

SBML Model Report

Model name: “Bungay2006_FollicularFluid”



May 6, 2016

1 General Overview

This is a document in SBML Level 2 Version 4 format. This model was created by the following three authors: Nick Juty¹, Michael Schubert² and Vijayalakshmi Chelliah³ at May twelveth 2011 at 12:59 a. m. and last time modified at May 28th 2014 at 1:25 p. m. Table 1 gives an overview of the quantities of all components of this model.

Table 1: Number of components in this model, which are described in the following sections.

Element	Quantity	Element	Quantity
compartment types	0	compartments	1
species types	0	species	54
events	0	constraints	0
reactions	45	function definitions	0
global parameters	75	unit definitions	1
rules	0	initial assignments	0

Model Notes

This model is from the article:

Modelling thrombin generation in human ovarian follicular fluid

Bungay Sharene D., Gentry Patricia A., Gentry Rodney D. Bulletin of Mathematical Biology Volume 68, Issue 8, 12 July 2006, Pages 2283-302 [16838084](#),

Abstract:

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A mathematical model is constructed to study thrombin production in human ovarian follicular fluid. The model results show that the amount of thrombin that can be produced in ovarian follicular fluid is much lower than that in blood plasma, failing to reach the level required for fibrin formation, and thereby supporting the hypothesis that in follicular fluid thrombin functions to initiate cellular activities via intracellular signalling receptors. It is also concluded that the absence of the amplification pathway to thrombin production in follicular fluid is a major factor in restricting the amount of thrombin that can be produced. Titration of the initial concentrations of the various reactants in the model lead to predictions for the amount of tissue factor and phospholipid that is required to maintain thrombin production in the follicle, as well as to the conclusion that tissue factor pathway inhibitor has little effect on the time that thrombin generation is sustained. Numerical experiments to determine the effect of factor V, which is at a much reduced level in follicular fluid compared to plasma, and thrombomodulin, illustrate the importance for further experimental work to determine values for several parameters that have yet to be reported in the literature.

2 Unit Definitions

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

2.1 Unit `substance`

Name nano mole

Definition nmol

2.2 Unit `volume`

Notes Litre is the predefined SBML unit for `volume`.

Definition l

2.3 Unit `area`

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

Definition m²

2.4 Unit `length`

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

Definition m

2.5 Unit `time`

Notes Second is the predefined SBML unit for `time`.

Definition `s`

3 Compartment

This model contains one compartment.

Table 2: Properties of all compartments.

Id	Name	SBO	Spatial Dimensions	Size	Unit	Constant	Outside
compartment	Cell		3	1	litre	<input checked="" type="checkbox"/>	

3.1 Compartment `compartment`

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

Name `Cell`

4 Species

This model contains 54 species. Section 7 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
II_f	II_f	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
II_l	II_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
mIIa_f	mIIa_f	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
mIIa_l	mIIa_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
V_f	V_f	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
V_l	V_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
Va_f	Va_f	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
Va_l	Va_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
VII_f	VII_f	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
VII_l	VII_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
VIIa_f	VIIa_f	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
VIIa_l	VIIa_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
X_f	X_f	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
X_l	X_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
Xa_f	Xa_f	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
Xa_l	Xa_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
APC_f	APC_f	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
APC_l	APC_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
PS_f	PS_f	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
PS_l	PS_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
Vai_f	Vai_f	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square
Vai_l	Vai_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\square	\square

Id	Name	Compartment	Derived Unit	Constant	Boundary Condi- tion
PC_f	PC_f	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
PC_l	PC_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
TF_l	TF_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
TF_VIIa_l	TF_VIIa_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
TF_VII_l	TF_VII_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
TF_VIIa_X_l	TF_VIIa_X_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
TF_VIIa_Xa_l	TF_VIIa_Xa_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
TF_VII_Xa_l	TF_VII_Xa_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Xa_Va_l	Xa_Va_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
V_Xa_l	V_Xa_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
IIa_f	IIa_f	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
V_IIa_l	V_IIa_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Xa_Va_II_l	Xa_Va_II_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Xa_Va_mIIa_l	Xa_Va_mIIa_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
APC_PS_l	APC_PS_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
TFPI_f	TFPI_f	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
AT_f	AT_f	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
IIa_AT_f	IIa_AT_f	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
TFPI_Xa_l	TFPI_Xa_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
TFPI_Xa_TF_VIIa_l	TFPI_Xa_TF_VIIa_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
APC_PS_Va_l	APC_PS_Va_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Xa_AT_f	Xa_AT_f	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
VII_Xa_l	VII_Xa_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
V_mIIa_l	V_mIIa_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
TM_l	TM_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
IIa_TM_l	IIa_TM_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
IIa_TM_PC_l	IIa_TM_PC_l	compartment	$\text{nmol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

Id	Name	Compartment	Derived Unit	Constant	Boundary Condi- tion
mIIa_AT_1	mIIa_AT_1	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
LIPID	LIPID	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
alpha2M_1	alpha2M_1	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
alpha2M_IIa_1	alpha2M_IIa_1	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
alpha2M_Xa_1	alpha2M_Xa_1	compartment	$\text{nmol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

5 Parameters

This model contains 75 global parameters.

Table 4: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
konII			0.004		<input checked="" type="checkbox"/>
nva			100.000		<input checked="" type="checkbox"/>
koffII			1.000		<input checked="" type="checkbox"/>
konmIIa			0.050		<input checked="" type="checkbox"/>
koffmIIa			0.475		<input checked="" type="checkbox"/>
konV			0.050		<input checked="" type="checkbox"/>
koffV			0.145		<input checked="" type="checkbox"/>
konVa			0.057		<input checked="" type="checkbox"/>
koffVa			0.170		<input checked="" type="checkbox"/>
konVII			0.050		<input checked="" type="checkbox"/>
koffVII			0.660		<input checked="" type="checkbox"/>
konVIIa			0.050		<input checked="" type="checkbox"/>
koffVIIa			0.227		<input checked="" type="checkbox"/>
konX			0.010		<input checked="" type="checkbox"/>
koffX			1.900		<input checked="" type="checkbox"/>
konXa			0.029		<input checked="" type="checkbox"/>
koffXa			3.300		<input checked="" type="checkbox"/>
konAPC			0.050		<input checked="" type="checkbox"/>
koffAPC			3.500		<input checked="" type="checkbox"/>
konPS			0.050		<input checked="" type="checkbox"/>
koffPS			0.200		<input checked="" type="checkbox"/>
konVai			0.057		<input checked="" type="checkbox"/>
koffVai			0.170		<input checked="" type="checkbox"/>
konPC			0.050		<input checked="" type="checkbox"/>
koffPC			11.500		<input checked="" type="checkbox"/>
k1			0.500		<input checked="" type="checkbox"/>
k2			0.005		<input checked="" type="checkbox"/>
k3			0.005		<input checked="" type="checkbox"/>
k4			0.005		<input checked="" type="checkbox"/>
k8			0.100		<input checked="" type="checkbox"/>
k9			32.500		<input checked="" type="checkbox"/>
k10			1.500		<input checked="" type="checkbox"/>
k11			0.050		<input checked="" type="checkbox"/>
k12			44.800		<input checked="" type="checkbox"/>
k13			15.200		<input checked="" type="checkbox"/>
k16			1.000		<input checked="" type="checkbox"/>
k17			1.000		<input checked="" type="checkbox"/>

