SBML Model Report

Model name: “Benson2014 - FAAH inhibitors for the treatment of osteoarthritic pain”

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 Niel Benson[2] at February seventh 2014 at 11:43 a. m. and last time modified at April 28th 2014 at 3:59 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	5
species types	0	species	39
events	0	constraints	0
reactions	75	function definitions	0
global parameters	155	unit definitions	0
rules	27	initial assignments	0

Model Notes

Benson2014 - FAAH inhibitors for the treatment of osteoarthritic pain

Evaluation of fatty acid amide hydrolase (FAAH) as a target for osteoarthritic pain in humans, using an integrated systems pharmacology model.

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The SBML version of the model is obtained from the supplementary material of the corresponding paper (see below).

This model is described in the article:A systems pharmacology perspective on the clinical development of Fatty Acid amide hydrolase inhibitors for pain.Benson N, Metelkin E, Demin O, Li GL, Nichols D, van der Graaf PH.CPT Pharmacometrics Syst Pharmacol. 2014 Jan 15;3:e91.

Abstract:

The level of the endocannabinoid anandamide is controlled by fatty acid amide hydrolase (FAAH). In 2011, PF-04457845, an irreversible inhibitor of FAAH, was progressed to phase II clinical trials for osteoarthritic pain. This article discusses a prospective, integrated systems pharmacology model evaluation of FAAH as a target for pain in humans, using physiologically based pharmacokinetic and systems biology approaches. The model integrated physiological compartments; endocannabinoid production, degradation, and disposition data; PF-04457845 pharmacokinetics and pharmacodynamics, and cannabinoid receptor CB1-binding kinetics. The modeling identified clear gaps in our understanding and highlighted key risks going forward, in particular relating to whether methods are in place to demonstrate target engagement and pharmacological effect. The value of this modeling exercise will be discussed in detail and in the context of the clinical phase II data, together with recommendations to enable optimal future evaluation of FAAH inhibitors.

This model is hosted on BioModels Database and identifiedby: MODEL1402030000 .

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

2 Unit Definitions

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

2.1 Unit `substance`

Notes Mole is the predefined SBML unit for `substance`.

Definition mol

2.2 Unit `volume`

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

Definition l

2.3 Unit area

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

Definition m^2

2.4 Unit length

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

Definition m

2.5 Unit time

Notes Second is the predefined SBML unit for time.

Definition s

3 Compartments

This model contains five compartments.

Table 2: Properties of all compartments.

Id	Name	SBO	Spatial Dimensions	Size	Unit	Constant	Outside
Default		0000290	3	1	litre	☑	
BRAIN		0000290	3	1.45000004768372	l	☑	Default
PLASMA		0000290	3	2.6489999294281	l	☑	Default
ROB		0000290	3	65.3000030517578	l	☑	Default
MEC		0000290	3	$1.49999996210681 \cdot 10^{-5}$	l	☑	Default

3.1 Compartment Default

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

SBO:0000290 physical compartment

3.2 Compartment BRAIN

This is a three dimensional compartment with a constant size of 1.45000004768372 litre, which is surrounded by Default.

SBO:0000290 physical compartment

3.3 Compartment PLASMA

This is a three dimensional compartment with a constant size of 2.6489999294281 litre, which is surrounded by Default.

SBO:0000290 physical compartment

3.4 Compartment ROB

This is a three dimensional compartment with a constant size of 65.3000030517578 litre, which is surrounded by Default.

SBO:0000290 physical compartment

3.5 Compartment MEC

This is a three dimensional compartment with a constant size of $1.49999996210681 \cdot 10^{-5}$ litre, which is surrounded by Default.

SBO:0000290 physical compartment

4 Species

This model contains 39 species. Section 8 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
A_b	A_b	BRAIN	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
O_b	O_b	BRAIN	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
P_b	P_b	BRAIN	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
L_b	L_b	BRAIN	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
S_b	S_b	BRAIN	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
NAPE_b	NAPE_b	BRAIN	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
NOPE_b	NOPE_b	BRAIN	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
NPPE_b	NPPE_b	BRAIN	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
NLPE_b	NLPE_b	BRAIN	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
NSPE_b	NSPE_b	BRAIN	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
FAAH_b	FAAH_b	BRAIN	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
FAAHinh_b	FAAHinh_b	BRAIN	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
A_r	A_r	ROB	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
O_r	O_r	ROB	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
P_r	P_r	ROB	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
L_r	L_r	ROB	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
S_r	S_r	ROB	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
NAPE_r	NAPE_r	ROB	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
NOPE_r	NOPE_r	ROB	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
NPPE_r	NPPE_r	ROB	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
NLPE_r	NLPE_r	ROB	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
NSPE_r	NSPE_r	ROB	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
FAAH_r	FAAH_r	ROB	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
FAAHinh_r	FAAHinh_r	ROB	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
A_m	A_m	MEC	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
O_m	O_m	MEC	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
P_m	P_m	MEC	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
L_m	L_m	MEC	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
S_m	S_m	MEC	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
FAAH_m	FAAH_m	MEC	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
FAAHinh_m	FAAHinh_m	MEC	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
A_p	A_p	PLASMA	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
O_p	O_p	PLASMA	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
P_p	P_p	PLASMA	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
L_p	L_p	PLASMA	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
S_p	S_p	PLASMA	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
PFM_gut	PFM_gut	Default	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
PFM_p	PFM_p	Default	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟
PFM_r	PFM_r	Default	$\mathrm{mol} \cdot \mathrm{l}^{-1}$	⊟	⊟

5 Parameters

This model contains 155 global parameters.

Table 4: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
AG2_b			0.000		⊟
Dose			10.000		⊟
ED50			0.530		⊟
Emax_PFM			0.773		⊟
FAAH_t			78.000		⊟
Gut			1.650		⊟
H			0.480		⊟
Heart			0.310		⊟
Kd_AG2			3424.000		⊟
Kd_CB1_A			239.200		⊟
Ki_A			230.000		⊟
Ki_L			1000.000		⊟
Ki_O			240.000		⊟
Ki_P			6700.000		⊟
Ki_S			840.000		⊟
Kidney			0.280		⊟
Km_FAAH_A			8200.000		⊟
Km_FAAH_L			10800.000		⊟
Km_FAAH_O			52200.000		⊟
Km_FAAH_P			543000.000		⊟
Km_FAAH_S			10000.000		⊟
Km_NA_PE			2800.000		⊟
Km_NL_PE			1000.000		⊟
Km_NO_PE			2900.000		⊟
Km_NP_PE			3300.000		⊟
Km_NS_PE			3400.000		⊟
Km_PFM			26.100		⊟
Km_p_m_A			1.000		⊟
Kp_b_PF			1.300		⊟
Kp_m_PF			1.300		⊟
Kp_r_PF			1.500		⊟
Ktr_p_m_A			1.890		⊟
Ktr_p_m_L			2.770		⊟
Ktr_p_m_O			9.070		⊟
Ktr_p_m_P			2.650		⊟
Ktr_p_m_S			30.010		⊟
Ktr_p_r_A			0.620		⊟

Id	Name	SBO	Value	Unit	Constant
Ktr_p_r_L			0.890		⊟
Ktr_p_r_O			2.800		⊟
Ktr_p_r_P			0.850		⊟
Ktr_p_r_S			9.190		⊟
LEU			0.025		⊟
LIVER			1.690		⊟
Leucocytes			0.025		⊟
Lungs			1.172		⊟
M_A			347.500		⊟
M_L			323.500		⊟
M_O			325.500		⊟
M_P			299.500		⊟
M_PF			455.400		⊟
M_S			321.500		⊟
Muscles			35.000		⊟
PLD_b			10^7		⊟
PLD_r			10^7		⊟
Pancreas			0.077		⊟
R_PF			0.600		⊟
Spleen			0.192		⊟
Testis			0.036		⊟
Thymus			0.029		⊟
Vm_PFM			1511.000		⊟
Vmax_NAT			300.000		⊟
Vss_PFM			58.328		⊟
a_FAAH_A			1.000		⊟
a_FAAH_L			1.150		⊟
a_FAAH_O			5.700		⊟
a_FAAH_P			37.800		⊟
a_FAAH_S			1.000		⊟
a_NAT_A			1.000		⊟
a_NAT_L			8.600		⊟
a_NAT_O			13.000		⊟
a_NAT_P			0.420		⊟
a_NAT_S			1.000		⊟
b_FAAH_Brain			0.197		⊟
b_FAAH_Gut			0.034		⊟
b_FAAH-_Kidney			0.069		⊟
b_FAAH-_Leucocytes			0.000		⊟
b_FAAH_Liver			1.000		⊟

