SBML Model Report

Model name: "Wajima2009-_BloodCoagulation_warfarin_heparin"

May 6, 2016

1 General Overview

This is a document in SBML Level 2 Version 4 format. This model was created by the following two authors: Vijayalakshmi Chelliah[1] and Michael Schubert[2] at July fifth 2011 at 5:07 p. m. and last time modified at October nineth 2014 at 4:55 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	116	function definitions	6
global parameters	58	unit definitions	2
rules	3	initial assignments	27

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 therapeuticsVolume 86, Issue 3, 10 June 2009, EPub 19516255,

[1]EMBL-EBI, viji@ebi.ac.uk
[2]EBI, schubert@ebi.ac.uk

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 m^2

2.5 Unit `length`

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

Definition m

3 Compartment

This model contains one compartment.

Table 2: Properties of all compartments.

Id	Name	SBO	Spatial Dimensions	Size	Unit	Constant	Outside
compartment_1	compartment_1		3	1	litre	☑	

3.1 Compartment compartment_1

This is a three dimensional compartment with a 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	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
VIII	VIII	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
VIIIa	VIIIa	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
APC_PS	APC_PS	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
IX	IX	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
IXa	IXa	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
XIa	XIa	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
XI	XI	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
XIIa	XIIa	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
VII	VII	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
VIIa	VIIa	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
X	X	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
Xa	Xa	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
IXa_VIIIa	IXa_VIIIa	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
V	V	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
Va	Va	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
II	II	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
F	F	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
Fg	Fg	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐
DP	DP	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☑
P	P	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	☐	☐

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
XF	XF	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
XIII	XIII	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
Pg	Pg	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
APC	APC	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
IIa_Tmod	IIa_Tmod	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
PC	PC	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
Tmod	Tmod	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
TF	TF	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
VIIa_TF	VIIa_TF	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
VII_TF	VII_TF	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
Xa_TFPI	Xa_TFPI	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
TFPI	TFPI	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
PS	PS	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
VKH2	VKH2	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
Va_Xa	Va_Xa	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
CA	CA	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
XII	XII	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
K	K	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
ATIII_Heparin	ATIII_Heparin	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
Xa_ATIII_Heparin	Xa_ATIII_Heparin	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
VK	VK	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
C_warf	C_warf	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	☑
VKO	VKO	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
Pk	Pk	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
FDP	FDP	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
D	D	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟
TAT	TAT	compartment_1	$\mathrm{nmol \cdot l^{-1}}$	⊟	⊟

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
VIIa_TF_Xa_TFPI	VIIa_TF_Xa_TFPI	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
XIIIa	XIIIa	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
IIa_ATIII_Heparin	IIa_ATIII_Heparin	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
IXa_ATIII_Heparin	IXa_ATIII_Heparin	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	⊟	⊟
A_warf	A_warf	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	⊟	☑
VK_p	VK_p	compartment_1	$\mathrm{nmol} \cdot \mathrm{l}^{-1}$	⊟	⊟

5 Parameters

This model contains 58 global parameters.

Table 4: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
I_max	I_max		1.000		☑
IC50	IC50		0.340		☑
II0	II(0)		1394.400		☑
VII0	VII(0)		10.000		☑
IX0	IX(0)		89.600		☑
X0	X(0)		174.300		☑
PC0	PC(0)		60.000		☑
PS0	PS(0)		300.000		☑
VKH20	VKH2(0)		0.100		☑
d_II	d_II	0000035	0.010		☑
d_VII	d_VII	0000035	0.120		☑
d_IX	d_IX	0000035	0.029		☑
d_X	d_X	0000035	0.018		☑
d_PC	d_PC	0000035	0.050		☑
d_PS	d_PS	0000035	0.017		☑
vitaminK_Vc	vitaminK_Vc		24.000		☑
d_VK2	d_VK2		0.023		☑
d_VKH2	d_VKH2	0000035	0.228		☑
d_VKO	d_VKO		0.228		☑
VK0	VK(0)		1.000		☑
VKO0	VKO(0)		0.100		☑
vitaminK_k21_Vc	vitaminK_k21/Vc	0000038	$5.08333333333333 \cdot 10^{-4}$		☑
vitaminK_k12	vitaminK_k12	0000035	0.059		☑
heparin_ke	heparin_ke	0000035	0.693		☑
warfarin_ka	warfarin_ka		1.000		☑
warfarin_Vd	warfarin_Vd		10.000		☑
warfarin_CL	warfarin_CL		0.200		☑
warfarin_ke	warfarin_ke		0.020		☑
d_XII	d_XII	0000035	0.012		☑
d_VIII	d_VIII	0000035	0.058		☑
d_XI	d_XI		0.100		☑
d_V	d_V	0000035	0.043		☑
d_Fg	d_Fg	0000035	0.032		☑
d_XIII	d_XIII	0000035	0.004		☑
d_Pg	d_Pg	0000035	0.050		☑
d_Tmod	d_Tmod	0000035	0.050		☑

Id	Name	SBO	Value	Unit	Constant
d_TFPI	d_TFPI	0000035	20.000		☑
d_Pk	d_Pk	0000035	0.050		☑
XII0	XII(0)		375.000		☑
VIII0	VIII(0)		0.700		☑
XI0	XI(0)		30.600		☑
V0	V(0)		26.700		☑
Fg0	Fg(0)		8945.500		☑
XIII0	XIII(0)		70.300		☑
Pg0	Pg(0)		2154.300		☑
Tmod0	Tmod(0)		50.000		☑
TFPI0	TFPI(0)		2.500		☑
Pk0	Pk(0)		450.000		☑
R1	R1		0.141		☑
R2	R2		1.000		☑
c44	c44	0000036	0.120		☑
c45	c45	0000036	0.850		☑
c46	c46	0000036	0.850		☑
d_VK	d_VK	0000035	0.205		☑
warfarin_daily_dose	warfarin_daily_dose		4.000		☑
heparin_infusion	heparin_infusion	0000048	0.000		⊟
heparin_bolus	heparin_bolus		0.000		☑
heparin_infusion_duration_hr	heparin_infusion_duration [hr]		24.000		☑

6 Initialassignments

This is an overview of 27 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 ATIII_Heparin

Derived unit contains undeclared units

Math heparin_bolus

6.18 Initialassignment VK

Derived unit contains undeclared units

Math VK0

6.19 Initialassignment VKO

Derived unit contains undeclared units

Math VKO0

6.20 Initialassignment Pk

Derived unit contains undeclared units

Math Pk0

6.21 Initialassignment VK_p

Derived unit contains undeclared units

Math $\frac{\text{VK0} \cdot \text{vitaminK\_k12}}{\text{vitaminK\_k21\_Vc}}$

6.22 Initialassignment d_VKH2

Derived unit contains undeclared units

Math $\frac{\text{d\_VK2} \cdot \text{VK0}}{\text{VKH20}}$

6.23 Initialassignment d_VKO

Derived unit contains undeclared units

Math $\frac{\text{d\_VK2} \cdot \text{VK0}}{\text{VKO0}}$

6.24 Initialassignment vitaminK_k21_Vc

Derived unit contains undeclared units

Math $\frac{0.0122}{\text{vitaminK\_Vc}}$

6.25 Initialassignment warfarin_ke

Derived unit contains undeclared units

Math $\frac{\text{warfarin\_CL}}{\text{warfarin\_Vd}}$

6.26 Initialassignment c44

Derived unit contains undeclared units

Math $\text{c45} \cdot \text{R1}$

6.27 Initialassignment c46

Derived unit contains undeclared units

Math c45 · R2

7 Function definitions

This is an overview of six function definitions.

7.1 Function definition Constant_flux_irreversible

Name Constant flux (irreversible)

Argument v

Mathematical Expression

$$\mathrm{v} \tag{1}$$

7.2 Function definition Factor_production

Name Factor production

Arguments initial, degradation

Mathematical Expression

$$\mathrm{initial} \cdot \mathrm{degradation} \tag{2}$$

7.3 Function definition Hyperbolic_rate_law

Name Hyperbolic rate law

Arguments v, substrate, enzyme, k

Mathematical Expression

$$\frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{3}$$

7.4 Function definition VKH2mediated_factor_production

Name VKH2-mediated factor production

Arguments d_factor, factor_initial, [VKH2], VKH2_initial

Mathematical Expression

$$\frac{\mathrm{d\_factor} \cdot \mathrm{factor\_initial} \cdot [\mathrm{VKH2}]}{\mathrm{VKH2\_initial}} \tag{4}$$

7.5 Function definition Irreversible_association

Name Irreversible association

Arguments s1, s2, c

Mathematical Expression

$$\frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \tag{5}$$

7.6 Function definition Warfarin_inhibited_first_order_kinetics

Name Warfarin inhibited first order kinetics

Arguments Imax, Cwarf, IC50, substrate, degradation

Mathematical Expression

$$\mathrm{degradation} \cdot \mathrm{substrate} \cdot \left(1 - \frac{\mathrm{Imax} \cdot \mathrm{Cwarf}}{\mathrm{IC50} + \mathrm{Cwarf}}\right) \tag{6}$$

8 Rules

This is an overview of three rules.