Id	Name	SBO	Value	Unit	Constant
k21			0.100		<input checked="" type="checkbox"/>
k22			1.000		<input checked="" type="checkbox"/>
k23			0.043		<input checked="" type="checkbox"/>
k27			0.100		<input checked="" type="checkbox"/>
k28			6.940		<input checked="" type="checkbox"/>
k29			0.230		<input checked="" type="checkbox"/>
k33			0.100		<input checked="" type="checkbox"/>
k34			100.000		<input checked="" type="checkbox"/>
k35			0.100		<input checked="" type="checkbox"/>
k36			66.000		<input checked="" type="checkbox"/>
k37			13.000		<input checked="" type="checkbox"/>
k38			15.000		<input checked="" type="checkbox"/>
k39			0.050		<input checked="" type="checkbox"/>
k40			44.800		<input checked="" type="checkbox"/>
k41			15.200		<input checked="" type="checkbox"/>
k48			0.100		<input checked="" type="checkbox"/>
k49			1.600		<input checked="" type="checkbox"/>
k50			0.400		<input checked="" type="checkbox"/>
k51			0.016		<input checked="" type="checkbox"/>
k52			$3.3 \cdot 10^{-4}$		<input checked="" type="checkbox"/>
k53			0.010		<input checked="" type="checkbox"/>
k54			0.001		<input checked="" type="checkbox"/>
k56			$2.3 \cdot 10^{-6}$		<input checked="" type="checkbox"/>
k57			$6.83 \cdot 10^{-6}$		<input checked="" type="checkbox"/>
k58			0.100		<input checked="" type="checkbox"/>
k59			6.940		<input checked="" type="checkbox"/>
k60			1.035		<input checked="" type="checkbox"/>
k64			1.000		<input checked="" type="checkbox"/>
k65			0.500		<input checked="" type="checkbox"/>
k66			0.100		<input checked="" type="checkbox"/>
k67			6.400		<input checked="" type="checkbox"/>
k68			3.600		<input checked="" type="checkbox"/>
k69			$6.83 \cdot 10^{-6}$		<input checked="" type="checkbox"/>
k70			0.100		<input checked="" type="checkbox"/>
k71			0.500		<input checked="" type="checkbox"/>
k75			1.000		<input checked="" type="checkbox"/>
k77			$2.5 \cdot 10^{-6}$		<input checked="" type="checkbox"/>
k78			$1.4 \cdot 10^{-6}$		<input checked="" type="checkbox"/>

6 Reactions

This model contains 45 reactions. All reactions are listed in the following table and are subsequently described in detail. If a reaction is affected by a modifier, the identifier of this species is written above the reaction arrow.

Table 5: Overview of all reactions

Nº	Id	Name	Reaction Equation	SBO
1	LB1	Factor II lipid binding	$II.f + 100 \text{ LIPID} \longrightarrow II.l$	
2	LB2	Factor mIIa lipid binding	$mIIa.f + 100 \text{ LIPID} \longrightarrow mIIa.l$	
3	LB3	Factor V lipid binding	$V.f + 100 \text{ LIPID} \longrightarrow V.l$	
4	LB4	Factor Va lipid binding	$Va.f + 100 \text{ LIPID} \longrightarrow Va.l$	
5	LB5	Factor VII lipid binding	$VII.f + 100 \text{ LIPID} \longrightarrow VII.l$	
6	LB6	Factor VIIa lipid binding	$VIIa.f + 100 \text{ LIPID} \longrightarrow VIIa.l$	
7	LB11	Factor X lipid binding	$X.f + 100 \text{ LIPID} \longrightarrow X.l$	
8	LB12	Factor Xa lipid binding	$Xa.f + 100 \text{ LIPID} \longrightarrow Xa.l$	
9	LB13	APC lipid binding	$APC.f + 100 \text{ LIPID} \longrightarrow APC.l$	
10	LB14	PS lipid binding	$PS.f + 100 \text{ LIPID} \longrightarrow PS.l$	
11	LB16	Factor Vai lipid binding	$Vai.f + 100 \text{ LIPID} \longrightarrow Vai.l$	
12	LB17	PC lipid binding	$PC.f + 100 \text{ LIPID} \longrightarrow PC.l$	
13	R1	TF_VIIa binding	$VIIa.l + TF.l \longrightarrow TF_VIIa.l$	0000177
14	R2	TF_VII binding	$VII.l + TF.l \longrightarrow TF_VII.l$	0000177
15	R4	X_TF_VIIa complex formation	$X.l + TF_VIIa.l \longrightarrow TF_VIIa_X.l$	0000526
16	R4b	Factor X activation	$TF_VIIa_X.l \longrightarrow TF_VIIa_Xa.l$	0000170
17	R4c	Factor Xa release	$TF_VIIa_Xa.l \longrightarrow Xa.l + TF_VIIa.l$	0000180
18	R5	Xa_TF_VII binding	$Xa.l + TF_VII.l \longrightarrow TF_VII_Xa.l$	0000177
19	R5b	TF_VII activation	$TF_VII_Xa.l \longrightarrow Xa.l + TF_VIIa.l$	0000170
20	R7	Va_Xa binding	$Va.l + Xa.l \longrightarrow Xa_Va.l$	0000177
21	R9	V_Xa binding	$Xa.l + V.l \longrightarrow V_Xa.l$	0000177
22	R9b	Factor V activation	$V_Xa.l \longrightarrow Xa.l + Va.l$	0000170
23	R11		$IIa.f + V.l \longrightarrow V_IIa.l$	0000177

Nº	Id	Name	Reaction Equation	SBO
24	R11b		$V_IIa_l \longrightarrow IIa_f + Va_l$	0000180
25	R13		$II_l + Xa_Va_l \longrightarrow Xa_Va_II_l$	0000177
26	R14		$mIIa_l + Xa_Va_l \longrightarrow Xa_Va_mIIa_l$	0000177
27	R15		$Xa_Va_II_l \longrightarrow Xa_Va_mIIa_l$	0000170
28	R15b		$Xa_Va_mIIa_l \longrightarrow IIa_f + Xa_Va_l + 100 \text{ LIPID}$	0000180
29	R16		$Xa_l + VII_l \longrightarrow VII_Xa_l$	0000177
30	R16b		$VII_Xa_l \longrightarrow Xa_l + VIIa_l$	0000180
31	R19		$Va_l + APC_PS_l \longrightarrow APC_PS_Va_l$	0000177
32	R19b		$APC_PS_Va_l \longrightarrow Vai_l + APC_PS_l$	0000180
33	R20		$Xa_f + TFPI_f \longrightarrow TFPI_Xa_l$	0000177
34	R21		$TF_VIIa_l + TFPI_Xa_l \longrightarrow TFPI_Xa_TF_VIIa_l$	0000177
35	R23		$AT_f + Xa_f \longrightarrow Xa_AT_f$	0000177
36	R24		$AT_f + IIa_f \longrightarrow IIa_AT_f$	0000177
37	R25		$mIIa_l + V_l \longrightarrow V_mIIa_l$	0000177
38	R25b		$V_mIIa_l \longrightarrow mIIa_l + Va_l$	0000180
39	R27		$TM_l + IIa_f \longrightarrow IIa_TM_l$	0000177
40	R28		$PC_l + IIa_TM_l \longrightarrow IIa_TM_PC_l$	0000177
41	R28b		$IIa_TM_PC_l \longrightarrow APC_l + IIa_TM_l$	0000180
42	R29		$AT_f + mIIa_f \longrightarrow mIIa_AT_l$	0000177
43	R30		$PS_l + APC_l \longrightarrow APC_PS_l$	0000177
44	R33	R33	$\alpha 2M_l + IIa_f \longrightarrow \alpha 2M_IIa_l$	0000177
45	R34	R34	$\alpha 2M_l + Xa_f \longrightarrow \alpha 2M_Xa_l$	0000177

6.1 Reaction LB1

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

Name Factor II lipid binding

Reaction equation



Reactants

Table 6: Properties of each reactant.