Id	Name	SBO	Value	Unit	Constant
b_FAAH_Lungs			0.032		☐
b_FAAH_MEC			0.137		☐
b_FAAH_Spleen			0.030		☐
b_FAAH_Testis			0.126		☐
b_NAAA_Brain			0.600		☐
b_NAAA_Gut			0.200		☐
b_NAAA_Heart			0.200		☐
b_NAAA_Kidney			0.600		☐
b_NAAA_Liver			1.000		☐
b_NAAA_Lungs			14.000		☐
b_NAAA_Spleen			8.000		☐
b_NAAA_Testis			0.600		☐
b_NAAA_Thymus			4.000		☐
b_NAT_Brain			1.667		☐
b_NAT_Heart			1.000		☐
b_NAT_Kidney			0.667		☐
b_NAT_Leucocytes			0.000		☐
b_NAT_Lungs			0.033		☐
b_NAT_Muscles			0.333		☐
b_NAT_Pancreas			0.333		☐
b_NAT_Testis			0.667		☐
e1			0.000		☑
k_NA_PE			202.000		☐
k_NL_PE			100.000		☐
k_NO_PE			230.000		☐
k_NP_PE			270.000		☐
k_NS_PE			280.000		☐
k_deg_FAAH			0.005		☐
k_inh			1.100		☐
kabs_PFM			2.200		☐
kcat_FAAH			18000.000		☐
kcl_A			1.740		☐
kcl_L			1.250		☐

Id	Name	SBO	Value	Unit	Constant
kcl_O			2.500		☐
kcl_P			2.610		☐
kcl_S			1.200		☐
kin_PFM			0.117		☐
klinear_PFM			0.080		☐
kout_PFM			0.180		☐
ktr_m_p_A			150.000		☐
ktr_m_p_L			0.000		☐
ktr_m_p_O			10.000		☐
ktr_m_p_P			10.000		☐
ktr_m_p_S			10.000		☐
ktr_r_p			100.000		☐
p_A			0.051		☐
p_L			0.016		☐
p_O			0.098		☐
p_P			0.615		☐
p_S			0.191		☐
t			0.000		☑
F_PFM			0.000		☐
MD			0.000		☐
PF_p			0.000		☐
PF_b			0.000		☐
PF_r			0.000		☐
PF_m			0.000		☐
FAAH_D_b			0.000		☐
slag1_b			0.000		☐
slag2_b			0.000		☐
den_b			0.000		☐
FAAH_D_r			0.000		☐
c_NAT_ROB			0.000		☐
slag1_r			0.000		☐
slag2_r			0.000		☐
den_r			0.000		☐
c_FAAH_ROB			0.000		☐
c_NAAA_ROB			0.000		☐
FAAH_D_m			0.000		☐
F_r			0.000		☐
PFG_p			0.000		☐
AG_p			0.000		☐
OG_p			0.000		☐
PG_p			0.000		☐
LG_p			0.000		☐

Id	Name	SBO	Value	Unit	Constant
SG_p			0.000		⊟
CB1_b			0.000		⊟
tid			0.000		⊟

6 Rules

This is an overview of 27 rules.

6.1 Rule F_PFM

Rule F_PFM is an assignment rule for parameter F_PFM:

$$\text{F\_PFM} = \frac{\text{Emax\_PFM} \cdot \text{Dose}}{\text{ED50} + \text{Dose}} \tag{1}$$

6.2 Rule MD

Rule MD is an assignment rule for parameter MD:

$$\text{MD} = [\text{PFM\_gut}] + 1000000.0 \cdot \text{Dose} \cdot \text{F\_PFM} \tag{2}$$

6.3 Rule PF_p

Rule PF_p is an assignment rule for parameter PF_p:

$$\text{PF\_p} = \frac{\frac{1.0}{\text{M\_PF}} \cdot [\text{PFM\_p}]}{\text{Vss\_PFM}} \tag{3}$$

6.4 Rule PF_b

Rule PF_b is an assignment rule for parameter PF_b:

$$\text{PF\_b} = \text{PF\_p} \cdot \text{Kp\_b\_PF} \tag{4}$$

6.5 Rule PF_r

Rule PF_r is an assignment rule for parameter PF_r:

$$\text{PF\_r} = \text{PF\_p} \cdot \text{Kp\_r\_PF} \tag{5}$$

6.6 Rule PF_m

Rule PF_m is an assignment rule for parameter PF_m:

$$\text{PF\_m} = \text{PF\_p} \cdot \text{Kp\_m\_PF} \tag{6}$$

6.7 Rule FAAH_D_b

Rule FAAH_D_b is an assignment rule for parameter FAAH_D_b:

$$\begin{aligned} \text{FAAH\_D\_b} = 1.0 &+ \frac{[\text{A\_b}]}{\text{Km\_FAAH\_A}} + \frac{[\text{O\_b}]}{\text{Km\_FAAH\_O}} \\ &+ \frac{[\text{P\_b}]}{\text{Km\_FAAH\_P}} + \frac{[\text{L\_b}]}{\text{Km\_FAAH\_L}} + \frac{[\text{S\_b}]}{\text{Km\_FAAH\_S}} \end{aligned} \tag{7}$$

6.8 Rule slag1_b

Rule slag1_b is an assignment rule for parameter slag1_b:

$$\text{slag1\_b} = \frac{[\text{NAPE\_b}]}{\text{Km\_NA\_PE}} + \frac{[\text{NOPE\_b}]}{\text{Km\_NO\_PE}} + \frac{[\text{NPPE\_b}]}{\text{Km\_NP\_PE}} + \frac{[\text{NLPE\_b}]}{\text{Km\_NL\_PE}} + \frac{[\text{NSPE\_b}]}{\text{Km\_NS\_PE}} \tag{8}$$

6.9 Rule slag2_b

Rule slag2_b is an assignment rule for parameter slag2_b:

$$\text{slag2\_b} = \frac{[\text{A\_b}]}{\text{Ki\_A}} + \frac{[\text{O\_b}]}{\text{Ki\_O}} + \frac{[\text{P\_b}]}{\text{Ki\_P}} + \frac{[\text{L\_b}]}{\text{Ki\_L}} + \frac{[\text{S\_b}]}{\text{Ki\_S}} \tag{9}$$

6.10 Rule den_b

Rule den_b is an assignment rule for parameter den_b:

$$\text{den\_b} = 1.0 + \text{slag1\_b} + \text{slag2\_b} \tag{10}$$

6.11 Rule FAAH_D_r

Rule FAAH_D_r is an assignment rule for parameter FAAH_D_r:

$$\begin{aligned} \text{FAAH\_D\_r} = 1.0 &+ \frac{[\text{A\_r}]}{\text{Km\_FAAH\_A}} + \frac{[\text{O\_r}]}{\text{Km\_FAAH\_O}} \\ &+ \frac{[\text{P\_r}]}{\text{Km\_FAAH\_P}} + \frac{[\text{L\_r}]}{\text{Km\_FAAH\_L}} + \frac{[\text{S\_r}]}{\text{Km\_FAAH\_S}} \end{aligned} \tag{11}$$

6.12 Rule c_NAT_ROB

Rule c_NAT_ROB is an assignment rule for parameter c_NAT_ROB:

$$\begin{aligned} \text{c\_NAT\_ROB} = \text{Pancreas} &\cdot \text{b\_NAT\_Pancreas} + \text{Kidney} \cdot \text{b\_NAT\_Kidney} + \text{Heart} \\ &\cdot \text{b\_NAT\_Heart} + \text{Lungs} \cdot \text{b\_NAT\_Lungs} + \text{Muscles} \cdot \text{b\_NAT\_Muscles} \\ &+ \text{Testis} \cdot \text{b\_NAT\_Testis} + \text{Leucocytes} \cdot \text{b\_NAT\_Leucocytes} \end{aligned} \tag{12}$$

6.13 Rule slag1_r

Rule slag1_r is an assignment rule for parameter slag1_r:

$$\text{slag1\_r} = \frac{[\text{NAPE\_r}]}{\text{Km\_NA\_PE}} + \frac{[\text{NOPE\_r}]}{\text{Km\_NO\_PE}} + \frac{[\text{NPPE\_r}]}{\text{Km\_NP\_PE}} + \frac{[\text{NLPE\_r}]}{\text{Km\_NL\_PE}} + \frac{[\text{NSPE\_r}]}{\text{Km\_NS\_PE}} \tag{13}$$

6.14 Rule slag2_r

Rule slag2_r is an assignment rule for parameter slag2_r:

$$\text{slag2\_r} = \frac{[\text{A\_r}]}{\text{Ki\_A}} + \frac{[\text{O\_r}]}{\text{Ki\_O}} + \frac{[\text{P\_r}]}{\text{Ki\_P}} + \frac{[\text{L\_r}]}{\text{Ki\_L}} + \frac{[\text{S\_r}]}{\text{Ki\_S}} \tag{14}$$