8.1 Rule DP

Rule DP is an assignment rule for species DP:

$$\mathrm{DP} = [\mathrm{FDP}] + [\mathrm{D}] \tag{7}$$

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

8.2 Rule C_warf

Rule C_warf is a rate rule for species C_warf:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{C\_warf} = \frac{\mathrm{warfarin\_ka} \cdot [\mathrm{A\_warf}]}{\mathrm{warfarin\_Vd}} - \mathrm{warfarin\_ke} \cdot [\mathrm{C\_warf}] \tag{8}$$

8.3 Rule A_warf

Rule A_warf is a rate rule for species A_warf:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{A\_warf} = \mathrm{warfarin\_ka} \cdot [\mathrm{A\_warf}] \tag{9}$$

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

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 `warfarin_administration`

Name warfarin_administration

Trigger condition

$$\begin{cases} \text{time} - 24 \cdot \left\lceil \dfrac{\text{time}}{24} \right\rceil & \text{if } (\text{time} < 0) \oplus (24 < 0) \\ \text{time} - 24 \cdot \left\lfloor \dfrac{\text{time}}{24} \right\rfloor & \text{otherwise} \end{cases} > 1 \tag{10}$$

Assignment

$$\text{A\_warf} = [\text{A\_warf}] + \text{warfarin\_daily\_dose} \tag{11}$$

9.2 Event `heparin_administration`

Name heparin_administration

Trigger condition

$$\text{time} > \text{heparin\_infusion\_duration\_hr} \tag{12}$$

Assignment

$$\text{heparin\_infusion} = 0 \tag{13}$$

10 Reactions

This model contains 116 reactions. All reactions are listed in the following table and are subsequently described in detail. If a reaction is affected by a modifier, the identifier of this species is written above the reaction arrow.

Table 5: Overview of all reactions

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

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

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

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

№	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 $\longrightarrow \emptyset$	
116	pHeparin	pHeparin	$\emptyset \longrightarrow$ ATIII_Heparin	

10.1 Reaction r1_

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

Name r1

Reaction equation

$$\mathrm{VIII} \xrightarrow{\mathrm{IIa}} \mathrm{VIIIa} \tag{14}$$

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

$$v_1 = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{VIII}], [\mathrm{IIa}], \mathrm{k}\right) \tag{15}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{16}$$

$$\text{Hyperbolic\_rate\_law}\left(\text{v}, \text{substrate}, \text{enzyme}, \text{k}\right) = \frac{\text{v} \cdot \text{substrate} \cdot \text{enzyme}}{\text{k} + \text{enzyme}} \tag{17}$$

Table 9: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	50000.000		☑
k	k	0000371	10^{-6}		☑

10.2 Reaction r2_

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

Name r2

Reaction equation

$$\text{VIIIa} \xrightarrow{\text{APC\_PS}} \emptyset \tag{18}$$

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

$$v_2 = \text{vol}\left(\text{compartment\_1}\right) \cdot \text{Hyperbolic\_rate\_law}\left(\text{v}, [\text{VIIIa}], [\text{APC\_PS}], \text{k}\right) \tag{19}$$

$$\text{Hyperbolic\_rate\_law}\left(\text{v}, \text{substrate}, \text{enzyme}, \text{k}\right) = \frac{\text{v} \cdot \text{substrate} \cdot \text{enzyme}}{\text{k} + \text{enzyme}} \tag{20}$$

$$\text{Hyperbolic\_rate\_law}\left(\text{v}, \text{substrate}, \text{enzyme}, \text{k}\right) = \frac{\text{v} \cdot \text{substrate} \cdot \text{enzyme}}{\text{k} + \text{enzyme}} \tag{21}$$

Table 12: Properties of each parameter.

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

10.3 Reaction r3_

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

Name r3

Reaction equation

$$\text{IX} \xrightarrow{\text{XIa}} \text{IXa} \tag{22}$$

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

$$v_3 = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{IX}], [\mathrm{XIa}], \mathrm{k}\right) \tag{23}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{24}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{25}$$

Table 16: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		☑
k	k	0000371	10.0		☑

10.4 Reaction r4_

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

Name r4

Reaction equation

$$\mathrm{XI} \xrightarrow{\mathrm{XIIa}} \mathrm{XIa} \tag{26}$$

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

$$v_4 = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{XI}], [\mathrm{XIIa}], \mathrm{k}\right) \tag{27}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{28}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{29}$$

Table 20: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		☑
k	k	0000371	1.0		☑

10.5 Reaction r5_

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

Name r5

Reaction equation

$$\mathrm{XI} \xrightarrow{\mathrm{IIa}} \mathrm{XIa} \tag{30}$$

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

$$v_5 = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{XI}], [\mathrm{IIa}], \mathrm{k}\right) \tag{31}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{32}$$

$$\text{Hyperbolic\_rate\_law}\left(\text{v}, \text{substrate}, \text{enzyme}, \text{k}\right) = \frac{\text{v} \cdot \text{substrate} \cdot \text{enzyme}}{\text{k} + \text{enzyme}} \tag{33}$$

Table 24: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	10.0		☑
k	k	0000371	10.0		☑

10.6 Reaction r6_

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

Name r6

Reaction equation

$$\text{VII} \xrightarrow{\text{IIa}} \text{VIIa} \tag{34}$$

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

$$v_6 = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{VII}], [\mathrm{IIa}], \mathrm{k}\right) \tag{35}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{36}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{37}$$

Table 28: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	0.1		☑
k	k	0000371	10.0		☑

10.7 Reaction r7_

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

Name r7

Reaction equation

$$\mathrm{X} \xrightarrow{\mathrm{IXa}} \mathrm{Xa} \tag{38}$$

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

$$v_7 = \text{vol}\left(\text{compartment\_1}\right) \cdot \text{Hyperbolic\_rate\_law}\left(\text{v}, [\text{X}], [\text{IXa}], \text{k}\right) \tag{39}$$

$$\text{Hyperbolic\_rate\_law}\left(\text{v}, \text{substrate}, \text{enzyme}, \text{k}\right) = \frac{\text{v} \cdot \text{substrate} \cdot \text{enzyme}}{\text{k} + \text{enzyme}} \tag{40}$$

$$\text{Hyperbolic\_rate\_law}\left(\text{v}, \text{substrate}, \text{enzyme}, \text{k}\right) = \frac{\text{v} \cdot \text{substrate} \cdot \text{enzyme}}{\text{k} + \text{enzyme}} \tag{41}$$

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

$$\mathrm{X} \xrightarrow{\mathrm{IXa\_VIIIa}} \mathrm{Xa} \tag{42}$$

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

$$v_8 = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{X}], [\mathrm{IXa\_VIIIa}], \mathrm{k}\right) \tag{43}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{44}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{45}$$

Table 36: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	2.0		☑
k	k	0000371	0.1		☑

10.9 Reaction r9_

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

Name r9

Reaction equation

$$\mathrm{X} \xrightarrow{\mathrm{VIIa}} \mathrm{Xa} \tag{46}$$

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
Xa	Xa	0000011

Kinetic Law

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

Derived unit contains undeclared units

$$v_9 = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{X}], [\mathrm{VIIa}], \mathrm{k}\right) \tag{47}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{48}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{49}$$

Table 40: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	10^{-9}		☑
k	k	0000371	10.000		☑

10.10 Reaction r10

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

Name r10

Reaction equation

$$\mathrm{V} \xrightarrow{\mathrm{IIa}} \mathrm{Va} \tag{50}$$

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

$$v_{10} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{V}], [\mathrm{IIa}], \mathrm{k}\right) \tag{51}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{52}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{53}$$

Table 44: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	50000.0		☑
k	k	0000371	10.0		☑

10.11 Reaction r11

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

Name r11

Reaction equation

$$\mathrm{Va} \xrightarrow{\mathrm{APC\_PS}} \emptyset \tag{54}$$

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

$$v_{11} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{Va}], [\mathrm{APC\_PS}], \mathrm{k}\right) \tag{55}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{56}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{57}$$

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

$$\mathrm{II} \xrightarrow{\mathrm{Va\_Xa}} \mathrm{IIa} \tag{58}$$

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

$$v_{12} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{II}], [\mathrm{Va\_Xa}], \mathrm{k}\right) \tag{59}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{60}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{61}$$

Table 51: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	100.0		☑
k	k	0000371	10.0		☑

10.13 Reaction r13

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

Name r13

Reaction equation

$$\mathrm{II} \xrightarrow{\mathrm{Xa}} \mathrm{IIa} \tag{62}$$

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

$$v_{13} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{II}], [\mathrm{Xa}], \mathrm{k}\right) \tag{63}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{64}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{65}$$

Table 55: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	9.0		☑
k	k	0000371	500.0		☑

10.14 Reaction r14

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

Name r14

Reaction equation

$$\mathrm{Fg} \xrightarrow{\mathrm{IIa}} \mathrm{F} \tag{66}$$

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

$$v_{14} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{Fg}], [\mathrm{IIa}], \mathrm{k}\right) \tag{67}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{68}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{69}$$

Table 59: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	20000.0		☑
k	k	0000371	0.5		☑

10.15 Reaction r15

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

Name r15

Reaction equation

$$\mathrm{Fg} \xrightarrow{\mathrm{P}} \mathrm{FDP} \tag{70}$$

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

$$v_{15} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{Fg}], [\mathrm{P}], \mathrm{k}\right) \tag{71}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{72}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{73}$$

Table 63: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	500.0		☑
k	k	0000371	500.0		☑

10.16 Reaction r16

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

Name r16

Reaction equation

$$\mathrm{F} \xrightarrow{\mathrm{XIIIa}} \mathrm{XF} \tag{74}$$

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

$$v_{16} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{F}], [\mathrm{XIIIa}], \mathrm{k}\right) \tag{75}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{76}$$

$$\text{Hyperbolic\_rate\_law}\left(\text{v}, \text{substrate}, \text{enzyme}, \text{k}\right) = \frac{\text{v} \cdot \text{substrate} \cdot \text{enzyme}}{\text{k} + \text{enzyme}} \tag{77}$$

Table 67: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		☑
k	k	0000371	10.0		☑

10.17 Reaction r17

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

Name r17

Reaction equation

$$\text{F} \xrightarrow{\text{P}} \text{FDP} \tag{78}$$

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

$$v_{17} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{F}], [\mathrm{P}], \mathrm{k}\right) \tag{79}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{80}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{81}$$

Table 71: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		☑
k	k	0000371	10.0		☑

10.18 Reaction r18

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

Name r18

Reaction equation

$$\mathrm{XF} \xrightarrow{\mathrm{P}} \mathrm{D} \tag{82}$$

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

$$v_{18} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{XF}], [\mathrm{P}], \mathrm{k}\right) \tag{83}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{84}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{85}$$

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

$$\mathrm{XF} \xrightarrow{\mathrm{APC\_PS}} \mathrm{D} \tag{86}$$

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

$$v_{19} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{XF}], [\mathrm{APC\_PS}], \mathrm{k}\right) \tag{87}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{88}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{89}$$

Table 79: Properties of each parameter.