Id	Name	SBO
II_f	II_f	
LIPID	LIPID	

Product

Table 7: Properties of each product.

Id	Name	SBO
II_l	II_l	

Kinetic Law

Derived unit contains undeclared units

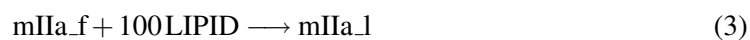
$$v_1 = \text{vol}(\text{compartment}) \cdot \left(\frac{\text{konII} \cdot [\text{II}_f] \cdot [\text{LIPID}]}{\text{nva}} - \text{koffII} \cdot [\text{II}_l] \right) \quad (2)$$

6.2 Reaction LB2

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

Name Factor mIIa lipid binding

Reaction equation



Reactants

Table 8: Properties of each reactant.

Id	Name	SBO
mIIa_f	mIIa_f	
LIPID	LIPID	

Product

Table 9: Properties of each product.

Id	Name	SBO
mIIa_l	mIIa_l	

Kinetic Law

Derived unit contains undeclared units

$$v_2 = \text{vol}(\text{compartment}) \cdot \left(\frac{\text{konmIIa} \cdot [\text{mIIa}_f] \cdot [\text{LIPID}]}{\text{nva}} - \text{koffmIIa} \cdot [\text{mIIa}_l] \right) \quad (4)$$

6.3 Reaction LB3

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

Name Factor V lipid binding

Reaction equation



Reactants

Table 10: Properties of each reactant.

Id	Name	SBO
V_f	V_f	
LIPID	LIPID	

Product

Table 11: Properties of each product.

Id	Name	SBO
V_l	V_l	

Kinetic Law

Derived unit contains undeclared units

$$v_3 = \text{vol}(\text{compartment}) \cdot \left(\frac{\text{konV} \cdot [\text{V}_f] \cdot [\text{LIPID}]}{\text{nva}} - \text{koffV} \cdot [\text{V}_l] \right) \quad (6)$$

6.4 Reaction LB4

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

Name Factor Va lipid binding

Reaction equation



Reactants

Table 12: Properties of each reactant.

Id	Name	SBO
Va_f	Va_f	
LIPID	LIPID	

Product

Table 13: Properties of each product.

Id	Name	SBO
Va_l	Va_l	

Kinetic Law

Derived unit contains undeclared units

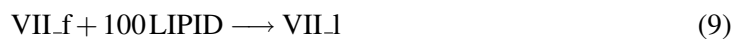
$$v_4 = \text{vol}(\text{compartment}) \cdot \left(\frac{\text{konVa} \cdot [\text{Va}_f] \cdot [\text{LIPID}]}{\text{nva}} - \text{koffVa} \cdot [\text{Va}_l] \right) \quad (8)$$

6.5 Reaction LB5

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

Name Factor VII lipid binding

Reaction equation



Reactants

Table 14: Properties of each reactant.

Id	Name	SBO
VII_f	VII_f	
LIPID	LIPID	

Product

Table 15: Properties of each product.

Id	Name	SBO
VII_l	VII_l	

Kinetic Law

Derived unit contains undeclared units

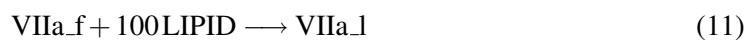
$$v_5 = \text{vol}(\text{compartment}) \cdot \left(\frac{\text{konVII} \cdot [\text{VII}_f] \cdot [\text{LIPID}]}{\text{nva}} - \text{koffVII} \cdot [\text{VII}_l] \right) \quad (10)$$

6.6 Reaction LB6

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

Name Factor VIIa lipid binding

Reaction equation



Reactants

Table 16: Properties of each reactant.

Id	Name	SBO
VIIa_f	VIIa_f	
LIPID	LIPID	

Product

Table 17: Properties of each product.

Id	Name	SBO
VIIa_l	VIIa_l	

Kinetic Law

Derived unit contains undeclared units

$$v_6 = \text{vol}(\text{compartment}) \cdot \left(\frac{\text{konVIIa} \cdot [\text{VIIa}_f] \cdot [\text{LIPID}]}{\text{nva}} - \text{koffVIIa} \cdot [\text{VIIa}_l] \right) \quad (12)$$

6.7 Reaction LB11

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

Name Factor X lipid binding

Reaction equation



Reactants

Table 18: Properties of each reactant.

Id	Name	SBO
X_f	X_f	
LIPID	LIPID	

Product

Table 19: Properties of each product.

Id	Name	SBO
X_l	X_l	

Kinetic Law

Derived unit contains undeclared units

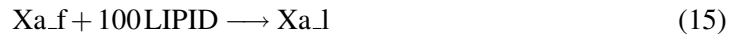
$$v_7 = \text{vol}(\text{compartment}) \cdot \left(\frac{\text{konX} \cdot [\text{X}_f] \cdot [\text{LIPID}]}{\text{nva}} - \text{koffX} \cdot [\text{X}_l] \right) \quad (14)$$

6.8 Reaction LB12

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

Name Factor Xa lipid binding

Reaction equation



Reactants

Table 20: Properties of each reactant.

Id	Name	SBO
Xa_f	Xa_f	
LIPID	LIPID	

Product

Table 21: Properties of each product.

Id	Name	SBO
Xa_l	Xa_l	

Kinetic Law

Derived unit contains undeclared units

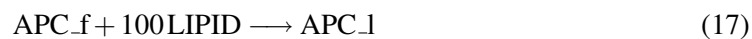
$$v_8 = \frac{\text{konXa} \cdot [\text{Xa}_f] \cdot [\text{LIPID}]}{\text{nva}} - \text{koffXa} \cdot [\text{Xa}_l] \quad (16)$$

6.9 Reaction LB13

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

Name APC lipid binding

Reaction equation



Reactants

Table 22: Properties of each reactant.

Id	Name	SBO
APC_f	APC_f	
LIPID	LIPID	

Product

Table 23: Properties of each product.

Id	Name	SBO
APC_l	APC_l	

Kinetic Law

Derived unit contains undeclared units

$$v_9 = \text{vol}(\text{compartment}) \cdot \left(\frac{\text{konAPC} \cdot [\text{APC_f}] \cdot [\text{LIPID}]}{\text{nva}} - \text{koffAPC} \cdot [\text{APC_l}] \right) \quad (18)$$

6.10 Reaction LB14

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

Name PS lipid binding

Reaction equation



Reactants

Table 24: Properties of each reactant.

Id	Name	SBO
PS_f	PS_f	
LIPID	LIPID	

Product

Table 25: Properties of each product.

