SBO:0000011 product: Substance that is produced in a reaction. In a chemical equation the Products are the elements or compounds on the right hand side of the reaction equation. A product can be produced and consumed by the same reaction, its global quantity remaining unchanged

SBO:0000019 modifier: Substance that changes the velocity of a process without itself being consumed or transformed by the reaction

SBO:0000025 catalytic rate constant: Numerical parameter that quantifies the velocity of an enzymatic reaction

SBO:0000028 enzymatic rate law for irreversible non-modulated non-interacting unireactant enzymes: Kinetics of enzymes that react only with one substance, their substrate. The enzymes do not catalyse the reactions in both directions.

SBO:0000035 forward unimolecular rate constant, continuous case: Numerical parameter that quantifies the forward velocity of a chemical reaction involving only one reactant. This parameter encompasses all the contributions to the velocity except the quantity of the reactant. It is to be used in a reaction modelled using a continuous framework

SBO:0000036 forward bimolecular rate constant, continuous case: Numerical parameter that quantifies the forward velocity of a chemical reaction involving two reactants. This parameter encompasses all the contributions to the velocity except the quantity of the reactants. It is to be used in a reaction modelled using a continuous framework

SBO:0000038 reverse unimolecular rate constant, continuous case: Numerical parameter that quantifies the reverse velocity of a chemical reaction involving only one product. This parameter encompasses all the contributions to the velocity except the quantity of the product. It is to be used in a reaction modelled using a continuous framework

SBO:0000049 mass action rate law for first order irreversible reactions, continuous scheme: Reaction scheme where the products are created from the reactants and the change of a product quantity is proportional to the product of reactant activities. The reaction scheme does not include any reverse process that creates the reactants from the products. The change of a product quantity is proportional to the quantity of one reactant. It is to be used in a reaction modelled using a continuous framework.

SBO:0000080 mass action rate law for first order forward, first order reverse, reversible reactions, continuous scheme: Reaction scheme where the products are created from the

reactants and the change of a product quantity is proportional to the product of reactant activities. The reaction scheme does include a reverse process that creates the reactants from the products. The rate of the forward process is proportional to the quantity of one reactant. The rate of the reverse process is proportional to the quantity of one product. It is to be used in a reaction modelled using a continuous framework.

SBO:0000371 Michaelis constant in quasi-steady state situation: Michaelis constant derived using a steady-state assumption for enzyme-substrate and enzyme-product intermediates. For example see Briggs-Haldane equation (SBO:0000031)

SBO:0000461 essential activator: A substance that is absolutely required for occurrence and stimulation of a reaction

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