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

10.20 Reaction r20

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

Name r20

Reaction equation

$$\mathrm{XIII} \xrightarrow{\mathrm{IIa}} \mathrm{XIIIa} \tag{90}$$

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

$$v_{20} = \text{vol}\left(\text{compartment\_1}\right) \cdot \text{Hyperbolic\_rate\_law}\left(\text{v}, [\text{XIII}], [\text{IIa}], \text{k}\right) \tag{91}$$

$$\text{Hyperbolic\_rate\_law}\left(\text{v}, \text{substrate}, \text{enzyme}, \text{k}\right) = \frac{\text{v} \cdot \text{substrate} \cdot \text{enzyme}}{\text{k} + \text{enzyme}} \tag{92}$$

$$\text{Hyperbolic\_rate\_law}\left(\text{v}, \text{substrate}, \text{enzyme}, \text{k}\right) = \frac{\text{v} \cdot \text{substrate} \cdot \text{enzyme}}{\text{k} + \text{enzyme}} \tag{93}$$

Table 83: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		☑
k	k	0000371	1.0		☑

10.21 Reaction r21

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

Name r21

Reaction equation

$$\text{Pg} \xrightarrow{\text{IIa}} \text{P} \tag{94}$$

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

$$v_{21} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{Pg}], [\mathrm{IIa}], \mathrm{k}\right) \tag{95}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{96}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{97}$$

Table 87: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		☑
k	k	0000371	5000.0		☑

10.22 Reaction r22

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

Name r22

Reaction equation

$$\mathrm{Pg} \xrightarrow{\mathrm{F}} \mathrm{P} \tag{98}$$

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

$$v_{22} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{Pg}], [\mathrm{F}], \mathrm{k}\right) \tag{99}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{100}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{101}$$

Table 91: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	5.0		☑
k	k	0000371	10000.0		☑

10.23 Reaction r23

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

Name r23

Reaction equation

$$\mathrm{Pg} \xrightarrow{\mathrm{APC\_PS}} \mathrm{P} \tag{102}$$

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

$$v_{23} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{Pg}], [\mathrm{APC\_PS}], \mathrm{k}\right) \tag{103}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{104}$$

$$\text{Hyperbolic\_rate\_law}\left(\text{v}, \text{substrate}, \text{enzyme}, \text{k}\right) = \frac{\text{v} \cdot \text{substrate} \cdot \text{enzyme}}{\text{k} + \text{enzyme}} \tag{105}$$

Table 95: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	2.0		☑
k	k	0000371	1.0		☑

10.24 Reaction r24

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

Name r24

Reaction equation

$$\text{PC} \xrightarrow{\text{IIa\_Tmod}} \text{APC} \tag{106}$$

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

$$v_{24} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{PC}], [\mathrm{IIa\_Tmod}], \mathrm{k}\right) \tag{107}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{108}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{109}$$

Table 99: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		☑
k	k	0000371	1.0		☑

10.25 Reaction r25

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

Name r25

Reaction equation

$$\mathrm{Va\_Xa} \xrightarrow{\mathrm{APC\_PS}} \emptyset \tag{110}$$

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

$$v_{25} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{Va\_Xa}], [\mathrm{APC\_PS}], \mathrm{k}\right) \tag{111}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{112}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{113}$$

Table 102: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	2.0		☑
k	k	0000371	1.0		☑

10.26 Reaction r26

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

Name r26

Reaction equation

$$\mathrm{IXa} + \mathrm{VIIIa} \longrightarrow \mathrm{IXa\_VIIIa} \tag{114}$$

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

$$v_{26} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Irreversible\_association}\left([\mathrm{IXa}], [\mathrm{VIIIa}], \mathrm{c}\right) \tag{115}$$

$$\mathrm{Irreversible\_association}\left(\mathrm{s1}, \mathrm{s2}, \mathrm{c}\right) = \frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \tag{116}$$

$$\mathrm{Irreversible\_association}\left(\mathrm{s1}, \mathrm{s2}, \mathrm{c}\right) = \frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \tag{117}$$

Table 105: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
c	c	0000036	0.01		☑

10.27 Reaction r27

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

Name r27

Reaction equation

$$\mathrm{Va} + \mathrm{Xa} \longrightarrow \mathrm{Va\_Xa} \tag{118}$$

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

$$v_{27} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Irreversible\_association}\left([\mathrm{Va}], [\mathrm{Xa}], \mathrm{c}\right) \tag{119}$$

$$\mathrm{Irreversible\_association}\left(\mathrm{s1}, \mathrm{s2}, \mathrm{c}\right) = \frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \tag{120}$$

$$\mathrm{Irreversible\_association}\left(\mathrm{s1}, \mathrm{s2}, \mathrm{c}\right) = \frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \tag{121}$$

Table 108: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
c	c	0000036	0.5		☑

10.28 Reaction r28

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

Name r28

Reaction equation

$$\mathrm{IIa} + \mathrm{Tmod} \longrightarrow \mathrm{IIa\_Tmod} \tag{122}$$

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

$$v_{28} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Irreversible\_association}\left(\left[\mathrm{IIa}\right], \left[\mathrm{Tmod}\right], \mathrm{c}\right) \tag{123}$$

$$\mathrm{Irreversible\_association}\left(\mathrm{s1}, \mathrm{s2}, \mathrm{c}\right) = \frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \tag{124}$$

$$\mathrm{Irreversible\_association}\left(\mathrm{s1}, \mathrm{s2}, \mathrm{c}\right) = \frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \tag{125}$$

Table 111: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
c	c	0000036	0.5		☑

10.29 Reaction r29

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

Name r29

Reaction equation

$$\mathrm{VIIa} + \mathrm{TF} \longrightarrow \mathrm{VIIa\_TF} \tag{126}$$

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

$$v_{29} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Irreversible\_association}\left(\left[\mathrm{VIIa}\right], \left[\mathrm{TF}\right], \mathrm{c}\right) \tag{127}$$

$$\mathrm{Irreversible\_association}\left(\mathrm{s1}, \mathrm{s2}, \mathrm{c}\right) = \frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \tag{128}$$

$$\mathrm{Irreversible\_association}\left(\mathrm{s1}, \mathrm{s2}, \mathrm{c}\right) = \frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \tag{129}$$

Table 114: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
c	c	0000036	0.5		☑

10.30 Reaction r30

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

Name r30

Reaction equation

$$\mathrm{VII} + \mathrm{TF} \longrightarrow \mathrm{VII\_TF} \tag{130}$$

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

$$v_{30} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Irreversible\_association}\left([\mathrm{VII}], [\mathrm{TF}], \mathrm{c}\right) \tag{131}$$

$$\mathrm{Irreversible\_association}\left(\mathrm{s1}, \mathrm{s2}, \mathrm{c}\right) = \frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \tag{132}$$

$$\mathrm{Irreversible\_association}\left(\mathrm{s1}, \mathrm{s2}, \mathrm{c}\right) = \frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \tag{133}$$

Table 117: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
c	c	0000036	0.1		☑

10.31 Reaction r31

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

Name r31

Reaction equation

$$\text{VIIa\_TF} + \text{Xa\_TFPI} \longrightarrow \text{VIIa\_TF\_Xa\_TFPI} \tag{134}$$

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

$$v_{31} = \text{vol}(\text{compartment\_1}) \cdot \text{Irreversible\_association}([\text{VIIa\_TF}], [\text{Xa\_TFPI}], \text{c}) \tag{135}$$

$$\text{Irreversible\_association}(\text{s1}, \text{s2}, \text{c}) = \frac{\text{s1} \cdot \text{s2}}{\text{c}} \tag{136}$$

$$\text{Irreversible\_association}(\text{s1}, \text{s2}, \text{c}) = \frac{\text{s1} \cdot \text{s2}}{\text{c}} \tag{137}$$

Table 120: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
c	c	0000036	0.5		☑

10.32 Reaction r32

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

Name r32

Reaction equation

$$\mathrm{Xa} + \mathrm{TFPI} \longrightarrow \mathrm{Xa\_TFPI} \tag{138}$$

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

$$v_{32} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Irreversible\_association}\left(\left[\mathrm{Xa}\right], \left[\mathrm{TFPI}\right], \mathrm{c}\right) \tag{139}$$

$$\mathrm{Irreversible\_association}\left(\mathrm{s1}, \mathrm{s2}, \mathrm{c}\right) = \frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \tag{140}$$

$$\mathrm{Irreversible\_association}\left(\mathrm{s1}, \mathrm{s2}, \mathrm{c}\right) = \frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \tag{141}$$

Table 123: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
c	c	0000036	0.5		☑

10.33 Reaction r33

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

Name r33

Reaction equation

$$\text{VII\_TF} \xrightarrow{\text{Xa}} \text{VIIa\_TF} \tag{142}$$

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

$$v_{33} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{Hyperbolic\_rate\_law}\,(\mathrm{v}, [\mathrm{VII\_TF}], [\mathrm{Xa}], \mathrm{k}) \tag{143}$$

$$\mathrm{Hyperbolic\_rate\_law}\,(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{144}$$

$$\mathrm{Hyperbolic\_rate\_law}\,(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{145}$$

Table 127: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	70.0		☑
k	k	0000371	1.0		☑

10.34 Reaction r34

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

Name r34

Reaction equation

$$\mathrm{X} \xrightarrow{\mathrm{VIIa\_TF}} \mathrm{Xa} \tag{146}$$

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

$$v_{34} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{X}], [\mathrm{VIIa\_TF}], \mathrm{k}\right) \tag{147}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{148}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{149}$$

Table 131: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	900.0		☑
k	k	0000371	200.0		☑