Id	Name	SBO
PS_l	PS_l	

Kinetic Law

Derived unit contains undeclared units

$$v_{10} = \text{vol}(\text{compartment}) \cdot \left(\frac{\text{konPS} \cdot [\text{PS}_f] \cdot [\text{LIPID}]}{\text{nva}} - \text{koffPS} \cdot [\text{PS}_l] \right) \quad (20)$$

6.11 Reaction LB16

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

Name Factor Vai lipid binding

Reaction equation



Reactants

Table 26: Properties of each reactant.

Id	Name	SBO
Vai_f	Vai_f	
LIPID	LIPID	

Product

Table 27: Properties of each product.

Id	Name	SBO
Vai_l	Vai_l	

Kinetic Law

Derived unit contains undeclared units

$$v_{11} = \text{vol}(\text{compartment}) \cdot \left(\frac{\text{konVai} \cdot [\text{Vai}_f] \cdot [\text{LIPID}]}{\text{nva}} - \text{koffVai} \cdot [\text{Vai}_l] \right) \quad (22)$$

6.12 Reaction LB17

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

Name PC lipid binding

Reaction equation



Reactants

Table 28: Properties of each reactant.

Id	Name	SBO
PC_f	PC_f	
LIPID	LIPID	

Product

Table 29: Properties of each product.

Id	Name	SBO
PC_l	PC_l	

Kinetic Law

Derived unit contains undeclared units

$$v_{12} = \text{vol}(\text{compartment}) \cdot \left(\frac{\text{konPC} \cdot [\text{PC}_f] \cdot [\text{LIPID}]}{\text{nva}} - \text{koffPC} \cdot [\text{PC}_l] \right) \quad (24)$$

6.13 Reaction R1

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

Name TF_VIIa binding

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 30: Properties of each reactant.

Id	Name	SBO
VIIa_1	VIIa_1	
TF_1	TF_1	

Product

Table 31: Properties of each product.

Id	Name	SBO
TF_VIIa_1	TF_VIIa_1	

Kinetic Law

Derived unit contains undeclared units

$$v_{13} = \text{vol}(\text{compartment}) \cdot (k_1 \cdot [\text{TF}_1] \cdot [\text{VIIa}_1] - k_2 \cdot [\text{TF_VIIa}_1]) \quad (26)$$

6.14 Reaction R2

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

Name TF_VII binding

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 32: Properties of each reactant.

Id	Name	SBO
VII_1	VII_1	
TF_1	TF_1	

Product

Table 33: Properties of each product.

Id	Name	SBO
TF_VII_1	TF_VII_1	

Kinetic Law

Derived unit contains undeclared units

$$v_{14} = \text{vol}(\text{compartment}) \cdot (k_3 \cdot [\text{TF}_1] \cdot [\text{VII}_1] - k_4 \cdot [\text{TF_VII}_1]) \quad (28)$$

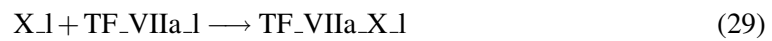
6.15 Reaction R4

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

Name X_TF_VIIa complex formation

SBO:0000526 protein complex formation

Reaction equation



Reactants

Table 34: Properties of each reactant.

Id	Name	SBO
X_1	X_1	
TF_VIIa_1	TF_VIIa_1	

Product

Table 35: Properties of each product.

Id	Name	SBO
TF_VIIa_X.1	TF_VIIa_X.1	

Kinetic Law**Derived unit** contains undeclared units

$$v_{15} = \text{vol}(\text{compartment}) \cdot (k8 \cdot [\text{TF_VIIa_1}] \cdot [\text{X_1}] - k9 \cdot [\text{TF_VIIa_X_1}]) \quad (30)$$

6.16 Reaction R4b

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

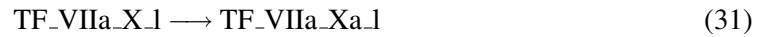
Name Factor X activation**SBO:0000170** stimulation**Reaction equation****Reactant**

Table 36: Properties of each reactant.

Id	Name	SBO
TF_VIIa_X.1	TF_VIIa_X.1	

Product

Table 37: Properties of each product.

Id	Name	SBO
TF_VIIa_Xa.1	TF_VIIa_Xa.1	

Kinetic Law**Derived unit** contains undeclared units

$$v_{16} = \text{vol}(\text{compartment}) \cdot k10 \cdot [\text{TF_VIIa_X_1}] \quad (32)$$

6.17 Reaction R4c

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

Name Factor Xa release

SBO:0000180 dissociation

Reaction equation



Reactant

Table 38: Properties of each reactant.

Id	Name	SBO
TF_VIIa_Xa.l	TF_VIIa_Xa.l	

Products

Table 39: Properties of each product.

Id	Name	SBO
Xa.l	Xa.l	
TF_VIIa.l	TF_VIIa.l	

Kinetic Law

Derived unit contains undeclared units

$$v_{17} = \text{vol}(\text{compartment}) \cdot k_{75} \cdot [\text{TF_VIIa_Xa.l}] \quad (34)$$

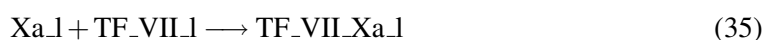
6.18 Reaction R5

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

Name Xa.TF_VII binding

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 40: Properties of each reactant.

Id	Name	SBO
Xa_1	Xa_1	
TF_VII_1	TF_VII_1	

Product

Table 41: Properties of each product.

Id	Name	SBO
TF_VII_Xa_1	TF_VII_Xa_1	

Kinetic Law

Derived unit contains undeclared units

$$v_{18} = \text{vol}(\text{compartment}) \cdot (k_{11} \cdot [\text{TF_VII_1}] \cdot [\text{Xa_1}] - k_{12} \cdot [\text{TF_VII_Xa_1}]) \quad (36)$$

6.19 Reaction R5b

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

Name TF_VII activation

SBO:0000170 stimulation

Reaction equation



Reactant

Table 42: Properties of each reactant.

Id	Name	SBO
TF_VII_Xa_1	TF_VII_Xa_1	

Products

Table 43: Properties of each product.

Id	Name	SBO
Xa_1	Xa_1	
TF_VIIa_1	TF_VIIa_1	

Kinetic Law

Derived unit contains undeclared units

$$v_{19} = \text{vol}(\text{compartment}) \cdot k_{13} \cdot [\text{TF_VII_Xa_1}] \quad (38)$$

6.20 Reaction R7

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

Name Va_Xa binding

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 44: Properties of each reactant.

Id	Name	SBO
Va_1	Va_1	
Xa_1	Xa_1	

Product

Table 45: Properties of each product.

Id	Name	SBO
Xa_Va_1	Xa_Va_1	

Kinetic Law

Derived unit contains undeclared units

$$v_{20} = \text{vol}(\text{compartment}) \cdot (k_{16} \cdot [\text{Xa}_1] \cdot [\text{Va}_1] - k_{17} \cdot [\text{Xa_Va}_1]) \quad (40)$$

6.21 Reaction R9

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

Name V_Xa binding

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 46: Properties of each reactant.

Id	Name	SBO
Xa_1	Xa_1	
V_1	V_1	

Product

Table 47: Properties of each product.

Id	Name	SBO
V_Xa_1	V_Xa_1	

Kinetic Law

Derived unit contains undeclared units

$$v_{21} = \text{vol}(\text{compartment}) \cdot (k_{21} \cdot [\text{V}_1] \cdot [\text{Xa}_1] - k_{22} \cdot [\text{V_Xa}_1]) \quad (42)$$

6.22 Reaction R9b

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

Name Factor V activation

SBO:0000170 stimulation

Reaction equation



Reactant

Table 48: Properties of each reactant.