6.15 Rule den_r

Rule den_r is an assignment rule for parameter den_r:

$$\text{den\_r} = 1.0 + \text{slag1\_r} + \text{slag2\_r} \tag{15}$$

6.16 Rule c_FAAH_ROB

Rule c_FAAH_ROB is an assignment rule for parameter c_FAAH_ROB:

$$\begin{aligned}\text{c\_FAAH\_ROB} = {} & \text{LIVER} \cdot \text{b\_FAAH\_Liver} + \text{Gut} \cdot \text{b\_FAAH\_Gut} + \text{Spleen} \\ & \cdot \text{b\_FAAH\_Spleen} + \text{Kidney} \cdot \text{b\_FAAH\_Kidney} + \text{Lungs} \cdot \text{b\_FAAH\_Lungs} \\ & + \text{Testis} \cdot \text{b\_FAAH\_Testis} + \text{Leucocytes} \cdot \text{b\_FAAH\_Leucocytes}\end{aligned} \tag{16}$$

6.17 Rule c_NAAA_ROB

Rule c_NAAA_ROB is an assignment rule for parameter c_NAAA_ROB:

$$\begin{aligned}\text{c\_NAAA\_ROB} = {} & \text{LIVER} \cdot \text{b\_NAAA\_Liver} + \text{Gut} \cdot \text{b\_NAAA\_Gut} + \text{Spleen} \\ & \cdot \text{b\_NAAA\_Spleen} + \text{Kidney} \cdot \text{b\_NAAA\_Kidney} + \text{Heart} \\ & \cdot \text{b\_NAAA\_Heart} + \text{Lungs} \cdot \text{b\_NAAA\_Lungs} + \text{Thymus} \\ & \cdot \text{b\_NAAA\_Thymus} + \text{Testis} \cdot \text{b\_NAAA\_Thymus} \cdot \text{Testis}\end{aligned} \tag{17}$$

6.18 Rule FAAH_D_m

Rule FAAH_D_m is an assignment rule for parameter FAAH_D_m:

$$\begin{aligned}\text{FAAH\_D\_m} = {} & 1.0 + \frac{[\text{A\_m}]}{\text{Km\_FAAH\_A}} + \frac{[\text{O\_m}]}{\text{Km\_FAAH\_O}} \\ & + \frac{[\text{P\_m}]}{\text{Km\_FAAH\_P}} + \frac{[\text{L\_m}]}{\text{Km\_FAAH\_L}} + \frac{[\text{S\_m}]}{\text{Km\_FAAH\_S}}\end{aligned} \tag{18}$$

6.19 Rule F_r

Rule F_r is an assignment rule for parameter F_r:

$$\mathrm{F\_r} = \frac{1500.0 \cdot [\mathrm{FAAH\_r}]}{[\mathrm{FAAHinh\_r}] + [\mathrm{FAAH\_r}]} \tag{19}$$

6.20 Rule PFG_p

Rule PFG_p is an assignment rule for parameter PFG_p:

$$\mathrm{PFG\_p} = \frac{0.0010 \cdot [\mathrm{PFM\_p}]}{\mathrm{Vss\_PFM}} \tag{20}$$

6.21 Rule AG_p

Rule AG_p is an assignment rule for parameter AG_p:

$$\mathrm{AG\_p} = 0.0010 \cdot [\mathrm{A\_p}] \cdot \mathrm{M\_A} \tag{21}$$

6.22 Rule OG_p

Rule OG_p is an assignment rule for parameter OG_p:

$$\mathrm{OG\_p} = 0.0010 \cdot [\mathrm{O\_p}] \cdot \mathrm{M\_O} \tag{22}$$

6.23 Rule PG_p

Rule PG_p is an assignment rule for parameter PG_p:

$$\mathrm{PG\_p} = 0.0010 \cdot [\mathrm{P\_p}] \cdot \mathrm{M\_P} \tag{23}$$

6.24 Rule LG_p

Rule LG_p is an assignment rule for parameter LG_p:

$$\mathrm{LG\_p} = 0.0010 \cdot [\mathrm{L\_p}] \cdot \mathrm{M\_L} \tag{24}$$

6.25 Rule SG_p

Rule SG_p is an assignment rule for parameter SG_p:

$$\mathrm{SG\_p} = 0.0010 \cdot [\mathrm{S\_p}] \cdot \mathrm{M\_S} \tag{25}$$

6.26 Rule CB1_b

Rule CB1_b is an assignment rule for parameter CB1_b:

$$\mathrm{CB1\_b} = \frac{\frac{[\mathrm{A\_b}]}{\mathrm{Kd\_CB1\_A}} + \frac{\mathrm{AG2\_b}}{\mathrm{Kd\_AG2}}}{1.0 + \frac{[\mathrm{A\_b}]}{\mathrm{Kd\_CB1\_A}} + \frac{\mathrm{AG2\_b}}{\mathrm{Kd\_AG2}}} \tag{26}$$

6.27 Rule `tid`

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

$$\mathrm{tid} = \frac{\mathrm{t}}{24.0} \tag{27}$$

7 Reactions

This model contains 75 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	vA_degr_b	vA_degr_b	$\mathrm{A\_b} \xrightarrow{\mathrm{FAAH\_b,\ FAAH\_b,\ A\_b}} \emptyset$	
2	vO_degr_b	vO_degr_b	$\mathrm{O\_b} \xrightarrow{\mathrm{FAAH\_b,\ FAAH\_b,\ O\_b}} \emptyset$	
3	vP_degr_b	vP_degr_b	$\mathrm{P\_b} \xrightarrow{\mathrm{FAAH\_b,\ FAAH\_b,\ P\_b}} \emptyset$	
4	vL_degr_b	vL_degr_b	$\mathrm{L\_b} \xrightarrow{\mathrm{FAAH\_b,\ FAAH\_b,\ L\_b}} \emptyset$	
5	vS_degr_b	vS_degr_b	$\mathrm{S\_b} \xrightarrow{\mathrm{FAAH\_b,\ FAAH\_b,\ S\_b}} \emptyset$	
6	vNAPE_syn_b	vNAPE_syn_b	$\emptyset \longrightarrow \mathrm{NAPE\_b}$	
7	vNOPE_syn_b	vNOPE_syn_b	$\emptyset \longrightarrow \mathrm{NOPE\_b}$	
8	vNPPE_syn_b	vNPPE_syn_b	$\emptyset \longrightarrow \mathrm{NPPE\_b}$	
9	vNLPE_syn_b	vNLPE_syn_b	$\emptyset \longrightarrow \mathrm{NLPE\_b}$	
10	vNSPE_syn_b	vNSPE_syn_b	$\emptyset \longrightarrow \mathrm{NSPE\_b}$	
11	vA_syn_b	vA_syn_b	$\mathrm{NAPE\_b} \xrightarrow{\mathrm{NAPE\_b}} \mathrm{A\_b}$	
12	vO_syn_b	vO_syn_b	$\mathrm{NOPE\_b} \xrightarrow{\mathrm{NOPE\_b}} \mathrm{O\_b}$	
13	vP_syn_b	vP_syn_b	$\mathrm{NPPE\_b} \xrightarrow{\mathrm{NPPE\_b}} \mathrm{P\_b}$	
14	vL_syn_b	vL_syn_b	$\mathrm{NLPE\_b} \xrightarrow{\mathrm{NLPE\_b}} \mathrm{L\_b}$	
15	vS_syn_b	vS_syn_b	$\mathrm{NSPE\_b} \xrightarrow{\mathrm{NSPE\_b}} \mathrm{S\_b}$	
16	vFAAH_syn_b	vFAAH_syn_b	$\emptyset \longrightarrow \mathrm{FAAH\_b}$	
17	vFAAH_degr_b	vFAAH_degr_b	$\mathrm{FAAH\_b} \xrightarrow{\mathrm{FAAH\_b}} \emptyset$	
18	vFAAH_inh_b	vFAAH_inh_b	$\mathrm{FAAH\_b} \xrightarrow{\mathrm{FAAH\_b}} \mathrm{FAAHinh\_b}$	