10.35 Reaction r35

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

Name r35

Reaction equation

$$\mathrm{IX} \xrightarrow{\mathrm{VIIa\_TF}} \mathrm{IXa} \tag{150}$$

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

$$v_{35} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{IX}], [\mathrm{VIIa\_TF}], \mathrm{k}\right) \tag{151}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{152}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{153}$$

Table 135: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	70.0		☑
k	k	0000371	1.0		☑

10.36 Reaction r36

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

Name r36

Reaction equation

$$\text{VII\_TF} \xrightarrow{\text{TF}} \text{VIIa\_TF} \tag{154}$$

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

$$v_{36} = \text{vol}\left(\text{compartment\_1}\right) \cdot \text{Hyperbolic\_rate\_law}\left(\text{v}, [\text{VII\_TF}], [\text{TF}], \text{k}\right) \tag{155}$$

$$\text{Hyperbolic\_rate\_law}\left(\text{v}, \text{substrate}, \text{enzyme}, \text{k}\right) = \frac{\text{v} \cdot \text{substrate} \cdot \text{enzyme}}{\text{k} + \text{enzyme}} \tag{156}$$

$$\text{Hyperbolic\_rate\_law}\left(\text{v}, \text{substrate}, \text{enzyme}, \text{k}\right) = \frac{\text{v} \cdot \text{substrate} \cdot \text{enzyme}}{\text{k} + \text{enzyme}} \tag{157}$$

Table 139: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	1000.0		☑
k	k	0000371	1.0		☑

10.37 Reaction r37

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

Name r37

Reaction equation

$$\text{APC} + \text{PS} \longrightarrow \text{APC\_PS} \tag{158}$$

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

$$v_{37} = \text{vol}\left(\text{compartment\_1}\right) \cdot \text{Irreversible\_association}\left(\left[\text{APC}\right], \left[\text{PS}\right], \text{c}\right) \tag{159}$$

$$\text{Irreversible\_association}\,(\text{s1},\text{s2},\text{c}) = \frac{\text{s1}\cdot\text{s2}}{\text{c}} \tag{160}$$

$$\text{Irreversible\_association}\,(\text{s1},\text{s2},\text{c}) = \frac{\text{s1}\cdot\text{s2}}{\text{c}} \tag{161}$$

Table 142: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
c	c	0000036	0.5		☑

10.38 Reaction `r38`

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

Name r38

Reaction equation

$$\text{VII} \xrightarrow{\text{Xa}} \text{VIIa} \tag{162}$$

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

Kinetic Law

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

Derived unit contains undeclared units

$$v_{38} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{VII}], [\mathrm{Xa}], \mathrm{k}\right) \tag{163}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{164}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{165}$$

Table 146: Properties of each parameter.

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

10.39 Reaction r39

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

Name r39

Reaction equation

$$\mathrm{VII} \xrightarrow{\mathrm{VIIa\_TF}} \mathrm{VIIa} \tag{166}$$

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

$$v_{39} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{VII}], [\mathrm{VIIa\_TF}], \mathrm{k}\right) \tag{167}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{168}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{169}$$

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

$$\mathrm{VII} \xrightarrow{\mathrm{IXa}} \mathrm{VIIa} \tag{170}$$

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

$$v_{40} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{VII}], [\mathrm{IXa}], \mathrm{k}\right) \tag{171}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{172}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{173}$$

Table 154: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	0.2		☑
k	k	0000371	10.0		☑

10.41 Reaction r41

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

Name r41

Reaction equation

$$\mathrm{XII} \xrightarrow{\mathrm{CA}} \mathrm{XIIa} \tag{174}$$

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

$$v_{41} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{XII}], [\mathrm{CA}], \mathrm{k}\right) \tag{175}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{176}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{177}$$

Table 158: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		☑
k	k	0000371	1.0		☑

10.42 Reaction r42

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

Name r42

Reaction equation

$$\mathrm{XII} \xrightarrow{\mathrm{K}} \mathrm{XIIa} \tag{178}$$

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

$$v_{42} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{XII}], [\mathrm{K}], \mathrm{k}\right) \tag{179}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{180}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{181}$$

Table 162: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	70.0		☑
k	k	0000371	1.0		☑

10.43 Reaction r43

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

Name r43

Reaction equation

$$\mathrm{Pk} \xrightarrow{\mathrm{XIIa}} \mathrm{K} \tag{182}$$

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

$$v_{43} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, [\mathrm{Pk}], [\mathrm{XIIa}], \mathrm{k}\right) \tag{183}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{184}$$

$$\mathrm{Hyperbolic\_rate\_law}\left(\mathrm{v}, \mathrm{substrate}, \mathrm{enzyme}, \mathrm{k}\right) = \frac{\mathrm{v} \cdot \mathrm{substrate} \cdot \mathrm{enzyme}}{\mathrm{k} + \mathrm{enzyme}} \tag{185}$$

Table 166: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
v	v	0000025	7.0		☑
k	k	0000371	1.0		☑

10.44 Reaction r44

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

Name r44

Reaction equation

$$\mathrm{IIa} + \mathrm{ATIII\_Heparin} \longrightarrow \mathrm{IIa\_ATIII\_Heparin} \tag{186}$$

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

$$v_{44} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{Irreversible\_association}\,([\mathrm{IIa}], [\mathrm{ATIII\_Heparin}], \mathrm{c44}) \tag{187}$$

$$\mathrm{Irreversible\_association}\,(\mathrm{s1}, \mathrm{s2}, \mathrm{c}) = \frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \tag{188}$$

$$\mathrm{Irreversible\_association}\,(\mathrm{s1}, \mathrm{s2}, \mathrm{c}) = \frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \tag{189}$$

10.45 Reaction r45

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

Name r45

Reaction equation

$$\mathrm{Xa} + \mathrm{ATIII\_Heparin} \longrightarrow \mathrm{Xa\_ATIII\_Heparin} \tag{190}$$

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

$$v_{45} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{Irreversible\_association}\,([\mathrm{Xa}], [\mathrm{ATIII\_Heparin}], \mathrm{c45}) \tag{191}$$

$$\mathrm{Irreversible\_association}\,(\mathrm{s1}, \mathrm{s2}, \mathrm{c}) = \frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \tag{192}$$

$$\mathrm{Irreversible\_association}\,(\mathrm{s1}, \mathrm{s2}, \mathrm{c}) = \frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \tag{193}$$

10.46 Reaction `r46`

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

Name r46

Reaction equation

$$\mathrm{IXa} + \mathrm{ATIII\_Heparin} \longrightarrow \mathrm{IXa\_ATIII\_Heparin} \tag{194}$$

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

$$v_{46} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{Irreversible\_association}\,([\mathrm{IXa}], [\mathrm{ATIII\_Heparin}], \mathrm{c46}) \quad (195)$$

$$\mathrm{Irreversible\_association}\,(\mathrm{s1}, \mathrm{s2}, \mathrm{c}) = \frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \quad (196)$$

$$\mathrm{Irreversible\_association}\,(\mathrm{s1}, \mathrm{s2}, \mathrm{c}) = \frac{\mathrm{s1} \cdot \mathrm{s2}}{\mathrm{c}} \quad (197)$$

10.47 Reaction r47

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

Name r47

Reaction equation

$$\mathrm{VK} \xrightarrow{\mathrm{C\_warf}} \mathrm{VKH2} \quad (198)$$

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

$$v_{47} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{Warfarin\_inhibited\_first\_order\_kinetics}\,(\mathrm{I\_max}, [\mathrm{C\_warf}], \mathrm{IC50}, [\mathrm{VK}], \mathrm{d\_VK2}) \tag{199}$$

$$\mathrm{Warfarin\_inhibited\_first\_order\_kinetics}\,(\mathrm{Imax}, \mathrm{Cwarf}, \mathrm{IC50}, \mathrm{substrate}, \mathrm{degradation}) = \mathrm{degradation} \cdot \mathrm{substrate} \cdot \left(1 - \frac{\mathrm{Imax} \cdot \mathrm{Cwarf}}{\mathrm{IC50} + \mathrm{Cwarf}}\right) \tag{200}$$

$$\mathrm{Warfarin\_inhibited\_first\_order\_kinetics}\,(\mathrm{Imax}, \mathrm{Cwarf}, \mathrm{IC50}, \mathrm{substrate}, \mathrm{degradation}) = \mathrm{degradation} \cdot \mathrm{substrate} \cdot \left(1 - \frac{\mathrm{Imax} \cdot \mathrm{Cwarf}}{\mathrm{IC50} + \mathrm{Cwarf}}\right) \tag{201}$$

10.48 Reaction r48

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

Name r48

Reaction equation

$$\mathrm{VKO} \xrightarrow{\mathrm{C\_warf}} \mathrm{VK} \tag{202}$$

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

$$\begin{aligned} v_{48} = {} & \mathrm{vol}\left(\mathrm{compartment\_1}\right) \\ & \cdot \mathrm{Warfarin\_inhibited\_first\_order\_kinetics}\left(\mathrm{I\_max}, [\mathrm{C\_warf}], \mathrm{IC50}, [\mathrm{VKO}], \mathrm{d\_VKO}\right) \end{aligned} \tag{203}$$

$$\begin{aligned} & \mathrm{Warfarin\_inhibited\_first\_order\_kinetics}\left(\mathrm{Imax}, \mathrm{Cwarf}, \mathrm{IC50}, \mathrm{substrate}, \mathrm{degradation}\right) \\ & = \mathrm{degradation} \cdot \mathrm{substrate} \cdot \left(1 - \frac{\mathrm{Imax} \cdot \mathrm{Cwarf}}{\mathrm{IC50} + \mathrm{Cwarf}}\right) \end{aligned} \tag{204}$$

$$\begin{aligned} & \mathrm{Warfarin\_inhibited\_first\_order\_kinetics}\left(\mathrm{Imax}, \mathrm{Cwarf}, \mathrm{IC50}, \mathrm{substrate}, \mathrm{degradation}\right) \\ & = \mathrm{degradation} \cdot \mathrm{substrate} \cdot \left(1 - \frac{\mathrm{Imax} \cdot \mathrm{Cwarf}}{\mathrm{IC50} + \mathrm{Cwarf}}\right) \end{aligned} \tag{205}$$