Id	Name	SBO
V_Xa_1	V_Xa_1	

Products

Table 49: Properties of each product.

Id	Name	SBO
Xa_1	Xa_1	
Va_1	Va_1	

Kinetic Law

Derived unit contains undeclared units

$$v_{22} = \text{vol}(\text{compartment}) \cdot k_{23} \cdot [V_Xa_1] \quad (44)$$

6.23 Reaction R11

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

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 50: Properties of each reactant.

Id	Name	SBO
IIa_f	IIa_f	
V_1	V_1	

Product

Table 51: Properties of each product.

Id	Name	SBO
V_IIa_l	V_IIa_l	

Kinetic Law

Derived unit contains undeclared units

$$v_{23} = \text{vol}(\text{compartment}) \cdot (k_{27} \cdot [V_l] \cdot [IIa_f] - k_{28} \cdot [V_IIa_l]) \quad (46)$$

6.24 Reaction R11b

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

SBO:0000180 dissociation

Reaction equation



Reactant

Table 52: Properties of each reactant.

Id	Name	SBO
V_IIa_l	V_IIa_l	

Products

Table 53: Properties of each product.

Id	Name	SBO
IIa_f	IIa_f	
Va_l	Va_l	

Kinetic Law

Derived unit contains undeclared units

$$v_{24} = \text{vol}(\text{compartment}) \cdot k_{29} \cdot [V_IIa_l] \quad (48)$$

6.25 Reaction R13

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

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 54: Properties of each reactant.

Id	Name	SBO
II_1	II_1	
Xa_Va_1	Xa_Va_1	

Product

Table 55: Properties of each product.

Id	Name	SBO
Xa_Va_II_1	Xa_Va_II_1	

Kinetic Law

Derived unit contains undeclared units

$$v_{25} = \text{vol}(\text{compartment}) \cdot (k33 \cdot [Xa_Va_1] \cdot [II_1] - k34 \cdot [Xa_Va_II_1])$$

(50)

6.26 Reaction R14

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

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 56: Properties of each reactant.

Id	Name	SBO
mIIa_1	mIIa_1	
Xa_Va_1	Xa_Va_1	

Product

Table 57: Properties of each product.

Id	Name	SBO
Xa_Va_mIIa_1	Xa_Va_mIIa_1	

Kinetic Law

Derived unit contains undeclared units

$$v_{26} = \text{vol}(\text{compartment}) \cdot (k35 \cdot [\text{Xa_Va_1}] \cdot [\text{mIIa_1}] - k36 \cdot [\text{Xa_Va_mIIa_1}]) \quad (52)$$

6.27 Reaction R15

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

SBO:0000170 stimulation

Reaction equation



Reactant

Table 58: Properties of each reactant.

Id	Name	SBO
Xa_Va_II_1	Xa_Va_II_1	

Product

Table 59: Properties of each product.

Id	Name	SBO
Xa_Va_mIIa_1	Xa_Va_mIIa_1	

Id	Name	SBO
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Kinetic Law

Derived unit contains undeclared units

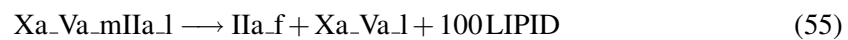
$$v_{27} = \text{vol}(\text{compartment}) \cdot k_{37} \cdot [\text{Xa_Va_II_l}] \quad (54)$$

6.28 Reaction R15b

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

SBO:0000180 dissociation

Reaction equation



Reactant

Table 60: Properties of each reactant.

Id	Name	SBO
Xa_Va_mIIa_l	Xa_Va_mIIa_l	

Products

Table 61: Properties of each product.

Id	Name	SBO
IIa_f	IIa_f	
Xa_Va_l	Xa_Va_l	
LIPID	LIPID	

Kinetic Law

Derived unit contains undeclared units

$$v_{28} = \text{vol}(\text{compartment}) \cdot k_{38} \cdot [\text{Xa_Va_mIIa_l}] \quad (56)$$

6.29 Reaction R16

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

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 62: Properties of each reactant.

Id	Name	SBO
Xa.l	Xa.l	
VII.l	VII.l	

Product

Table 63: Properties of each product.

Id	Name	SBO
VII.Xa.l	VII.Xa.l	

Kinetic Law

Derived unit contains undeclared units

$$v_{29} = \text{vol}(\text{compartment}) \cdot (k_{39} \cdot [\text{VII.l}] \cdot [\text{Xa.l}] - k_{40} \cdot [\text{VII.Xa.l}]) \quad (58)$$

6.30 Reaction R16b

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

SBO:0000180 dissociation

Reaction equation



Reactant

Table 64: Properties of each reactant.

Id	Name	SBO
VII.Xa.l	VII.Xa.l	

Products

Table 65: Properties of each product.

Id	Name	SBO
Xa_1	Xa_1	
VIIa_1	VIIa_1	

Kinetic Law

Derived unit contains undeclared units

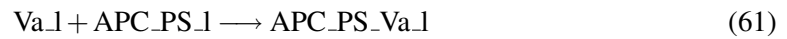
$$v_{30} = \text{vol}(\text{compartment}) \cdot k_{41} \cdot [\text{VII_Xa_1}] \quad (60)$$

6.31 Reaction R19

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

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 66: Properties of each reactant.

Id	Name	SBO
Va_1	Va_1	
APC_PS_1	APC_PS_1	

Product

Table 67: Properties of each product.

Id	Name	SBO
APC_PS_Va_1	APC_PS_Va_1	

Kinetic Law

Derived unit contains undeclared units

$$v_{31} = \text{vol}(\text{compartment}) \cdot (k_{48} \cdot [\text{APC_PS_I}] \cdot [\text{Va_I}] - k_{49} \cdot [\text{APC_PS_Va_I}]) \quad (62)$$

6.32 Reaction R19b

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

SBO:0000180 dissociation

Reaction equation



Reactant

Table 68: Properties of each reactant.

Id	Name	SBO
APC_PS_Va_I	APC_PS_Va_I	

Products

Table 69: Properties of each product.

Id	Name	SBO
Vai_I	Vai_I	
APC_PS_I	APC_PS_I	

Kinetic Law

Derived unit contains undeclared units

$$v_{32} = \text{vol}(\text{compartment}) \cdot k_{50} \cdot [\text{APC_PS_Va_I}] \quad (64)$$

6.33 Reaction R20

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

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 70: Properties of each reactant.

Id	Name	SBO
Xa_f	Xa_f	
TFPI_f	TFPI_f	

Product

Table 71: Properties of each product.

Id	Name	SBO
TFPI_Xa_l	TFPI_Xa_l	

Kinetic Law

Derived unit contains undeclared units

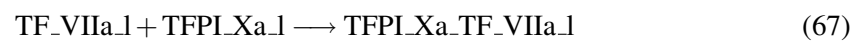
$$v_{33} = \text{vol}(\text{compartment}) \cdot (k_{51} \cdot [\text{TFPI}_f] \cdot [\text{Xa}_f] - k_{52} \cdot [\text{TFPI_Xa}_l]) \quad (66)$$

6.34 Reaction R21

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

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 72: Properties of each reactant.

Id	Name	SBO
TF_VIIa_l	TF_VIIa_l	
TFPI_Xa_l	TFPI_Xa_l	

Product

Table 73: Properties of each product.