№	Id	Name	Reaction Equation	SBO
19	vFAAH_inh_degr_b	vFAAH_inh_degr_b	$\text{FAAHinh\_b} \xrightarrow{\text{FAAHinh\_b}} \emptyset$	
20	vA_UE_b	vA_UE_b	$\text{A\_b} \xrightarrow{\text{A\_b}} \emptyset$	
21	vO_UE_b	vO_UE_b	$\text{O\_b} \xrightarrow{\text{O\_b}} \emptyset$	
22	vP_UE_b	vP_UE_b	$\text{P\_b} \xrightarrow{\text{P\_b}} \emptyset$	
23	vL_UE_b	vL_UE_b	$\text{L\_b} \xrightarrow{\text{L\_b}} \emptyset$	
24	vS_UE_b	vS_UE_b	$\text{S\_b} \xrightarrow{\text{S\_b}} \emptyset$	
25	vA_degr_r	vA_degr_r	$\text{A\_r} \xrightarrow{\text{FAAH\_r, FAAH\_r, A\_r}} \emptyset$	
26	vO_degr_r	vO_degr_r	$\text{O\_r} \xrightarrow{\text{FAAH\_r, FAAH\_r, O\_r}} \emptyset$	
27	vP_degr_r	vP_degr_r	$\text{P\_r} \xrightarrow{\text{FAAH\_r, FAAH\_r, P\_r}} \emptyset$	
28	vL_degr_r	vL_degr_r	$\text{L\_r} \xrightarrow{\text{FAAH\_r, FAAH\_r, L\_r}} \emptyset$	
29	vS_degr_r	vS_degr_r	$\text{S\_r} \xrightarrow{\text{FAAH\_r, FAAH\_r, S\_r}} \emptyset$	
30	vNAPE_syn_r	vNAPE_syn_r	$\emptyset \longrightarrow \text{NAPE\_r}$	
31	vNOPE_syn_r	vNOPE_syn_r	$\emptyset \longrightarrow \text{NOPE\_r}$	
32	vNPPE_syn_r	vNPPE_syn_r	$\emptyset \longrightarrow \text{NPPE\_r}$	
33	vNLPE_syn_r	vNLPE_syn_r	$\emptyset \longrightarrow \text{NLPE\_r}$	
34	vNSPE_syn_r	vNSPE_syn_r	$\emptyset \longrightarrow \text{NSPE\_r}$	
35	vA_syn_r	vA_syn_r	$\text{NAPE\_r} \xrightarrow{\text{NAPE\_r}} \text{A\_r}$	
36	vO_syn_r	vO_syn_r	$\text{NOPE\_r} \xrightarrow{\text{NOPE\_r}} \text{O\_r}$	
37	vP_syn_r	vP_syn_r	$\text{NPPE\_r} \xrightarrow{\text{NPPE\_r}} \text{P\_r}$	
38	vL_syn_r	vL_syn_r	$\text{NLPE\_r} \xrightarrow{\text{NLPE\_r}} \text{L\_r}$	
39	vS_syn_r	vS_syn_r	$\text{NSPE\_r} \xrightarrow{\text{NSPE\_r}} \text{S\_r}$	
40	vFAAH_syn_r	vFAAH_syn_r	$\emptyset \longrightarrow \text{FAAH\_r}$	

№	Id	Name	Reaction Equation	SBO
41	vFAAH_degr_r	vFAAH_degr_r	$\text{FAAH\_r} \xrightarrow{\text{FAAH\_r}} \emptyset$	
42	vFAAH_inh_r	vFAAH_inh_r	$\text{FAAH\_r} \xrightarrow{\text{FAAH\_r}} \text{FAAHinh\_r}$	
43	vFAAH_inh_degr_r	vFAAH_inh_degr_r	$\text{FAAHinh\_r} \xrightarrow{\text{FAAHinh\_r}} \emptyset$	
44	vA_UE_r	vA_UE_r	$\text{A\_r} \xrightarrow{\text{A\_r}} \emptyset$	
45	vO_UE_r	vO_UE_r	$\text{O\_r} \xrightarrow{\text{O\_r}} \emptyset$	
46	vP_UE_r	vP_UE_r	$\text{P\_r} \xrightarrow{\text{P\_r}} \emptyset$	
47	vL_UE_r	vL_UE_r	$\text{L\_r} \xrightarrow{\text{L\_r}} \emptyset$	
48	vS_UE_r	vS_UE_r	$\text{S\_r} \xrightarrow{\text{S\_r}} \emptyset$	
49	vA_degr_m	vA_degr_m	$\text{A\_m} \xrightarrow{\text{FAAH\_m, FAAH\_m, A\_m}} \emptyset$	
50	vO_degr_m	vO_degr_m	$\text{O\_m} \xrightarrow{\text{FAAH\_m, FAAH\_m, O\_m}} \emptyset$	
51	vP_degr_m	vP_degr_m	$\text{P\_m} \xrightarrow{\text{FAAH\_m, FAAH\_m, P\_m}} \emptyset$	
52	vL_degr_m	vL_degr_m	$\text{L\_m} \xrightarrow{\text{FAAH\_m, FAAH\_m, L\_m}} \emptyset$	
53	vS_degr_m	vS_degr_m	$\text{S\_m} \xrightarrow{\text{FAAH\_m, FAAH\_m, S\_m}} \emptyset$	
54	vFAAH_syn_m	vFAAH_syn_m	$\emptyset \longrightarrow \text{FAAH\_m}$	
55	vFAAH_degr_m	vFAAH_degr_m	$\text{FAAH\_m} \xrightarrow{\text{FAAH\_m}} \emptyset$	
56	vFAAH_inh_m	vFAAH_inh_m	$\text{FAAH\_m} \xrightarrow{\text{FAAH\_m}} \text{FAAHinh\_m}$	
57	vFAAH_inh_degr_m	vFAAH_inh_degr_m	$\text{FAAHinh\_m} \xrightarrow{\text{FAAHinh\_m}} \emptyset$	
58	vA_m_p	vA_m_p	$\text{A\_m} \xrightarrow{\text{A\_m, A\_p}} \text{A\_p}$	
59	vo_m_p	vo_m_p	$\text{O\_m} \xrightarrow{\text{O\_m, O\_p}} \text{O\_p}$	

№	Id	Name	Reaction Equation	SBO
60	vP_m_p	vP_m_p	$\mathrm{P\_m} \xrightarrow{\mathrm{P\_m,\ P\_p}} \mathrm{P\_p}$	
61	vL_m_p	vL_m_p	$\mathrm{L\_m} \xrightarrow{\mathrm{L\_m,\ L\_p}} \mathrm{L\_p}$	
62	vS_m_p	vS_m_p	$\mathrm{S\_m} \xrightarrow{\mathrm{S\_m,\ S\_p}} \mathrm{S\_p}$	
63	vA_b_m	vA_b_m	$\mathrm{A\_b} \xrightarrow{\mathrm{A\_b,\ A\_m}} \mathrm{A\_m}$	
64	vO_b_m	vO_b_m	$\mathrm{O\_b} \xrightarrow{\mathrm{O\_b,\ O\_m}} \mathrm{O\_m}$	
65	vP_b_m	vP_b_m	$\mathrm{P\_b} \xrightarrow{\mathrm{P\_b,\ P\_m}} \mathrm{P\_m}$	
66	vL_b_m	vL_b_m	$\mathrm{L\_b} \xrightarrow{\mathrm{L\_b,\ L\_m}} \mathrm{L\_m}$	
67	vS_b_m	vS_b_m	$\mathrm{S\_b} \xrightarrow{\mathrm{S\_b,\ S\_m}} \mathrm{S\_m}$	
68	vA_r_p	vA_r_p	$\mathrm{A\_r} \xrightarrow{\mathrm{A\_r,\ A\_p}} \mathrm{A\_p}$	
69	vO_r_p	vO_r_p	$\mathrm{O\_r} \xrightarrow{\mathrm{O\_r,\ O\_p}} \mathrm{O\_p}$	
70	vP_r_p	vP_r_p	$\mathrm{P\_r} \xrightarrow{\mathrm{P\_r,\ P\_p}} \mathrm{P\_p}$	
71	vL_r_p	vL_r_p	$\mathrm{L\_r} \xrightarrow{\mathrm{L\_r,\ L\_p}} \mathrm{L\_p}$	
72	vS_r_p	vS_r_p	$\mathrm{S\_r} \xrightarrow{\mathrm{S\_r,\ S\_p}} \mathrm{S\_p}$	
73	absorp	absorp	$\mathrm{PFM\_gut} \longrightarrow \mathrm{PFM\_p}$	
74	dist	dist	$\mathrm{PFM\_p} \xrightarrow{\mathrm{PFM\_p,\ PFM\_r}} \mathrm{PFM\_r}$	
75	elim	elim	$\mathrm{PFM\_p} \xrightarrow{\mathrm{PFM\_p}} \emptyset$	

7.1 Reaction vA_degr_b

This is a fast irreversible reaction of one reactant forming no product influenced by three modifiers.

Name vA_degr_b

Reaction equation

$$\mathrm{A\_b} \xrightarrow{\mathrm{FAAH\_b,\ FAAH\_b,\ A\_b}} \emptyset \tag{28}$$

Reactant

Table 6: Properties of each reactant.

Id	Name	SBO
A_b	A_b	

Modifiers

Table 7: Properties of each modifier.

Id	Name	SBO
FAAH_b	FAAH_b	
FAAH_b	FAAH_b	
A_b	A_b	

Kinetic Law

Derived unit contains undeclared units

$$v_1 = \frac{\mathrm{vol\,(BRAIN)} \cdot [\mathrm{FAAH\_b}] \cdot \mathrm{kcat\_FAAH} \cdot \mathrm{a\_FAAH\_A} \cdot [\mathrm{A\_b}]}{\mathrm{Km\_FAAH\_A} \cdot \mathrm{FAAH\_D\_b}} \tag{29}$$

7.2 Reaction vO_degr_b

This is a fast irreversible reaction of one reactant forming no product influenced by three modifiers.

Name vO_degr_b

Reaction equation

$$\mathrm{O\_b} \xrightarrow{\mathrm{FAAH\_b,\ FAAH\_b,\ O\_b}} \emptyset \tag{30}$$

Reactant

Table 8: Properties of each reactant.