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

$$\emptyset \xrightarrow{\text{VKH2}} \text{II} \tag{206}$$

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

$$v_{49} = \text{vol}(\text{compartment\_1}) \cdot \text{VKH2mediated\_factor\_production}(\text{d\_II}, \text{II0}, [\text{VKH2}], \text{VKH20}) \tag{207}$$

$$\text{VKH2mediated\_factor\_production}(\text{d\_factor}, \text{factor\_initial}, [\text{VKH2}], \text{VKH2\_initial}) = \frac{\text{d\_factor} \cdot \text{factor\_initial} \cdot [\text{VKH2}]}{\text{VKH2\_initial}} \tag{208}$$

$$\text{VKH2mediated\_factor\_production}(\text{d\_factor}, \text{factor\_initial}, [\text{VKH2}], \text{VKH2\_initial}) = \frac{\text{d\_factor} \cdot \text{factor\_initial} \cdot [\text{VKH2}]}{\text{VKH2\_initial}} \tag{209}$$

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

$$\emptyset \xrightarrow{\text{VKH2}} \text{VII} \tag{210}$$

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

$$v_{50} = \text{vol}\left(\text{compartment\_1}\right) \cdot \text{VKH2mediated\_factor\_production}\left(\text{d\_VII}, \text{VII0}, [\text{VKH2}], \text{VKH20}\right) \tag{211}$$

$$\begin{aligned}&\text{VKH2mediated\_factor\_production}\left(\text{d\_factor}, \text{factor\_initial}, [\text{VKH2}], \text{VKH2\_initial}\right)\\ &= \frac{\text{d\_factor} \cdot \text{factor\_initial} \cdot [\text{VKH2}]}{\text{VKH2\_initial}}\end{aligned} \tag{212}$$

$$\begin{aligned}&\text{VKH2mediated\_factor\_production}\left(\text{d\_factor}, \text{factor\_initial}, [\text{VKH2}], \text{VKH2\_initial}\right)\\ &= \frac{\text{d\_factor} \cdot \text{factor\_initial} \cdot [\text{VKH2}]}{\text{VKH2\_initial}}\end{aligned} \tag{213}$$

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

$$\emptyset \xrightarrow{\text{VKH2}} \text{IX} \tag{214}$$

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

$$v_{51} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{VKH2mediated\_factor\_production}\left(\mathrm{d\_IX}, \mathrm{IX0}, [\mathrm{VKH2}], \mathrm{VKH20}\right) \tag{215}$$

$$\mathrm{VKH2mediated\_factor\_production}\left(\mathrm{d\_factor}, \mathrm{factor\_initial}, [\mathrm{VKH2}], \mathrm{VKH2\_initial}\right) = \frac{\mathrm{d\_factor} \cdot \mathrm{factor\_initial} \cdot [\mathrm{VKH2}]}{\mathrm{VKH2\_initial}} \tag{216}$$

$$\mathrm{VKH2mediated\_factor\_production}\left(\mathrm{d\_factor}, \mathrm{factor\_initial}, [\mathrm{VKH2}], \mathrm{VKH2\_initial}\right) = \frac{\mathrm{d\_factor} \cdot \mathrm{factor\_initial} \cdot [\mathrm{VKH2}]}{\mathrm{VKH2\_initial}} \tag{217}$$

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

$$\emptyset \xrightarrow{\mathrm{VKH2}} \mathrm{X} \tag{218}$$

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

$$v_{52} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{VKH2mediated\_factor\_production}\left(\mathrm{d\_X}, \mathrm{X0}, [\mathrm{VKH2}], \mathrm{VKH20}\right) \tag{219}$$

$$\begin{aligned} &\mathrm{VKH2mediated\_factor\_production}\left(\mathrm{d\_factor}, \mathrm{factor\_initial}, [\mathrm{VKH2}], \mathrm{VKH2\_initial}\right) \\ &= \frac{\mathrm{d\_factor} \cdot \mathrm{factor\_initial} \cdot [\mathrm{VKH2}]}{\mathrm{VKH2\_initial}} \end{aligned} \tag{220}$$

$$\begin{aligned} &\mathrm{VKH2mediated\_factor\_production}\left(\mathrm{d\_factor}, \mathrm{factor\_initial}, [\mathrm{VKH2}], \mathrm{VKH2\_initial}\right) \\ &= \frac{\mathrm{d\_factor} \cdot \mathrm{factor\_initial} \cdot [\mathrm{VKH2}]}{\mathrm{VKH2\_initial}} \end{aligned} \tag{221}$$

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

$$\emptyset \xrightarrow{\mathrm{VKH2}} \mathrm{PC} \tag{222}$$

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

$$v_{53} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{VKH2mediated\_factor\_production}\left(\mathrm{d\_PC}, \mathrm{PC0}, [\mathrm{VKH2}], \mathrm{VKH20}\right) \tag{223}$$

$$\begin{aligned} &\mathrm{VKH2mediated\_factor\_production}\left(\mathrm{d\_factor}, \mathrm{factor\_initial}, [\mathrm{VKH2}], \mathrm{VKH2\_initial}\right) \\ &= \frac{\mathrm{d\_factor} \cdot \mathrm{factor\_initial} \cdot [\mathrm{VKH2}]}{\mathrm{VKH2\_initial}} \end{aligned} \tag{224}$$

$$\begin{aligned} &\mathrm{VKH2mediated\_factor\_production}\left(\mathrm{d\_factor}, \mathrm{factor\_initial}, [\mathrm{VKH2}], \mathrm{VKH2\_initial}\right) \\ &= \frac{\mathrm{d\_factor} \cdot \mathrm{factor\_initial} \cdot [\mathrm{VKH2}]}{\mathrm{VKH2\_initial}} \end{aligned} \tag{225}$$

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

$$\emptyset \xrightarrow{\mathrm{VKH2}} \mathrm{PS} \tag{226}$$

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

$$v_{54} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{VKH2mediated\_factor\_production}\left(\mathrm{d\_PS}, \mathrm{PS0}, [\mathrm{VKH2}], \mathrm{VKH20}\right) \tag{227}$$

$$\begin{aligned} &\mathrm{VKH2mediated\_factor\_production}\left(\mathrm{d\_factor}, \mathrm{factor\_initial}, [\mathrm{VKH2}], \mathrm{VKH2\_initial}\right) \\ &= \frac{\mathrm{d\_factor} \cdot \mathrm{factor\_initial} \cdot [\mathrm{VKH2}]}{\mathrm{VKH2\_initial}} \end{aligned} \tag{228}$$

$$\begin{aligned} &\mathrm{VKH2mediated\_factor\_production}\left(\mathrm{d\_factor}, \mathrm{factor\_initial}, [\mathrm{VKH2}], \mathrm{VKH2\_initial}\right) \\ &= \frac{\mathrm{d\_factor} \cdot \mathrm{factor\_initial} \cdot [\mathrm{VKH2}]}{\mathrm{VKH2\_initial}} \end{aligned} \tag{229}$$

10.55 Reaction dFg

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

Name dFg

Reaction equation

$$\mathrm{Fg} \longrightarrow \mathrm{FDP} \tag{230}$$

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

$$v_{55} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{d\_Fg} \cdot [\mathrm{Fg}] \tag{231}$$

10.56 Reaction dF

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

Name dF

Reaction equation

$$\mathrm{F} \longrightarrow \mathrm{FDP} \tag{232}$$

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

$$v_{56} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{k1} \cdot [\mathrm{F}] \tag{233}$$

Table 195: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	0.05		☑

10.57 Reaction dXF

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

Name dXF

Reaction equation

$$\mathrm{XF} \longrightarrow \mathrm{D} \tag{234}$$

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

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

Table 198: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	0.05		☑

10.58 Reaction dII

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

Name dII

Reaction equation

$$\mathrm{II} \longrightarrow \emptyset \tag{236}$$

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

$$v_{58} = \mathrm{vol}(\mathrm{compartment\_1}) \cdot \mathrm{d\_II} \cdot [\mathrm{II}] \tag{237}$$

10.59 Reaction dIIa

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

Name dIIa

Reaction equation

$$\text{IIa} \longrightarrow \text{TAT} \tag{238}$$

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

$$v_{59} = \text{vol}\left(\text{compartment\_1}\right) \cdot \text{k1} \cdot [\text{IIa}] \tag{239}$$

Table 202: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	67.4		☑

10.60 Reaction dTF

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

Name dTF

Reaction equation

$$\text{TF} \longrightarrow \emptyset \tag{240}$$

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

$$v_{60} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{k1} \cdot [\mathrm{TF}] \tag{241}$$

Table 204: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	0.05		☑

10.61 Reaction dV

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

Name dV

Reaction equation

$$\mathrm{V} \longrightarrow \emptyset \tag{242}$$

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

$$v_{61} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{d\_V} \cdot [\mathrm{V}] \tag{243}$$

10.62 Reaction dVa

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

Name dVa

Reaction equation

$$\mathrm{Va} \longrightarrow \emptyset \tag{244}$$

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

$$v_{62} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{k1} \cdot [\mathrm{Va}] \tag{245}$$

Table 207: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		☑

10.63 Reaction dVII

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

Name dVII

Reaction equation

$$\mathrm{VII} \longrightarrow \emptyset \tag{246}$$

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

$$v_{63} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{d\_VII} \cdot [\mathrm{VII}] \tag{247}$$

10.64 Reaction dVIIa

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

Name dVIIa

Reaction equation

$$\mathrm{VIIa} \longrightarrow \emptyset \tag{248}$$

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

$$v_{64} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{k1} \cdot [\mathrm{VIIa}] \tag{249}$$

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

$$\mathrm{VIII} \longrightarrow \emptyset \tag{250}$$

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

$$v_{65} = \mathrm{vol}(\mathrm{compartment\_1}) \cdot \mathrm{d\_VIII} \cdot [\mathrm{VIII}] \tag{251}$$