Id	Name	SBO
TFPI_Xa_TF_VIIa_1	TFPI_Xa_TF_VIIa_1	

Kinetic Law

Derived unit contains undeclared units

$$v_{34} = \text{vol}(\text{compartment}) \cdot (k_{53} \cdot [\text{TFPI_Xa_1}] \cdot [\text{TF_VIIa_1}] - k_{54} \cdot [\text{TFPI_Xa_TF_VIIa_1}]) \quad (68)$$

6.35 Reaction R23

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

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 74: Properties of each reactant.

Id	Name	SBO
AT_f	AT_f	
Xa_f	Xa_f	

Product

Table 75: Properties of each product.

Id	Name	SBO
Xa_AT_f	Xa_AT_f	

Kinetic Law

Derived unit contains undeclared units

$$v_{35} = \text{vol}(\text{compartment}) \cdot k_{56} \cdot [\text{Xa_f}] \cdot [\text{AT_f}] \quad (70)$$

6.36 Reaction R24

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

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 76: Properties of each reactant.

Id	Name	SBO
AT_f	AT_f	
IIa_f	IIa_f	

Product

Table 77: Properties of each product.

Id	Name	SBO
IIa_AT_f	IIa_AT_f	

Kinetic Law

Derived unit contains undeclared units

$$v_{36} = \text{vol}(\text{compartment}) \cdot k57 \cdot [\text{IIa_f}] \cdot [\text{AT_f}]$$

(72)

6.37 Reaction R25

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

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 78: Properties of each reactant.

Id	Name	SBO
mIIa_1	mIIa_1	
V_1	V_1	

Product

Table 79: Properties of each product.

Id	Name	SBO
V_mIIa_1	V_mIIa_1	

Kinetic Law

Derived unit contains undeclared units

$$v_{37} = \text{vol}(\text{compartment}) \cdot (k_{58} \cdot [V_1] \cdot [mIIa_1] - k_{59} \cdot [V_mIIa_1]) \quad (74)$$

6.38 Reaction R25b

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

SBO:0000180 dissociation

Reaction equation



Reactant

Table 80: Properties of each reactant.

Id	Name	SBO
V_mIIa_1	V_mIIa_1	

Products

Table 81: Properties of each product.

Id	Name	SBO
mIIa_1	mIIa_1	

Id	Name	SBO
Va_1	Va_1	

Kinetic Law

Derived unit contains undeclared units

$$v_{38} = \text{vol}(\text{compartment}) \cdot k_{60} \cdot [V_mIa_1] \quad (76)$$

6.39 Reaction R27

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

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 82: Properties of each reactant.

Id	Name	SBO
TM_1	TM_1	
IIa_f	IIa_f	

Product

Table 83: Properties of each product.

Id	Name	SBO
IIa_TM_1	IIa_TM_1	

Kinetic Law

Derived unit contains undeclared units

$$v_{39} = \text{vol}(\text{compartment}) \cdot (k_{64} \cdot [IIa_f] \cdot [TM_1] - k_{65} \cdot [IIa_TM_1]) \quad (78)$$

6.40 Reaction R28

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

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 84: Properties of each reactant.

Id	Name	SBO
PC_1	PC_1	
IIa_TM_1	IIa_TM_1	

Product

Table 85: Properties of each product.

Id	Name	SBO
IIa_TM_PC_1	IIa_TM_PC_1	

Kinetic Law

Derived unit contains undeclared units

$$v_{40} = \text{vol}(\text{compartment}) \cdot (k66 \cdot [\text{IIa_TM}_1] \cdot [\text{PC}_1] - k67 \cdot [\text{IIa_TM_PC}_1]) \quad (80)$$

6.41 Reaction R28b

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

SBO:0000180 dissociation

Reaction equation



Reactant

Table 86: Properties of each reactant.

Id	Name	SBO
IIa_TM_PC_1	IIa_TM_PC_1	

Products

Table 87: Properties of each product.

Id	Name	SBO
APC_l	APC_l	
IIa_TM_l	IIa_TM_l	

Kinetic Law

Derived unit contains undeclared units

$$v_{41} = \text{vol}(\text{compartment}) \cdot k_{68} \cdot [\text{IIa_TM_PC_l}] \quad (82)$$

6.42 Reaction R29

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

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 88: Properties of each reactant.

Id	Name	SBO
AT_f	AT_f	
mIIa_f	mIIa_f	

Product

Table 89: Properties of each product.

Id	Name	SBO
mIIa_AT_l	mIIa_AT_l	

Kinetic Law

Derived unit contains undeclared units

$$v_{42} = \text{vol}(\text{compartment}) \cdot k_{69} \cdot [\text{mIIa}_f] \cdot [\text{AT}_f] \quad (84)$$

6.43 Reaction R30

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

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 90: Properties of each reactant.

Id	Name	SBO
PS_1	PS_1	
APC_1	APC_1	

Product

Table 91: Properties of each product.

Id	Name	SBO
APC_PS_1	APC_PS_1	

Kinetic Law

Derived unit contains undeclared units

$$v_{43} = \text{vol}(\text{compartment}) \cdot (k_{70} \cdot [\text{APC}_1] \cdot [\text{PS}_1] - k_{71} \cdot [\text{APC_PS}_1]) \quad (86)$$

6.44 Reaction R33

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

Name R33

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 92: Properties of each reactant.

Id	Name	SBO
alpha2M_l	alpha2M_l	
IIa_f	IIa_f	

Product

Table 93: Properties of each product.

Id	Name	SBO
alpha2M_IIa_l	alpha2M_IIa_l	

Kinetic Law

Derived unit contains undeclared units

$$v_{44} = \text{vol}(\text{compartment}) \cdot k_{77} \cdot [\text{alpha2M}_l] \cdot [\text{IIa}_f] \quad (88)$$

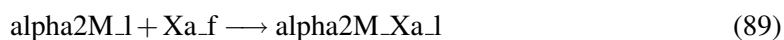
6.45 Reaction R34

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

Name R34

SBO:0000177 non-covalent binding

Reaction equation



Reactants

Table 94: Properties of each reactant.

Id	Name	SBO
alpha2M_l	alpha2M_l	
Xa_f	Xa_f	

Product

Table 95: Properties of each product.

Id	Name	SBO
alpha2M_Xa_l	alpha2M_Xa_l	

Kinetic Law

Derived unit contains undeclared units

$$v_{45} = \text{vol}(\text{compartment}) \cdot k_{78} \cdot [\text{alpha2M}_l] \cdot [\text{Xa}_f] \quad (90)$$

7 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.