Id	Name	SBO
O_b	O_b	

Modifiers

Table 9: Properties of each modifier.

Id	Name	SBO
FAAH_b	FAAH_b	
FAAH_b	FAAH_b	
O_b	O_b	

Kinetic Law

Derived unit contains undeclared units

$$v_2 = \frac{\mathrm{vol}\,(\mathrm{BRAIN}) \cdot [\mathrm{FAAH\_b}] \cdot \mathrm{kcat\_FAAH} \cdot \mathrm{a\_FAAH\_O} \cdot [\mathrm{O\_b}]}{\mathrm{Km\_FAAH\_O} \cdot \mathrm{FAAH\_D\_b}} \tag{31}$$

7.3 Reaction vP_degr_b

This is a fast irreversible reaction of one reactant forming no product influenced by three modifiers.

Name vP_degr_b

Reaction equation

$$\mathrm{P\_b} \xrightarrow{\mathrm{FAAH\_b,\ FAAH\_b,\ P\_b}} \emptyset \tag{32}$$

Reactant

Table 10: Properties of each reactant.

Id	Name	SBO
P_b	P_b	

Modifiers

Table 11: Properties of each modifier.

Id	Name	SBO
FAAH_b	FAAH_b	
FAAH_b	FAAH_b	
P_b	P_b	

Kinetic Law

Derived unit contains undeclared units

$$v_3 = \frac{\text{vol}\,(\text{BRAIN}) \cdot [\text{FAAH\_b}] \cdot \text{kcat\_FAAH} \cdot \text{a\_FAAH\_P} \cdot [\text{P\_b}]}{\text{Km\_FAAH\_P} \cdot \text{FAAH\_D\_b}} \tag{33}$$

7.4 Reaction vL_degr_b

This is a fast irreversible reaction of one reactant forming no product influenced by three modifiers.

Name vL_degr_b

Reaction equation

$$\text{L\_b} \xrightarrow{\text{FAAH\_b, FAAH\_b, L\_b}} \emptyset \tag{34}$$

Reactant

Table 12: Properties of each reactant.

Id	Name	SBO
L_b	L_b	

Modifiers

Table 13: Properties of each modifier.

Id	Name	SBO
FAAH_b	FAAH_b	
FAAH_b	FAAH_b	
L_b	L_b	

Kinetic Law

Derived unit contains undeclared units

$$v_4 = \frac{\text{vol}\,(\text{BRAIN}) \cdot [\text{FAAH\_b}] \cdot \text{kcat\_FAAH} \cdot \text{a\_FAAH\_L} \cdot [\text{L\_b}]}{\text{Km\_FAAH\_L} \cdot \text{FAAH\_D\_b}} \tag{35}$$

7.5 Reaction vS_degr_b

This is a fast irreversible reaction of one reactant forming no product influenced by three modifiers.

Name vS_degr_b

Reaction equation

$$\text{S\_b} \xrightarrow{\text{FAAH\_b, FAAH\_b, S\_b}} \emptyset \tag{36}$$

Reactant

Table 14: Properties of each reactant.

Id	Name	SBO
S_b	S_b	

Modifiers

Table 15: Properties of each modifier.

Id	Name	SBO
FAAH_b	FAAH_b	
FAAH_b	FAAH_b	
S_b	S_b	

Kinetic Law

Derived unit contains undeclared units

$$v_5 = \frac{\text{vol}\,(\text{BRAIN}) \cdot [\text{FAAH\_b}] \cdot \text{kcat\_FAAH} \cdot \text{a\_FAAH\_S} \cdot [\text{S\_b}]}{\text{Km\_FAAH\_S} \cdot \text{FAAH\_D\_b}} \tag{37}$$

7.6 Reaction vNAPE_syn_b

This is a fast irreversible reaction of no reactant forming one product.

Name vNAPE_syn_b

Reaction equation

$$\emptyset \longrightarrow \text{NAPE\_b} \tag{38}$$

Product

Table 16: Properties of each product.

Id	Name	SBO
NAPE_b	NAPE_b	

Kinetic Law

Derived unit contains undeclared units

$$v_6 = \text{vol}(\text{BRAIN}) \cdot \text{Vmax\_NAT} \cdot \text{p\_A} \cdot \text{a\_NAT\_A} \cdot \text{b\_NAT\_Brain} \tag{39}$$

7.7 Reaction vNOPE_syn_b

This is a fast irreversible reaction of no reactant forming one product.

Name vNOPE_syn_b

Reaction equation

$$\emptyset \longrightarrow \text{NOPE\_b} \tag{40}$$

Product

Table 17: Properties of each product.

Id	Name	SBO
NOPE_b	NOPE_b	

Kinetic Law

Derived unit contains undeclared units

$$v_7 = \text{vol}(\text{BRAIN}) \cdot \text{Vmax\_NAT} \cdot \text{p\_O} \cdot \text{a\_NAT\_O} \cdot \text{b\_NAT\_Brain} \tag{41}$$

7.8 Reaction vNPPE_syn_b

This is a fast irreversible reaction of no reactant forming one product.

Name vNPPE_syn_b

Reaction equation

$$\emptyset \longrightarrow \text{NPPE\_b} \tag{42}$$

Product

Table 18: Properties of each product.

Id	Name	SBO
NPPE_b	NPPE_b	

Kinetic Law

Derived unit contains undeclared units

$$v_8 = \text{vol}(\text{BRAIN}) \cdot \text{Vmax\_NAT} \cdot \text{p\_P} \cdot \text{a\_NAT\_P} \cdot \text{b\_NAT\_Brain} \tag{43}$$

7.9 Reaction vNLPE_syn_b

This is a fast irreversible reaction of no reactant forming one product.

Name vNLPE_syn_b

Reaction equation

$$\emptyset \longrightarrow \text{NLPE\_b} \tag{44}$$

Product

Table 19: Properties of each product.

Id	Name	SBO
NLPE_b	NLPE_b	

Kinetic Law

Derived unit contains undeclared units

$$v_9 = \text{vol}(\text{BRAIN}) \cdot \text{Vmax\_NAT} \cdot \text{p\_L} \cdot \text{a\_NAT\_L} \cdot \text{b\_NAT\_Brain} \tag{45}$$

7.10 Reaction vNSPE_syn_b

This is a fast irreversible reaction of no reactant forming one product.

Name vNSPE_syn_b

Reaction equation

$$\emptyset \longrightarrow \text{NSPE\_b} \tag{46}$$

Product

Table 20: Properties of each product.

Id	Name	SBO
NSPE_b	NSPE_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{10} = \text{vol}\left(\text{BRAIN}\right) \cdot \text{Vmax\_NAT} \cdot \text{p\_S} \cdot \text{a\_NAT\_S} \cdot \text{b\_NAT\_Brain} \tag{47}$$

7.11 Reaction vA_syn_b

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

Name vA_syn_b

Reaction equation

$$\text{NAPE\_b} \xrightarrow{\text{NAPE\_b}} \text{A\_b} \tag{48}$$

Reactant

Table 21: Properties of each reactant.

Id	Name	SBO
NAPE_b	NAPE_b	

Modifier

Table 22: Properties of each modifier.

Id	Name	SBO
NAPE_b	NAPE_b	

Product

Table 23: Properties of each product.

Id	Name	SBO
A_b	A_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{11} = \frac{\frac{\text{vol(BRAIN)} \cdot \text{PLD\_b} \cdot \text{k\_NA\_PE} \cdot [\text{NAPE\_b}]}{\text{Km\_NA\_PE}}}{\text{den\_b}} \tag{49}$$

7.12 Reaction v0_syn_b

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

Name vO_syn_b

Reaction equation

$$\text{NOPE\_b} \xrightarrow{\text{NOPE\_b}} \text{O\_b} \tag{50}$$

Reactant

Table 24: Properties of each reactant.

Id	Name	SBO
NOPE_b	NOPE_b	

Modifier

Table 25: Properties of each modifier.

Id	Name	SBO
NOPE_b	NOPE_b	

Product

Table 26: Properties of each product.

Id	Name	SBO
O_b	O_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{12} = \frac{\frac{\text{vol(BRAIN)} \cdot \text{PLD\_b} \cdot \text{k\_NO\_PE} \cdot [\text{NOPE\_b}]}{\text{Km\_NO\_PE}}}{\text{den\_b}} \tag{51}$$

7.13 Reaction vP_syn_b

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

Name vP_syn_b

Reaction equation

$$\text{NPPE\_b} \xrightarrow{\text{NPPE\_b}} \text{P\_b} \tag{52}$$

Reactant

Table 27: Properties of each reactant.

Id	Name	SBO
NPPE_b	NPPE_b	

Modifier

Table 28: Properties of each modifier.

Id	Name	SBO
NPPE_b	NPPE_b	

Product

Table 29: Properties of each product.