10.66 Reaction dVIIIa

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

Name dVIIIa

Reaction equation

$$\mathrm{VIIIa} \longrightarrow \emptyset \tag{252}$$

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

$$v_{66} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{k1} \cdot [\mathrm{VIIIa}] \tag{253}$$

Table 213: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		☑

10.67 Reaction dX

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

Name dX

Reaction equation

$$\mathrm{X} \longrightarrow \emptyset \tag{254}$$

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

$$v_{67} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{d\_X} \cdot [\mathrm{X}] \tag{255}$$

10.68 Reaction dXa

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

Name dXa

Reaction equation

$$\mathrm{Xa} \longrightarrow \emptyset \tag{256}$$

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

$$v_{68} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{k1} \cdot [\mathrm{Xa}] \tag{257}$$

Table 216: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		☑

10.69 Reaction dIX

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

Name dIX

Reaction equation

$$\mathrm{IX} \longrightarrow \emptyset \tag{258}$$

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

$$v_{69} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{d\_IX} \cdot [\mathrm{IX}] \tag{259}$$

10.70 Reaction `dIXa`

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

Name dIXa

Reaction equation

$$\mathrm{IXa} \longrightarrow \emptyset \tag{260}$$

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

$$v_{70} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{k1} \cdot [\mathrm{IXa}] \tag{261}$$

Table 219: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
`k1`	k1	0000035	20.0		☑

10.71 Reaction `dXII`

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

Name dXII

Reaction equation

$$\mathrm{XII} \longrightarrow \emptyset \tag{262}$$

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

$$v_{71} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{d\_XII} \cdot [\mathrm{XII}] \tag{263}$$

10.72 Reaction dXIIa

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

Name dXIIa

Reaction equation

$$\mathrm{XIIa} \longrightarrow \emptyset \tag{264}$$

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

$$v_{72} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{k1} \cdot [\mathrm{XIIa}] \tag{265}$$

Table 222: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		☑

10.73 Reaction dXIII

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

Name dXIII

Reaction equation

$$\mathrm{XIII} \longrightarrow \emptyset \tag{266}$$

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

$$v_{73} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{d\_XIII} \cdot [\mathrm{XIII}] \tag{267}$$

10.74 Reaction dXIIIa

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

Name dXIIIa

Reaction equation

$$\mathrm{XIIIa} \longrightarrow \emptyset \tag{268}$$

Reactant

Table 224: Properties of each reactant.

Id	Name	SBO
XIIIa	XIIIa	0000010

Kinetic Law

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

Derived unit contains undeclared units

$$v_{74} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{k1} \cdot [\mathrm{XIIIa}] \tag{269}$$

Table 225: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	0.69		☑

10.75 Reaction dPk

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

Name dPk

Reaction equation

$$\mathrm{Pk} \longrightarrow \emptyset \tag{270}$$

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

$$v_{75} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{d\_Pk} \cdot [\mathrm{Pk}] \tag{271}$$

10.76 Reaction dK

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

Name dK

Reaction equation

$$\mathrm{K} \longrightarrow \emptyset \tag{272}$$

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

$$v_{76} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{k1} \cdot [\mathrm{K}] \tag{273}$$

Table 228: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		☑

10.77 Reaction dPg

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

Name dPg

Reaction equation

$$\mathrm{Pg} \longrightarrow \emptyset \tag{274}$$

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

$$v_{77} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{d\_Pg} \cdot [\mathrm{Pg}] \tag{275}$$

10.78 Reaction dP

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

Name dP

Reaction equation

$$\mathrm{P} \longrightarrow \emptyset \tag{276}$$

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

$$v_{78} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{k1} \cdot [\mathrm{P}] \tag{277}$$

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

$$\mathrm{PC} \longrightarrow \emptyset \tag{278}$$

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

$$v_{79} = \mathrm{vol}(\mathrm{compartment\_1}) \cdot \mathrm{d\_PC} \cdot [\mathrm{PC}] \tag{279}$$

10.80 Reaction dAPC

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

Name dAPC

Reaction equation

$$\mathrm{APC} \longrightarrow \emptyset \tag{280}$$

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

$$v_{80} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{k1} \cdot [\mathrm{APC}] \tag{281}$$

Table 234: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.4		☑

10.81 Reaction dPS

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

Name dPS

Reaction equation

$$\mathrm{PS} \longrightarrow \emptyset \tag{282}$$

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

$$v_{81} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{d\_PS} \cdot [\mathrm{PS}] \tag{283}$$

10.82 Reaction dFDP

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

Name dFDP

Reaction equation

$$\mathrm{FDP} \longrightarrow \emptyset \tag{284}$$

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

$$v_{82} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{k1} \cdot [\mathrm{FDP}] \tag{285}$$

Table 237: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	3.5		☑

10.83 Reaction dD

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

Name dD

Reaction equation

$$\mathrm{D} \longrightarrow \emptyset \tag{286}$$

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

$$v_{83} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{k1} \cdot [\mathrm{D}] \tag{287}$$

Table 239: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	0.1		☑

10.84 Reaction dTFPI

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

Name dTFPI

Reaction equation

$$\mathrm{TFPI} \longrightarrow \emptyset \tag{288}$$

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

$$v_{84} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{d\_TFPI} \cdot [\mathrm{TFPI}] \tag{289}$$

10.85 Reaction dVIIa_TF

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

Name dVIIa_TF

Reaction equation

$$\text{VIIa\_TF} \longrightarrow \emptyset \tag{290}$$

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

$$v_{85} = \text{vol}(\text{compartment\_1}) \cdot \text{k1} \cdot [\text{VIIa\_TF}] \tag{291}$$

Table 242: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		☑

10.86 Reaction dVII_TF

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

Name dVII_TF

Reaction equation

$$\text{VII\_TF} \longrightarrow \emptyset \tag{292}$$

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

$$v_{86} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{k1} \cdot [\mathrm{VII\_TF}] \tag{293}$$

Table 244: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	0.7		☑

10.87 Reaction dAPC_PS

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

Name dAPC_PS

Reaction equation

$$\mathrm{APC\_PS} \longrightarrow \emptyset \tag{294}$$

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

$$v_{87} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{k1} \cdot [\mathrm{APC\_PS}] \tag{295}$$

Table 246: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		☑

10.88 Reaction dVa_Xa

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

Name dVa_Xa

Reaction equation

$$\text{Va\_Xa} \longrightarrow \emptyset \tag{296}$$

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

$$v_{88} = \text{vol}\left(\text{compartment\_1}\right) \cdot \text{k1} \cdot [\text{Va\_Xa}] \tag{297}$$

Table 248: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		☑

10.89 Reaction dIXa_VIIIa

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

Name dIXa_VIIIa

Reaction equation

$$\text{IXa\_VIIIa} \longrightarrow \emptyset \tag{298}$$

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

$$v_{89} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{k1} \cdot [\mathrm{IXa\_VIIIa}] \tag{299}$$

Table 250: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		☑

10.90 Reaction dTmod

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

Name dTmod

Reaction equation

$$\mathrm{Tmod} \longrightarrow \emptyset \tag{300}$$

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

$$v_{90} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{d\_Tmod} \cdot [\mathrm{Tmod}] \tag{301}$$

10.91 Reaction dIIa_Tmod

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

Name dIIa_Tmod

Reaction equation

$$\text{IIa\_Tmod} \longrightarrow \emptyset \tag{302}$$

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

$$v_{91} = \text{vol}\left(\text{compartment\_1}\right) \cdot \text{k1} \cdot [\text{IIa\_Tmod}] \tag{303}$$

Table 253: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		☑

10.92 Reaction dXa_TFPI

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

Name dXa_TFPI

Reaction equation

$$\text{Xa\_TFPI} \longrightarrow \emptyset \tag{304}$$

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

$$v_{92} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{k1} \cdot [\mathrm{Xa\_TFPI}] \tag{305}$$

Table 255: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		☑

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

$$\mathrm{VIIa\_TF\_Xa\_TFPI} \longrightarrow \emptyset \tag{306}$$

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

$$v_{93} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{k1} \cdot [\mathrm{VIIa\_TF\_Xa\_TFPI}] \tag{307}$$

Table 257: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		☑

10.94 Reaction dTAT

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

Name dTAT

Reaction equation

$$\mathrm{TAT} \longrightarrow \emptyset \tag{308}$$

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

$$v_{94} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{k1} \cdot [\mathrm{TAT}] \tag{309}$$

Table 259: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	0.2		☑

10.95 Reaction dCA

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

Name dCA

Reaction equation

$$\mathrm{CA} \longrightarrow \emptyset \tag{310}$$

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

$$v_{95} = \mathrm{vol}(\mathrm{compartment\_1}) \cdot \mathrm{k1} \cdot [\mathrm{CA}] \tag{311}$$

Table 261: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	0.05		☑

10.96 Reaction dXIa

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

Name dXIa

Reaction equation

$$\mathrm{XIa} \longrightarrow \emptyset \tag{312}$$

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

$$v_{96} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{k1} \cdot [\mathrm{XIa}] \tag{313}$$

Table 263: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	20.0		☑

10.97 Reaction dVKH2

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

Name dVKH2

Reaction equation

$$\mathrm{VKH2} \longrightarrow \mathrm{VKO} \tag{314}$$

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

$$v_{97} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{d\_VKH2} \cdot [\mathrm{VKH2}] \tag{315}$$

10.98 Reaction VK_transport

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

Name VK_transport

Reaction equation

$$\mathrm{VK} \rightleftharpoons \mathrm{VK\_p} \tag{316}$$

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

$$v_{98} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot (\mathrm{vitaminK\_k12} \cdot [\mathrm{VK}] - \mathrm{vitaminK\_k21\_Vc} \cdot [\mathrm{VK\_p}]) \tag{317}$$

10.99 Reaction eHeparin

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

Name eHeparin

Reaction equation

$$\mathrm{ATIII\_Heparin} \longrightarrow \emptyset \tag{318}$$

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

$$v_{99} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{heparin\_ke} \cdot [\mathrm{ATIII\_Heparin}] \tag{319}$$