7.1 Species II_f

Name II_f

Initial concentration 1174.5 nmol · l⁻¹

This species takes part in one reaction (as a reactant in LB1).

$$\frac{d}{dt} \text{II}_f = -v_1 \quad (91)$$

7.2 Species II_l

Name II_l

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in R13 and as a product in LB1).

$$\frac{d}{dt} \text{II}_l = v_1 - v_{25} \quad (92)$$

7.3 Species $mIIa_f$

Name $mIIa_f$

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

This species takes part in two reactions (as a reactant in [LB2](#), [R29](#)).

$$\frac{d}{dt}mIIa_f = -v_2 - v_{42} \quad (93)$$

7.4 Species $mIIa_l$

Name $mIIa_l$

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

This species takes part in four reactions (as a reactant in [R14](#), [R25](#) and as a product in [LB2](#), [R25b](#)).

$$\frac{d}{dt}mIIa_l = v_2 + v_{38} - v_{26} - v_{37} \quad (94)$$

7.5 Species V_f

Name V_f

Initial concentration $1.75 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in one reaction (as a reactant in [LB3](#)).

$$\frac{d}{dt}V_f = -v_3 \quad (95)$$

7.6 Species V_l

Name V_l

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

This species takes part in four reactions (as a reactant in [R9](#), [R11](#), [R25](#) and as a product in [LB3](#)).

$$\frac{d}{dt}V_l = v_3 - v_{21} - v_{23} - v_{37} \quad (96)$$

7.7 Species Va_f

Name Va_f

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

This species takes part in one reaction (as a reactant in [LB4](#)).

$$\frac{d}{dt}Va_f = -v_4 \quad (97)$$

7.8 Species Va_l

Name Va_l

Initial concentration 0 nmol · l⁻¹

This species takes part in six reactions (as a reactant in R7, R19 and as a product in LB4, R9b, R11b, R25b).

$$\frac{d}{dt} \text{Va}_l = v_4 + v_{22} + v_{24} + v_{38} - v_{20} - v_{31} \quad (98)$$

7.9 Species VII_f

Name VII_f

Initial concentration 7.6 nmol · l⁻¹

This species takes part in one reaction (as a reactant in LB5).

$$\frac{d}{dt} \text{VII}_f = -v_5 \quad (99)$$

7.10 Species VII_l

Name VII_l

Initial concentration 0 nmol · l⁻¹

This species takes part in three reactions (as a reactant in R2, R16 and as a product in LB5).

$$\frac{d}{dt} \text{VII}_l = v_5 - v_{14} - v_{29} \quad (100)$$

7.11 Species VIIa_f

Name VIIa_f

Initial concentration 0.1 nmol · l⁻¹

This species takes part in one reaction (as a reactant in LB6).

$$\frac{d}{dt} \text{VIIa}_f = -v_6 \quad (101)$$

7.12 Species VIIa_l

Name VIIa_l

Initial concentration 0 nmol · l⁻¹

This species takes part in three reactions (as a reactant in R1 and as a product in LB6, R16b).

$$\frac{d}{dt} \text{VIIa}_l = v_6 + v_{30} - v_{13} \quad (102)$$

7.13 Species X_f

Name X_f

Initial concentration 142.85 nmol · l⁻¹

This species takes part in one reaction (as a reactant in [LB11](#)).

$$\frac{d}{dt}X_f = -v_7 \quad (103)$$

7.14 Species X_l

Name X_l

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in [R4](#) and as a product in [LB11](#)).

$$\frac{d}{dt}X_l = v_7 - v_{15} \quad (104)$$

7.15 Species X_{a_f}

Name X_{a_f}

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in [LB12](#), [R20](#), [R23](#), [R34](#)).

$$\frac{d}{dt}X_{a_f} = -v_8 - v_{33} - v_{35} - v_{45} \quad (105)$$

7.16 Species X_{a_l}

Name X_{a_l}

Initial concentration 0 nmol · l⁻¹

This species takes part in nine reactions (as a reactant in [R5](#), [R7](#), [R9](#), [R16](#) and as a product in [LB12](#), [R4c](#), [R5b](#), [R9b](#), [R16b](#)).

$$\frac{d}{dt}X_{a_l} = v_8 + v_{17} + v_{19} + v_{22} + v_{30} - v_{18} - v_{20} - v_{21} - v_{29} \quad (106)$$

7.17 Species APC_f

Name APC_f

Initial concentration 0 nmol · l⁻¹

This species takes part in one reaction (as a reactant in [LB13](#)).

$$\frac{d}{dt}APC_f = -v_9 \quad (107)$$

7.18 Species APC_l

Name APC_l

Initial concentration 0 nmol · l⁻¹

This species takes part in three reactions (as a reactant in R30 and as a product in LB13, R28b).

$$\frac{d}{dt} \text{APC}_l = v_9 + v_{41} - v_{43} \quad (108)$$

7.19 Species PS_f

Name PS_f

Initial concentration 116 nmol · l⁻¹

This species takes part in one reaction (as a reactant in LB14).

$$\frac{d}{dt} \text{PS}_f = -v_{10} \quad (109)$$

7.20 Species PS_l

Name PS_l

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in R30 and as a product in LB14).

$$\frac{d}{dt} \text{PS}_l = v_{10} - v_{43} \quad (110)$$

7.21 Species Vai_f

Name Vai_f

Initial concentration 0 nmol · l⁻¹

This species takes part in one reaction (as a reactant in LB16).

$$\frac{d}{dt} \text{Vai}_f = -v_{11} \quad (111)$$

7.22 Species Vai_l

Name Vai_l

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a product in LB16, R19b).

$$\frac{d}{dt} \text{Vai}_l = v_{11} + v_{32} \quad (112)$$

7.23 Species PC_f

Name PC_f

Initial concentration 66 nmol · l⁻¹

This species takes part in one reaction (as a reactant in [LB17](#)).

$$\frac{d}{dt}PC_f = -v_{12} \quad (113)$$

7.24 Species PC_l

Name PC_l

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in [R28](#) and as a product in [LB17](#)).

$$\frac{d}{dt}PC_l = v_{12} - v_{40} \quad (114)$$

7.25 Species TF_l

Name TF_l

Initial concentration 0.0182 nmol · l⁻¹

This species takes part in two reactions (as a reactant in [R1](#), [R2](#)).

$$\frac{d}{dt}TF_l = -v_{13} - v_{14} \quad (115)$$

7.26 Species TF_VIIa_l

Name TF_VIIa_l

Initial concentration 0 nmol · l⁻¹

This species takes part in five reactions (as a reactant in [R4](#), [R21](#) and as a product in [R1](#), [R4c](#), [R5b](#)).

$$\frac{d}{dt}TF_VIIa_l = v_{13} + v_{17} + v_{19} - v_{15} - v_{34} \quad (116)$$

7.27 Species TF_VII_l

Name TF_VII_l

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in [R5](#) and as a product in [R2](#)).

$$\frac{d}{dt}TF_VII_l = v_{14} - v_{18} \quad (117)$$

7.28 Species TF_VIIa_X_1

Name TF_VIIa_X_1

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in R4b and as a product in R4).

$$\frac{d}{dt} \text{TF_VIIa_X_1} = v_{15} - v_{16} \quad (118)$$

7.29 Species TF_VIIa_Xa_1

Name TF_VIIa_Xa_1

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in R4c and as a product in R4b).

$$\frac{d}{dt} \text{TF_VIIa_Xa_1} = v_{16} - v_{17} \quad (119)$$

7.30 Species TF_VII_Xa_1

Name TF_VII_Xa_1

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in R5b and as a product in R5).

$$\frac{d}{dt} \text{TF_VII_Xa_1} = v_{18} - v_{19} \quad (120)$$

7.31 Species Xa_Va_1

Name Xa_Va_1

Initial concentration 0 nmol · l⁻¹

This species takes part in four reactions (as a reactant in R13, R14 and as a product in R7, R15b).

$$\frac{d}{dt} \text{Xa_Va_1} = v_{20} + v_{28} - v_{25} - v_{26} \quad (121)$$

7.32 Species V_Xa_1

Name V_Xa_1

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in R9b and as a product in R9).