Id	Name	SBO
P_b	P_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{13} = \frac{\frac{\text{vol(BRAIN)} \cdot \text{PLD\_b} \cdot \text{k\_NP\_PE} \cdot [\text{NPPE\_b}]}{\text{Km\_NP\_PE}}}{\text{den\_b}} \tag{53}$$

7.14 Reaction vL_syn_b

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

Name vL_syn_b

Reaction equation

$$\text{NLPE\_b} \xrightarrow{\text{NLPE\_b}} \text{L\_b} \tag{54}$$

Reactant

Table 30: Properties of each reactant.

Id	Name	SBO
NLPE_b	NLPE_b	

Modifier

Table 31: Properties of each modifier.

Id	Name	SBO
NLPE_b	NLPE_b	

Product

Table 32: Properties of each product.

Id	Name	SBO
L_b	L_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{14} = \frac{\frac{\text{vol(BRAIN)} \cdot \text{PLD\_b} \cdot \text{k\_NL\_PE} \cdot [\text{NLPE\_b}]}{\text{Km\_NL\_PE}}}{\text{den\_b}} \tag{55}$$

7.15 Reaction vS_syn_b

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

Name vS_syn_b

Reaction equation

$$\text{NSPE\_b} \xrightarrow{\text{NSPE\_b}} \text{S\_b} \tag{56}$$

Reactant

Table 33: Properties of each reactant.

Id	Name	SBO
NSPE_b	NSPE_b	

Modifier

Table 34: Properties of each modifier.

Id	Name	SBO
NSPE_b	NSPE_b	

Product

Table 35: Properties of each product.

Id	Name	SBO
S_b	S_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{15} = \frac{\frac{\text{vol(BRAIN)} \cdot \text{PLD\_b} \cdot \text{k\_NS\_PE} \cdot [\text{NSPE\_b}]}{\text{Km\_NS\_PE}}}{\text{den\_b}} \tag{57}$$

7.16 Reaction vFAAH_syn_b

This is a fast irreversible reaction of no reactant forming one product.

Name vFAAH_syn_b

Reaction equation

$$\emptyset \longrightarrow \text{FAAH\_b} \tag{58}$$

Product

Table 36: Properties of each product.

Id	Name	SBO
FAAH_b	FAAH_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{16} = \text{vol}\,(\text{BRAIN}) \cdot \text{FAAH\_t} \cdot \text{b\_FAAH\_Brain} \cdot \text{k\_deg\_FAAH} \tag{59}$$

7.17 Reaction vFAAH_degr_b

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

Name vFAAH_degr_b

Reaction equation

$$\text{FAAH\_b} \xrightarrow{\text{FAAH\_b}} \emptyset \tag{60}$$

Reactant

Table 37: Properties of each reactant.

Id	Name	SBO
FAAH_b	FAAH_b	

Modifier

Table 38: Properties of each modifier.

Id	Name	SBO
FAAH_b	FAAH_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{17} = \text{vol}(\text{BRAIN}) \cdot \text{k\_deg\_FAAH} \cdot [\text{FAAH\_b}] \tag{61}$$

7.18 Reaction vFAAH_inh_b

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

Name vFAAH_inh_b

Reaction equation

$$\text{FAAH\_b} \xrightarrow{\text{FAAH\_b}} \text{FAAHinh\_b} \tag{62}$$

Reactant

Table 39: Properties of each reactant.

Id	Name	SBO
FAAH_b	FAAH_b	

Modifier

Table 40: Properties of each modifier.

Id	Name	SBO
FAAH_b	FAAH_b	

Product

Table 41: Properties of each product.

Id	Name	SBO
FAAHinh_b	FAAHinh_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{18} = \mathrm{vol}\left(\mathrm{BRAIN}\right) \cdot \mathrm{k\_inh} \cdot \left[\mathrm{FAAH\_b}\right] \cdot \mathrm{PF\_b} \tag{63}$$

7.19 Reaction vFAAH_inh_degr_b

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

Name vFAAH_inh_degr_b

Reaction equation

$$\mathrm{FAAHinh\_b} \xrightarrow{\mathrm{FAAHinh\_b}} \emptyset \tag{64}$$

Reactant

Table 42: Properties of each reactant.

Id	Name	SBO
FAAHinh_b	FAAHinh_b	

Modifier

Table 43: Properties of each modifier.

Id	Name	SBO
FAAHinh_b	FAAHinh_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{19} = \mathrm{vol}\,(\mathrm{BRAIN}) \cdot \mathrm{k\_deg\_FAAH} \cdot [\mathrm{FAAHinh\_b}] \tag{65}$$

7.20 Reaction vA_UE_b

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

Name vA_UE_b

Reaction equation

$$\mathrm{A\_b} \xrightarrow{\mathrm{A\_b}} \emptyset \tag{66}$$

Reactant

Table 44: Properties of each reactant.

Id	Name	SBO
A_b	A_b	

Modifier

Table 45: Properties of each modifier.

Id	Name	SBO
A_b	A_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{20} = \mathrm{vol}\,(\mathrm{BRAIN}) \cdot \mathrm{b\_FAAH\_Brain} \cdot \mathrm{kcl\_A} \cdot [\mathrm{A\_b}] \tag{67}$$

7.21 Reaction vO_UE_b

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

Name vO_UE_b

Reaction equation

$$\mathrm{O\_b} \xrightarrow{\mathrm{O\_b}} \emptyset \tag{68}$$

Reactant

Table 46: Properties of each reactant.

Id	Name	SBO
O_b	O_b	

Modifier

Table 47: Properties of each modifier.

Id	Name	SBO
O_b	O_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{21} = \mathrm{vol}\,(\mathrm{BRAIN}) \cdot \mathrm{b\_FAAH\_Brain} \cdot \mathrm{kcl\_O} \cdot [\mathrm{O\_b}] \tag{69}$$

7.22 Reaction vP_UE_b

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

Name vP_UE_b

Reaction equation

$$\mathrm{P\_b} \xrightarrow{\mathrm{P\_b}} \emptyset \tag{70}$$

Reactant

Table 48: Properties of each reactant.

Id	Name	SBO
P_b	P_b	

Modifier

Table 49: Properties of each modifier.

Id	Name	SBO
P_b	P_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{22} = \mathrm{vol}\,(\mathrm{BRAIN}) \cdot \mathrm{b\_FAAH\_Brain} \cdot \mathrm{kcl\_P} \cdot [\mathrm{P\_b}] \tag{71}$$

7.23 Reaction vL_UE_b

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

Name vL_UE_b

Reaction equation

$$\mathrm{L\_b} \xrightarrow{\mathrm{L\_b}} \emptyset \tag{72}$$

Reactant

Table 50: Properties of each reactant.

Id	Name	SBO
L_b	L_b	

Modifier

Table 51: Properties of each modifier.

Id	Name	SBO
L_b	L_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{23} = \mathrm{vol}\,(\mathrm{BRAIN}) \cdot \mathrm{b\_FAAH\_Brain} \cdot \mathrm{kcl\_L} \cdot [\mathrm{L\_b}] \tag{73}$$

7.24 Reaction vS_UE_b

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

Name vS_UE_b

Reaction equation

$$\mathrm{S\_b} \xrightarrow{\mathrm{S\_b}} \emptyset \tag{74}$$

Reactant

Table 52: Properties of each reactant.

Id	Name	SBO
S_b	S_b	

Modifier

Table 53: Properties of each modifier.

Id	Name	SBO
S_b	S_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{24} = \mathrm{vol}\,(\mathrm{BRAIN}) \cdot \mathrm{b\_FAAH\_Brain} \cdot \mathrm{kcl\_S} \cdot [\mathrm{S\_b}] \tag{75}$$

7.25 Reaction vA_degr_r

This is a fast irreversible reaction of one reactant forming no product influenced by three modifiers.

Name vA_degr_r

Reaction equation

$$\mathrm{A\_r} \xrightarrow{\mathrm{FAAH\_r,\ FAAH\_r,\ A\_r}} \emptyset \tag{76}$$

Reactant

Table 54: Properties of each reactant.

Id	Name	SBO
A_r	A_r	

Modifiers

Table 55: Properties of each modifier.

Id	Name	SBO
FAAH_r	FAAH_r	
FAAH_r	FAAH_r	
A_r	A_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{25} = \frac{\mathrm{vol}\,(\mathrm{ROB}) \cdot [\mathrm{FAAH\_r}] \cdot \mathrm{kcat\_FAAH} \cdot \mathrm{a\_FAAH\_A} \cdot [\mathrm{A\_r}]}{\mathrm{Km\_FAAH\_A} \cdot \mathrm{FAAH\_D\_r}} \tag{77}$$

7.26 Reaction v0_degr_r

This is a fast irreversible reaction of one reactant forming no product influenced by three modifiers.

Name vO_degr_r

Reaction equation

$$\mathrm{O\_r} \xrightarrow{\mathrm{FAAH\_r,\ FAAH\_r,\ O\_r}} \emptyset \tag{78}$$

Reactant

Table 56: Properties of each reactant.

Id	Name	SBO
O_r	O_r	

Modifiers

Table 57: Properties of each modifier.