10.100 Reaction eHeparinXa

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

Name eHeparinXa

Reaction equation

$$\mathrm{Xa\_ATIII\_Heparin} \longrightarrow \emptyset \tag{320}$$

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

$$v_{100} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{heparin\_ke} \cdot [\mathrm{Xa\_ATIII\_Heparin}] \tag{321}$$

10.101 Reaction eHeparinIXa

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

Name eHeparinIXa

Reaction equation

$$\text{IXa\_ATIII\_Heparin} \longrightarrow \emptyset \tag{322}$$

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

$$v_{101} = \text{vol}\left(\text{compartment\_1}\right) \cdot \text{heparin\_ke} \cdot [\text{IXa\_ATIII\_Heparin}] \tag{323}$$

10.102 Reaction eHeparinIIa

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

Name eHeparinIIa

Reaction equation

$$\text{IIa\_ATIII\_Heparin} \longrightarrow \emptyset \tag{324}$$

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

$$v_{102} = \text{vol}\left(\text{compartment\_1}\right) \cdot \text{heparin\_ke} \cdot [\text{IIa\_ATIII\_Heparin}] \tag{325}$$

10.103 Reaction dXI

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

Name dXI

Reaction equation

$$\mathrm{XI} \longrightarrow \emptyset \tag{326}$$

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

$$v_{103} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{k1} \cdot [\mathrm{XI}] \tag{327}$$

Table 273: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1	0000035	0.1		☑

10.104 Reaction pXII

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

Name pXII

Reaction equation

$$\emptyset \longrightarrow \mathrm{XII} \tag{328}$$

Product

Table 274: Properties of each product.

Id	Name	SBO
XII	XII	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{104} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{Factor\_production}\,(\mathrm{XII0}, \mathrm{d\_XII}) \tag{329}$$

$$\mathrm{Factor\_production}\,(\mathrm{initial}, \mathrm{degradation}) = \mathrm{initial} \cdot \mathrm{degradation} \tag{330}$$

$$\mathrm{Factor\_production}\,(\mathrm{initial}, \mathrm{degradation}) = \mathrm{initial} \cdot \mathrm{degradation} \tag{331}$$

10.105 Reaction pVIII

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

Name pVIII

Reaction equation

$$\emptyset \longrightarrow \mathrm{VIII} \tag{332}$$

Product

Table 275: Properties of each product.

Id	Name	SBO
VIII	VIII	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{105} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{Factor\_production}\,(\mathrm{VIII0}, \mathrm{d\_VIII}) \tag{333}$$

$$\mathrm{Factor\_production}\,(\mathrm{initial}, \mathrm{degradation}) = \mathrm{initial} \cdot \mathrm{degradation} \tag{334}$$

$$\mathrm{Factor\_production}\,(\mathrm{initial}, \mathrm{degradation}) = \mathrm{initial} \cdot \mathrm{degradation} \tag{335}$$

10.106 Reaction pXI

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

Name pXI

Reaction equation

$$\emptyset \longrightarrow \mathrm{XI} \tag{336}$$

Product

Table 276: Properties of each product.

Id	Name	SBO
XI	XI	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{106} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Factor\_production}\left(\mathrm{XI0}, \mathrm{d\_XI}\right) \tag{337}$$

$$\mathrm{Factor\_production}\left(\mathrm{initial}, \mathrm{degradation}\right) = \mathrm{initial} \cdot \mathrm{degradation} \tag{338}$$

$$\mathrm{Factor\_production}\left(\mathrm{initial}, \mathrm{degradation}\right) = \mathrm{initial} \cdot \mathrm{degradation} \tag{339}$$

10.107 Reaction pV

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

Name pV

Reaction equation

$$\emptyset \longrightarrow \mathrm{V} \tag{340}$$

Product

Table 277: Properties of each product.

Id	Name	SBO
V	V	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{107} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{Factor\_production}\,(\mathrm{V0}, \mathrm{d\_V}) \tag{341}$$

$$\mathrm{Factor\_production}\,(\mathrm{initial}, \mathrm{degradation}) = \mathrm{initial} \cdot \mathrm{degradation} \tag{342}$$

$$\mathrm{Factor\_production}\,(\mathrm{initial}, \mathrm{degradation}) = \mathrm{initial} \cdot \mathrm{degradation} \tag{343}$$

10.108 Reaction pFg

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

Name pFg

Reaction equation

$$\emptyset \longrightarrow \mathrm{Fg} \tag{344}$$

Product

Table 278: Properties of each product.

Id	Name	SBO
Fg	Fg	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{108} = \mathrm{vol}\,(\mathrm{compartment\_1}) \cdot \mathrm{Factor\_production}\,(\mathrm{Fg0}, \mathrm{d\_Fg}) \tag{345}$$

$$\mathrm{Factor\_production}\,(\mathrm{initial}, \mathrm{degradation}) = \mathrm{initial} \cdot \mathrm{degradation} \tag{346}$$

$$\mathrm{Factor\_production}\,(\mathrm{initial}, \mathrm{degradation}) = \mathrm{initial} \cdot \mathrm{degradation} \tag{347}$$

10.109 Reaction pXIII

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

Name pXIII

Reaction equation

$$\emptyset \longrightarrow \text{XIII} \tag{348}$$

Product

Table 279: Properties of each product.

Id	Name	SBO
XIII	XIII	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{109} = \text{vol}(\text{compartment\_1}) \cdot \text{Factor\_production}(\text{XIII0}, \text{d\_XIII}) \tag{349}$$

$$\text{Factor\_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \tag{350}$$

$$\text{Factor\_production}(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \tag{351}$$

10.110 Reaction pPg

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

Name pPg

Reaction equation

$$\emptyset \longrightarrow \text{Pg} \tag{352}$$

Product

Table 280: Properties of each product.

Id	Name	SBO
Pg	Pg	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{110} = \text{vol}(\text{compartment\_1}) \cdot \text{Factor\_production}(\text{Pg0}, \text{d\_Pg}) \tag{353}$$

$$\text{Factor\_production}\,(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \tag{354}$$

$$\text{Factor\_production}\,(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \tag{355}$$

10.111 Reaction `pTmod`

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

Name pTmod

Reaction equation

$$\emptyset \longrightarrow \text{Tmod} \tag{356}$$

Product

Table 281: Properties of each product.

Id	Name	SBO
`Tmod`	Tmod	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{111} = \text{vol}\,(\text{compartment\_1}) \cdot \text{Factor\_production}\,(\text{Tmod0}, \text{d\_Tmod}) \tag{357}$$

$$\text{Factor\_production}\,(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \tag{358}$$

$$\text{Factor\_production}\,(\text{initial}, \text{degradation}) = \text{initial} \cdot \text{degradation} \tag{359}$$

10.112 Reaction `pTFPI`

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

Name pTFPI

Reaction equation

$$\emptyset \longrightarrow \text{TFPI} \tag{360}$$

Product

Table 282: Properties of each product.

Id	Name	SBO
TFPI	TFPI	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{112} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Factor\_production}\left(\mathrm{TFPI0}, \mathrm{d\_TFPI}\right) \tag{361}$$

$$\mathrm{Factor\_production}\left(\mathrm{initial}, \mathrm{degradation}\right) = \mathrm{initial} \cdot \mathrm{degradation} \tag{362}$$

$$\mathrm{Factor\_production}\left(\mathrm{initial}, \mathrm{degradation}\right) = \mathrm{initial} \cdot \mathrm{degradation} \tag{363}$$

10.113 Reaction pPk

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

Name pPk

Reaction equation

$$\emptyset \longrightarrow \mathrm{Pk} \tag{364}$$

Product

Table 283: Properties of each product.

Id	Name	SBO
Pk	Pk	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{113} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Factor\_production}\left(\mathrm{Pk0}, \mathrm{d\_Pk}\right) \tag{365}$$

$$\mathrm{Factor\_production}\left(\mathrm{initial}, \mathrm{degradation}\right) = \mathrm{initial} \cdot \mathrm{degradation} \tag{366}$$

$$\mathrm{Factor\_production}\left(\mathrm{initial}, \mathrm{degradation}\right) = \mathrm{initial} \cdot \mathrm{degradation} \tag{367}$$

10.114 Reaction pVK

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

Name pVK

Reaction equation

$$\emptyset \longrightarrow \mathrm{VK} \tag{368}$$

Product

Table 284: Properties of each product.

Id	Name	SBO
VK	VK	0000011

Kinetic Law

Derived unit contains undeclared units

$$v_{114} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Factor\_production}\left(\mathrm{VK0}, \mathrm{d\_VK}\right) \tag{369}$$

$$\mathrm{Factor\_production}\left(\mathrm{initial}, \mathrm{degradation}\right) = \mathrm{initial} \cdot \mathrm{degradation} \tag{370}$$

$$\mathrm{Factor\_production}\left(\mathrm{initial}, \mathrm{degradation}\right) = \mathrm{initial} \cdot \mathrm{degradation} \tag{371}$$

10.115 Reaction dVK

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

Name dVK

Reaction equation

$$\mathrm{VK} \longrightarrow \emptyset \tag{372}$$

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

$$v_{115} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{d\_VK} \cdot [\mathrm{VK}] \tag{373}$$

10.116 Reaction `pHeparin`

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

Name pHeparin

Reaction equation

$$\emptyset \longrightarrow \mathrm{ATIII\_Heparin} \tag{374}$$

Product

Table 286: Properties of each product.