$$\frac{d}{dt} \text{V_Xa_1} = v_{21} - v_{22} \quad (122)$$

7.33 Species IIa_f

Name IIa_f

Initial concentration 0 nmol · l⁻¹

This species takes part in six reactions (as a reactant in [R11](#), [R24](#), [R27](#), [R33](#) and as a product in [R11b](#), [R15b](#)).

$$\frac{d}{dt} \text{IIa}_f = v_{24} + v_{28} - v_{23} - v_{36} - v_{39} - v_{44} \quad (123)$$

7.34 Species V_IIa_l

Name V_IIa_l

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in [R11b](#) and as a product in [R11](#)).

$$\frac{d}{dt} \text{V}_{\text{IIa}_l} = v_{23} - v_{24} \quad (124)$$

7.35 Species Xa_Va_II_l

Name Xa_Va_II_l

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in [R15](#) and as a product in [R13](#)).

$$\frac{d}{dt} \text{Xa}_{\text{Va}_{\text{II}_l}} = v_{25} - v_{27} \quad (125)$$

7.36 Species Xa_Va_mIIa_l

Name Xa_Va_mIIa_l

Initial concentration 0 nmol · l⁻¹

This species takes part in three reactions (as a reactant in [R15b](#) and as a product in [R14](#), [R15](#)).

$$\frac{d}{dt} \text{Xa}_{\text{Va}_{\text{mIIa}_l}} = v_{26} + v_{27} - v_{28} \quad (126)$$

7.37 Species APC_PS_l

Name APC_PS_l

Initial concentration 0 nmol · l⁻¹

This species takes part in three reactions (as a reactant in [R19](#) and as a product in [R19b](#), [R30](#)).

$$\frac{d}{dt} \text{APC}_{\text{PS}_l} = v_{32} + v_{43} - v_{31} \quad (127)$$

7.38 Species TFPI_f

Name TFPI_f

Initial concentration 12.3 nmol · l⁻¹

This species takes part in one reaction (as a reactant in R20).

$$\frac{d}{dt} \text{TFPI}_f = -v_{33} \quad (128)$$

7.39 Species AT_f

Name AT_f

Initial concentration 4721 nmol · l⁻¹

This species takes part in three reactions (as a reactant in R23, R24, R29).

$$\frac{d}{dt} \text{AT}_f = -v_{35} - v_{36} - v_{42} \quad (129)$$

7.40 Species IIa_AT_f

Name IIa_AT_f

Initial concentration 0 nmol · l⁻¹

This species takes part in one reaction (as a product in R24).

$$\frac{d}{dt} \text{IIa_AT}_f = v_{36} \quad (130)$$

7.41 Species TFPI_Xa_1

Name TFPI_Xa_1

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in R21 and as a product in R20).

$$\frac{d}{dt} \text{TFPI_Xa}_1 = v_{33} - v_{34} \quad (131)$$

7.42 Species TFPI_Xa_TF_VIIa_1

Name TFPI_Xa_TF_VIIa_1

Initial concentration 0 nmol · l⁻¹

This species takes part in one reaction (as a product in R21).

$$\frac{d}{dt} \text{TFPI_Xa_TF_VIIa}_1 = v_{34} \quad (132)$$

7.43 Species APC_PS_Va_l

Name APC_PS_Va_l

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in R19b and as a product in R19).

$$\frac{d}{dt} \text{APC_PS_Va_l} = v_{31} - v_{32} \quad (133)$$

7.44 Species Xa_AT_f

Name Xa_AT_f

Initial concentration 0 nmol · l⁻¹

This species takes part in one reaction (as a product in R23).

$$\frac{d}{dt} \text{Xa_AT_f} = v_{35} \quad (134)$$

7.45 Species VII_Xa_l

Name VII_Xa_l

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in R16b and as a product in R16).

$$\frac{d}{dt} \text{VII_Xa_l} = v_{29} - v_{30} \quad (135)$$

7.46 Species V_mIIa_l

Name V_mIIa_l

Initial concentration 0 nmol · l⁻¹

This species takes part in two reactions (as a reactant in R25b and as a product in R25).

$$\frac{d}{dt} \text{V_mIIa_l} = v_{37} - v_{38} \quad (136)$$

7.47 Species TM_l

Name TM_l

Initial concentration 1 nmol · l⁻¹

This species takes part in one reaction (as a reactant in R27).

$$\frac{d}{dt} \text{TM_l} = -v_{39} \quad (137)$$

7.48 Species `Ila_TM_l`

Name `Ila_TM_l`

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

This species takes part in three reactions (as a reactant in [R28](#) and as a product in [R27](#), [R28b](#)).

$$\frac{d}{dt} \text{Ila_TM_l} = v_{39} + v_{41} - v_{40} \quad (138)$$

7.49 Species `Ila_TM_PC_l`

Name `Ila_TM_PC_l`

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

This species takes part in two reactions (as a reactant in [R28b](#) and as a product in [R28](#)).

$$\frac{d}{dt} \text{Ila_TM_PC_l} = v_{40} - v_{41} \quad (139)$$

7.50 Species `mIla_AT_l`

Name `mIla_AT_l`

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

This species takes part in one reaction (as a product in [R29](#)).

$$\frac{d}{dt} \text{mIla_AT_l} = v_{42} \quad (140)$$

7.51 Species `LIPID`

Name `LIPID`

Initial concentration $170000 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in 13 reactions (as a reactant in [LB1](#), [LB2](#), [LB3](#), [LB4](#), [LB5](#), [LB6](#), [LB11](#), [LB12](#), [LB13](#), [LB14](#), [LB16](#), [LB17](#) and as a product in [R15b](#)).

$$\begin{aligned} \frac{d}{dt} \text{LIPID} = & 100 v_{28} - 100 v_1 - 100 v_2 - 100 v_3 - 100 v_4 - 100 v_5 - 100 v_6 \\ & - 100 v_7 - 100 v_8 - 100 v_9 - 100 v_{10} - 100 v_{11} - 100 v_{12} \end{aligned} \quad (141)$$

7.52 Species `alpha2M_l`

Name `alpha2M_l`

Initial concentration $364 \text{ nmol} \cdot \text{l}^{-1}$

This species takes part in two reactions (as a reactant in [R33](#), [R34](#)).

$$\frac{d}{dt}\text{alpha2M}_l = -v_{44} - v_{45} \quad (142)$$

7.53 Species `alpha2M_Ila_l`

Name `alpha2M_Ila_l`

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

This species takes part in one reaction (as a product in [R33](#)).

$$\frac{d}{dt}\text{alpha2M_Ila}_l = v_{44} \quad (143)$$

7.54 Species `alpha2M_Xa_l`

Name `alpha2M_Xa_l`

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

This species takes part in one reaction (as a product in [R34](#)).

$$\frac{d}{dt}\text{alpha2M_Xa}_l = v_{45} \quad (144)$$

A Glossary of Systems Biology Ontology Terms

SBO:0000170 stimulation: Positive modulation of the execution of a process

SBO:0000177 non-covalent binding: Interaction between several biochemical entities that results in the formation of a non-covalent complex

SBO:0000180 dissociation: Transformation of a non-covalent complex that results in the formation of several independent biochemical entities

SBO:0000526 protein complex formation: The process by which two or more proteins interact non-covalently to form a protein complex (SBO:0000297)

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