Id	Name	SBO
FAAH_r	FAAH_r	
FAAH_r	FAAH_r	
O_r	O_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{26} = \frac{\text{vol}(\text{ROB}) \cdot [\text{FAAH\_r}] \cdot \text{kcat\_FAAH} \cdot \text{a\_FAAH\_O} \cdot [\text{O\_r}]}{\text{Km\_FAAH\_O} \cdot \text{FAAH\_D\_r}} \tag{79}$$

7.27 Reaction vP_degr_r

This is a fast irreversible reaction of one reactant forming no product influenced by three modifiers.

Name vP_degr_r

Reaction equation

$$\text{P\_r} \xrightarrow{\text{FAAH\_r, FAAH\_r, P\_r}} \emptyset \tag{80}$$

Reactant

Table 58: Properties of each reactant.

Id	Name	SBO
P_r	P_r	

Modifiers

Table 59: Properties of each modifier.

Id	Name	SBO
FAAH_r	FAAH_r	
FAAH_r	FAAH_r	
P_r	P_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{27} = \frac{\text{vol}\,(\text{ROB}) \cdot [\text{FAAH\_r}] \cdot \text{kcat\_FAAH} \cdot \text{a\_FAAH\_P} \cdot [\text{P\_r}]}{\text{Km\_FAAH\_P} \cdot \text{FAAH\_D\_r}} \tag{81}$$

7.28 Reaction vL_degr_r

This is a fast irreversible reaction of one reactant forming no product influenced by three modifiers.

Name vL_degr_r

Reaction equation

$$\text{L\_r} \xrightarrow{\text{FAAH\_r, FAAH\_r, L\_r}} \emptyset \tag{82}$$

Reactant

Table 60: Properties of each reactant.

Id	Name	SBO
L_r	L_r	

Modifiers

Table 61: Properties of each modifier.

Id	Name	SBO
FAAH_r	FAAH_r	
FAAH_r	FAAH_r	
L_r	L_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{28} = \frac{\text{vol}\,(\text{ROB}) \cdot [\text{FAAH\_r}] \cdot \text{kcat\_FAAH} \cdot \text{a\_FAAH\_L} \cdot [\text{L\_r}]}{\text{Km\_FAAH\_L} \cdot \text{FAAH\_D\_r}} \tag{83}$$

7.29 Reaction vS_degr_r

This is a fast irreversible reaction of one reactant forming no product influenced by three modifiers.

Name vS_degr_r

Reaction equation

$$\text{S\_r} \xrightarrow{\text{FAAH\_r, FAAH\_r, S\_r}} \emptyset \tag{84}$$

Reactant

Table 62: Properties of each reactant.

Id	Name	SBO
S_r	S_r	

Modifiers

Table 63: Properties of each modifier.

Id	Name	SBO
FAAH_r	FAAH_r	
FAAH_r	FAAH_r	
S_r	S_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{29} = \frac{\text{vol}\,(\text{ROB}) \cdot [\text{FAAH\_r}] \cdot \text{kcat\_FAAH} \cdot \text{a\_FAAH\_S} \cdot [\text{S\_r}]}{\text{Km\_FAAH\_S} \cdot \text{FAAH\_D\_r}} \tag{85}$$

7.30 Reaction vNAPE_syn_r

This is a fast irreversible reaction of no reactant forming one product.

Name vNAPE_syn_r

Reaction equation

$$\emptyset \longrightarrow \text{NAPE\_r} \tag{86}$$

Product

Table 64: Properties of each product.

Id	Name	SBO
NAPE_r	NAPE_r	

Kinetic Law

Derived unit not available

$$v_{30} = \text{Vmax\_NAT} \cdot \text{p\_A} \cdot \text{a\_NAT\_A} \cdot \text{c\_NAT\_ROB} \tag{87}$$

7.31 Reaction vNOPE_syn_r

This is a fast irreversible reaction of no reactant forming one product.

Name vNOPE_syn_r

Reaction equation

$$\emptyset \longrightarrow \text{NOPE\_r} \tag{88}$$

Product

Table 65: Properties of each product.

Id	Name	SBO
NOPE_r	NOPE_r	

Kinetic Law

Derived unit not available

$$v_{31} = \text{Vmax\_NAT} \cdot \text{p\_O} \cdot \text{a\_NAT\_O} \cdot \text{c\_NAT\_ROB} \tag{89}$$

7.32 Reaction vNPPE_syn_r

This is a fast irreversible reaction of no reactant forming one product.

Name vNPPE_syn_r

Reaction equation

$$\emptyset \longrightarrow \text{NPPE\_r} \tag{90}$$

Product

Table 66: Properties of each product.

Id	Name	SBO
NPPE_r	NPPE_r	

Kinetic Law

Derived unit not available

$$v_{32} = \text{Vmax\_NAT} \cdot \text{p\_P} \cdot \text{a\_NAT\_P} \cdot \text{c\_NAT\_ROB} \tag{91}$$

7.33 Reaction vNLPE_syn_r

This is a fast irreversible reaction of no reactant forming one product.

Name vNLPE_syn_r

Reaction equation

$$\emptyset \longrightarrow \text{NLPE\_r} \tag{92}$$

Product

Table 67: Properties of each product.

Id	Name	SBO
NLPE_r	NLPE_r	

Kinetic Law

Derived unit not available

$$v_{33} = \text{Vmax\_NAT} \cdot \text{p\_L} \cdot \text{a\_NAT\_L} \cdot \text{c\_NAT\_ROB} \tag{93}$$

7.34 Reaction vNSPE_syn_r

This is a fast irreversible reaction of no reactant forming one product.

Name vNSPE_syn_r

Reaction equation

$$\emptyset \longrightarrow \text{NSPE\_r} \tag{94}$$

Product

Table 68: Properties of each product.

Id	Name	SBO
NSPE_r	NSPE_r	

Kinetic Law

Derived unit not available

$$v_{34} = \text{Vmax\_NAT} \cdot \text{p\_S} \cdot \text{a\_NAT\_S} \cdot \text{c\_NAT\_ROB} \tag{95}$$

7.35 Reaction vA_syn_r

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

Name vA_syn_r

Reaction equation

$$\text{NAPE\_r} \xrightarrow{\text{NAPE\_r}} \text{A\_r} \tag{96}$$

Reactant

Table 69: Properties of each reactant.

Id	Name	SBO
NAPE_r	NAPE_r	

Modifier

Table 70: Properties of each modifier.

Id	Name	SBO
NAPE_r	NAPE_r	

Product

Table 71: Properties of each product.

Id	Name	SBO
A_r	A_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{35} = \frac{\frac{\text{vol(ROB)} \cdot \text{PLD\_r} \cdot \text{k\_NA\_PE} \cdot [\text{NAPE\_r}]}{\text{Km\_NA\_PE}}}{\text{den\_r}} \tag{97}$$

7.36 Reaction vO_syn_r

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

Name vO_syn_r

Reaction equation

$$\text{NOPE\_r} \xrightarrow{\text{NOPE\_r}} \text{O\_r} \tag{98}$$

Reactant

Table 72: Properties of each reactant.

Id	Name	SBO
NOPE_r	NOPE_r	

Modifier

Table 73: Properties of each modifier.

Id	Name	SBO
NOPE_r	NOPE_r	

Product

Table 74: Properties of each product.

Id	Name	SBO
O_r	O_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{36} = \frac{\frac{\text{vol(ROB)} \cdot \text{PLD\_r} \cdot \text{k\_NO\_PE} \cdot [\text{NOPE\_r}]}{\text{Km\_NO\_PE}}}{\text{den\_r}} \tag{99}$$

7.37 Reaction vP_syn_r

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

Name vP_syn_r

Reaction equation

$$\text{NPPE\_r} \xrightarrow{\text{NPPE\_r}} \text{P\_r} \tag{100}$$

Reactant

Table 75: Properties of each reactant.

Id	Name	SBO
NPPE_r	NPPE_r	

Modifier

Table 76: Properties of each modifier.

Id	Name	SBO
NPPE_r	NPPE_r	

Product

Table 77: Properties of each product.

Id	Name	SBO
P_r	P_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{37} = \frac{\frac{\text{vol(ROB)} \cdot \text{PLD\_r} \cdot \text{k\_NP\_PE} \cdot [\text{NPPE\_r}]}{\text{Km\_NP\_PE}}}{\text{den\_r}} \tag{101}$$

7.38 Reaction vL_syn_r

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

Name vL_syn_r

Reaction equation

$$\text{NLPE\_r} \xrightarrow{\text{NLPE\_r}} \text{L\_r} \tag{102}$$

Reactant

Table 78: Properties of each reactant.

Id	Name	SBO
NLPE_r	NLPE_r	

Modifier

Table 79: Properties of each modifier.

Id	Name	SBO
NLPE_r	NLPE_r	

Product

Table 80: Properties of each product.