Id	Name	SBO
`ATIII_Heparin`	ATIII_Heparin	0000011

Kinetic Law

SBO:0000047 mass action rate law for zeroth order irreversible reactions, continuous scheme

Derived unit contains undeclared units

$$v_{116} = \mathrm{vol}\left(\mathrm{compartment\_1}\right) \cdot \mathrm{Constant\_flux\_irreversible}\left(\mathrm{heparin\_infusion}\right) \tag{375}$$

$$\mathrm{Constant\_flux\_irreversible}\left(\mathrm{v}\right) = \mathrm{v} \tag{376}$$

$$\mathrm{Constant\_flux\_irreversible}\left(\mathrm{v}\right) = \mathrm{v} \tag{377}$$

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

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`).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{IIa} = v_{12} + v_{13} - v_{28} - v_{44} - v_{59} \tag{378}$$

11.2 Species `VIII`

Name VIII

Initial concentration $0.7\ \mathrm{nmol} \cdot \mathrm{l}^{-1}$

Initial assignment `VIII`

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{VIII} = v_{105} - v_{1} - v_{65} \tag{379}$$

11.3 Species `VIIIa`

Name VIIIa

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{VIIIa} = v_{1} - v_{2} - v_{26} - v_{66} \tag{380}$$

11.4 Species `APC_PS`

Name APC_PS

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

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`).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{APC\_PS} = v_{37} - v_{87} \tag{381}$$

11.5 Species IX

Name IX

Initial concentration $89.6\ \mathrm{nmol \cdot l^{-1}}$

Initial assignment IX

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{IX} = v_{51} - v_3 - v_{35} - v_{69} \tag{382}$$

11.6 Species IXa

Name IXa

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{IXa} = v_3 + v_{35} - v_{26} - v_{46} - v_{70} \tag{383}$$

11.7 Species XIa

Name XIa

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

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_).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{XIa} = v_4 + v_5 - v_{96} \tag{384}$$

11.8 Species XI

Name XI

Initial concentration $30.6\ \mathrm{nmol \cdot l^{-1}}$

Initial assignment XI

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{XI} = v_{106} - v_4 - v_5 - v_{103} \tag{385}$$

11.9 Species XIIa

Name XIIa

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{XIIa} = v_{41} + v_{42} - v_{72} \tag{386}$$

11.10 Species VII

Name VII

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{VII} = v_{50} - v_6 - v_{30} - v_{38} - v_{39} - v_{40} - v_{63} \tag{387}$$

11.11 Species VIIa

Name VIIa

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

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_).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{VIIa} = v_6 + v_{38} + v_{39} + v_{40} - v_{29} - v_{64} \tag{388}$$

11.12 Species X

Name X

Initial concentration $174.3\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{X} = v_{52} - v_7 - v_8 - v_9 - v_{34} - v_{67} \tag{389}$$

11.13 Species Xa

Name Xa

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Xa} = v_7 + v_8 + v_9 + v_{34} - v_{27} - v_{32} - v_{45} - v_{68} \tag{390}$$

11.14 Species IXa_VIIIa

Name IXa_VIIIa

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

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_).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{IXa\_VIIIa} = v_{26} - v_{89} \tag{391}$$

11.15 Species V

Name V

Initial concentration $26.7\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

Initial assignment V

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{V} = v_{107} - v_{10} - v_{61} \tag{392}$$

11.16 Species Va

Name Va

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Va} = v_{10} - v_{11} - v_{27} - v_{62} \tag{393}$$

11.17 Species II

Name II

Initial concentration $1394.4\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

Initial assignment II

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{II} = v_{49} - v_{12} - v_{13} - v_{58} \tag{394}$$

11.18 Species F

Name F

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{F} = v_{14} - v_{16} - v_{17} - v_{56} \tag{395}$$

11.19 Species Fg

Name Fg

Initial concentration $8945.5\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

Initial assignment Fg

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Fg} = v_{108} - v_{14} - v_{15} - v_{55} \tag{396}$$

11.20 Species DP

Name DP

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

Involved in rule DP

One rule determines the species' quantity.

11.21 Species P

Name P

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{P} = v_{21} + v_{22} + v_{23} - v_{78} \tag{397}$$

11.22 Species XF

Name XF

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{XF} = v_{16} - v_{18} - v_{19} - v_{57} \tag{398}$$

11.23 Species XIII

Name XIII

Initial concentration $70.3\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

Initial assignment XIII

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{XIII} = v_{109} - v_{20} - v_{73} \tag{399}$$

11.24 Species Pg

Name Pg

Initial concentration $2154.3\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

Initial assignment Pg

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Pg} = v_{110} - v_{21} - v_{22} - v_{23} - v_{77} \tag{400}$$

11.25 Species APC

Name APC

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{APC} = v_{24} - v_{37} - v_{80} \tag{401}$$

11.26 Species IIa_Tmod

Name IIa_Tmod

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{IIa\_Tmod} = v_{28} - v_{91} \tag{402}$$

11.27 Species PC

Name PC

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

Initial assignment PC

This species takes part in three reactions (as a reactant in r24, dPC and as a product in pPC_VKH2).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{PC} = v_{53} - v_{24} - v_{79} \tag{403}$$

11.28 Species Tmod

Name Tmod

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

Initial assignment Tmod

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Tmod} = v_{111} - v_{28} - v_{90} \tag{404}$$

11.29 Species TF

Name TF

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{TF} = -v_{29} - v_{30} - v_{60} \tag{405}$$

11.30 Species VIIa_TF

Name VIIa_TF

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{VIIa\_TF} = v_{29} + v_{33} + v_{36} - v_{31} - v_{85} \tag{406}$$

11.31 Species VII_TF

Name VII_TF

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{VII\_TF} = v_{30} - v_{33} - v_{36} - v_{86} \tag{407}$$

11.32 Species Xa_TFPI

Name Xa_TFPI

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Xa\_TFPI} = v_{32} - v_{31} - v_{92} \tag{408}$$

11.33 Species TFPI

Name TFPI

Initial concentration $2.5\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

Initial assignment TFPI

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{TFPI} = v_{112} - v_{32} - v_{84} \tag{409}$$

11.34 Species PS

Name PS

Initial concentration $300\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

Initial assignment PS

This species takes part in three reactions (as a reactant in r37, dPS and as a product in pPS_VKH2).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{PS} = v_{54} - v_{37} - v_{81} \tag{410}$$

11.35 Species VKH2

Name VKH2

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{VKH2} = v_{47} - v_{97} \tag{411}$$

11.36 Species Va_Xa

Name Va_Xa

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Va\_Xa} = v_{27} - v_{25} - v_{88} \tag{412}$$

11.37 Species CA

Name CA

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{CA} = -v_{95} \tag{413}$$

11.38 Species XII

Name XII

Initial concentration $375\ \mathrm{nmol}\cdot\mathrm{l}^{-1}$

Initial assignment XII

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{XII} = v_{104} - v_{41} - v_{42} - v_{71} \tag{414}$$

11.39 Species K

Name K

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{K} = v_{43} - v_{76} \tag{415}$$

11.40 Species ATIII_Heparin

Name ATIII_Heparin

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

Initial assignment ATIII_Heparin

This species takes part in five reactions (as a reactant in r44, r45, r46, eHeparin and as a product in pHeparin).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{ATIII\_Heparin} = v_{116} - v_{44} - v_{45} - v_{46} - v_{99} \tag{416}$$

11.41 Species Xa_ATIII_Heparin

Name Xa_ATIII_Heparin

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Xa\_ATIII\_Heparin} = v_{45} - v_{100} \tag{417}$$

11.42 Species VK

Name VK

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

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).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{VK} = v_{48} + v_{114} - v_{47} - v_{98} - v_{115} \tag{418}$$

11.43 Species C_warf

Name C_warf

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

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

Initial assignment VKO

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{VKO} = v_{97} - v_{48} \tag{419}$$

11.45 Species Pk

Name Pk

Initial concentration $450\ \mathrm{nmol} \cdot \mathrm{l}^{-1}$

Initial assignment Pk

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Pk} = v_{113} - v_{43} - v_{75} \tag{420}$$

11.46 Species FDP

Name FDP

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{FDP} = v_{15} + v_{17} + v_{55} + v_{56} - v_{82} \tag{421}$$

11.47 Species D

Name D

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{D} = v_{18} + v_{19} + v_{57} - v_{83} \tag{422}$$

11.48 Species TAT

Name TAT

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{TAT} = v_{59} - v_{94} \tag{423}$$

11.49 Species VIIa_TF_Xa_TFPI

Name VIIa_TF_Xa_TFPI

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{VIIa\_TF\_Xa\_TFPI} = v_{31} - v_{93} \tag{424}$$

11.50 Species XIIIa

Name XIIIa

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{XIIIa} = v_{20} - v_{74} \tag{425}$$

11.51 Species IIa_ATIII_Heparin

Name IIa_ATIII_Heparin

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{IIa\_ATIII\_Heparin} = v_{44} - v_{102} \tag{426}$$

11.52 Species IXa_ATIII_Heparin

Name IXa_ATIII_Heparin

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{IXa\_ATIII\_Heparin} = v_{46} - v_{101} \tag{427}$$

11.53 Species A_warf

Name A_warf

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

Involved in event warfarin_administration

Involved in rule A_warf

One rule together with one event determine the species' quantity.

11.54 Species VK_p

Name VK_p

Initial concentration $115.4754\ \mathrm{nmol} \cdot \mathrm{l}^{-1}$

Initial assignment VK_p

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{VK\_p} = v_{98} \tag{428}$$

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:0000047 mass action rate law for zeroth 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 constant. It is to be used in a reaction modelled using a continuous framework.

SBO:0000048 forward zeroth order rate constant, continuous case: Numerical parameter that quantifies the forward velocity of a chemical reaction independant of the reactant quantities. This parameter encompasses all the contributions to the velocity. 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

SBML2LaTeX was developed by Andreas Dräger[a], Hannes Planatscher[a], Dieudonné M Wouamba[a], Adrian Schröder[a], Michael Hucka[b], Lukas Endler[c], Martin Golebiewski[d] and Andreas Zell[a]. Please see http://www.ra.cs.uni-tuebingen.de/software/SBML2LaTeX for more information.

[a]Center for Bioinformatics Tübingen (ZBIT), Germany
[b]California Institute of Technology, Beckman Institute BNMC, Pasadena, United States
[c]European Bioinformatics Institute, Wellcome Trust Genome Campus, Hinxton, United Kingdom
[d]EML Research gGmbH, Heidelberg, Germany