Id	Name	SBO
L_r	L_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{38} = \frac{\frac{\text{vol(ROB)} \cdot \text{PLD\_r} \cdot \text{k\_NL\_PE} \cdot [\text{NLPE\_r}]}{\text{Km\_NL\_PE}}}{\text{den\_r}} \tag{103}$$

7.39 Reaction vS_syn_r

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

Name vS_syn_r

Reaction equation

$$\text{NSPE\_r} \xrightarrow{\text{NSPE\_r}} \text{S\_r} \tag{104}$$

Reactant

Table 81: Properties of each reactant.

Id	Name	SBO
NSPE_r	NSPE_r	

Modifier

Table 82: Properties of each modifier.

Id	Name	SBO
NSPE_r	NSPE_r	

Product

Table 83: Properties of each product.

Id	Name	SBO
S_r	S_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{39} = \frac{\frac{\text{vol(ROB)} \cdot \text{PLD\_r} \cdot \text{k\_NS\_PE} \cdot [\text{NSPE\_r}]}{\text{Km\_NS\_PE}}}{\text{den\_r}} \tag{105}$$

7.40 Reaction vFAAH_syn_r

This is a fast irreversible reaction of no reactant forming one product.

Name vFAAH_syn_r

Reaction equation

$$\emptyset \longrightarrow \text{FAAH\_r} \tag{106}$$

Product

Table 84: Properties of each product.

Id	Name	SBO
FAAH_r	FAAH_r	

Kinetic Law

Derived unit not available

$$v_{40} = \text{FAAH\_t} \cdot \text{c\_FAAH\_ROB} \cdot \text{k\_deg\_FAAH} \tag{107}$$

7.41 Reaction vFAAH_degr_r

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

Name vFAAH_degr_r

Reaction equation

$$\mathrm{FAAH\_r} \xrightarrow{\mathrm{FAAH\_r}} \emptyset \tag{108}$$

Reactant

Table 85: Properties of each reactant.

Id	Name	SBO
FAAH_r	FAAH_r	

Modifier

Table 86: Properties of each modifier.

Id	Name	SBO
FAAH_r	FAAH_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{41} = \mathrm{vol}\,(\mathrm{ROB}) \cdot \mathrm{k\_deg\_FAAH} \cdot [\mathrm{FAAH\_r}] \tag{109}$$

7.42 Reaction vFAAH_inh_r

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

Name vFAAH_inh_r

Reaction equation

$$\mathrm{FAAH\_r} \xrightarrow{\mathrm{FAAH\_r}} \mathrm{FAAHinh\_r} \tag{110}$$

Reactant

Table 87: Properties of each reactant.

Id	Name	SBO
FAAH_r	FAAH_r	

Modifier

Table 88: Properties of each modifier.

Id	Name	SBO
FAAH_r	FAAH_r	

Product

Table 89: Properties of each product.

Id	Name	SBO
FAAHinh_r	FAAHinh_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{42} = \mathrm{vol}\,(\mathrm{ROB}) \cdot \mathrm{k\_inh} \cdot [\mathrm{FAAH\_r}] \cdot \mathrm{PF\_r} \tag{111}$$

7.43 Reaction vFAAH_inh_degr_r

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

Name vFAAH_inh_degr_r

Reaction equation

$$\mathrm{FAAHinh\_r} \xrightarrow{\mathrm{FAAHinh\_r}} \emptyset \tag{112}$$

Reactant

Table 90: Properties of each reactant.

Id	Name	SBO
FAAHinh_r	FAAHinh_r	

Modifier

Table 91: Properties of each modifier.

Id	Name	SBO
FAAHinh_r	FAAHinh_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{43} = \mathrm{vol}\,(\mathrm{ROB}) \cdot \mathrm{k\_deg\_FAAH} \cdot [\mathrm{FAAHinh\_r}] \tag{113}$$

7.44 Reaction vA_UE_r

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

Name vA_UE_r

Reaction equation

$$\mathrm{A\_r} \xrightarrow{\mathrm{A\_r}} \emptyset \tag{114}$$

Reactant

Table 92: Properties of each reactant.

Id	Name	SBO
A_r	A_r	

Modifier

Table 93: Properties of each modifier.

Id	Name	SBO
A_r	A_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{44} = \mathrm{c\_NAAA\_ROB} \cdot \mathrm{kcl\_A} \cdot [\mathrm{A\_r}] \tag{115}$$

7.45 Reaction vO_UE_r

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

Name vO_UE_r

Reaction equation

$$\mathrm{O\_r} \xrightarrow{\mathrm{O\_r}} \emptyset \tag{116}$$

Reactant

Table 94: Properties of each reactant.

Id	Name	SBO
O_r	O_r	

Modifier

Table 95: Properties of each modifier.

Id	Name	SBO
O_r	O_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{45} = \mathrm{c\_NAAA\_ROB} \cdot \mathrm{kcl\_O} \cdot [\mathrm{O\_r}] \tag{117}$$

7.46 Reaction vP_UE_r

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

Name vP_UE_r

Reaction equation

$$\mathrm{P\_r} \xrightarrow{\mathrm{P\_r}} \emptyset \tag{118}$$

Reactant

Table 96: Properties of each reactant.

Id	Name	SBO
P_r	P_r	

Modifier

Table 97: Properties of each modifier.

Id	Name	SBO
P_r	P_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{46} = \mathrm{c\_NAAA\_ROB} \cdot \mathrm{kcl\_P} \cdot [\mathrm{P\_r}] \tag{119}$$

7.47 Reaction vL_UE_r

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

Name vL_UE_r

Reaction equation

$$\mathrm{L\_r} \xrightarrow{\mathrm{L\_r}} \emptyset \tag{120}$$

Reactant

Table 98: Properties of each reactant.

Id	Name	SBO
L_r	L_r	

Modifier

Table 99: Properties of each modifier.

Id	Name	SBO
L_r	L_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{47} = \text{c\_NAAA\_ROB} \cdot \text{kcl\_L} \cdot [\text{L\_r}] \tag{121}$$

7.48 Reaction vS_UE_r

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

Name vS_UE_r

Reaction equation

$$\text{S\_r} \xrightarrow{\text{S\_r}} \emptyset \tag{122}$$

Reactant

Table 100: Properties of each reactant.

Id	Name	SBO
S_r	S_r	

Modifier

Table 101: Properties of each modifier.

Id	Name	SBO
S_r	S_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{48} = \text{c\_NAAA\_ROB} \cdot \text{kcl\_S} \cdot [\text{S\_r}] \tag{123}$$

7.49 Reaction vA_degr_m

This is a fast irreversible reaction of one reactant forming no product influenced by three modifiers.

Name vA_degr_m

Reaction equation

$$\text{A\_m} \xrightarrow{\text{FAAH\_m, FAAH\_m, A\_m}} \emptyset \tag{124}$$

Reactant

Table 102: Properties of each reactant.

Id	Name	SBO
A_m	A_m	

Modifiers

Table 103: Properties of each modifier.

Id	Name	SBO
FAAH_m	FAAH_m	
FAAH_m	FAAH_m	
A_m	A_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{49} = \frac{\text{vol}(\text{MEC}) \cdot [\text{FAAH\_m}] \cdot \text{kcat\_FAAH} \cdot \text{a\_FAAH\_A} \cdot [\text{A\_m}]}{\text{Km\_FAAH\_A} \cdot \text{FAAH\_D\_m}} \tag{125}$$

7.50 Reaction vO_degr_m

This is a fast irreversible reaction of one reactant forming no product influenced by three modifiers.

Name vO_degr_m

Reaction equation

$$\text{O\_m} \xrightarrow{\text{FAAH\_m, FAAH\_m, O\_m}} \emptyset \tag{126}$$

Reactant

Table 104: Properties of each reactant.

Id	Name	SBO
O_m	O_m	

Modifiers

Table 105: Properties of each modifier.

Id	Name	SBO
FAAH_m	FAAH_m	
FAAH_m	FAAH_m	
O_m	O_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{50} = \frac{\mathrm{vol}\,(\mathrm{MEC}) \cdot [\mathrm{FAAH\_m}] \cdot \mathrm{kcat\_FAAH} \cdot \mathrm{a\_FAAH\_O} \cdot [\mathrm{O\_m}]}{\mathrm{Km\_FAAH\_O} \cdot \mathrm{FAAH\_D\_m}} \tag{127}$$

7.51 Reaction vP_degr_m

This is a fast irreversible reaction of one reactant forming no product influenced by three modifiers.

Name vP_degr_m

Reaction equation

$$\mathrm{P\_m} \xrightarrow{\mathrm{FAAH\_m,\ FAAH\_m,\ P\_m}} \emptyset \tag{128}$$

Reactant

Table 106: Properties of each reactant.

Id	Name	SBO
P_m	P_m	

Modifiers

Table 107: Properties of each modifier.

Id	Name	SBO
FAAH_m	FAAH_m	
FAAH_m	FAAH_m	
P_m	P_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{51} = \frac{\text{vol}\,(\text{MEC}) \cdot [\text{FAAH\_m}] \cdot \text{kcat\_FAAH} \cdot \text{a\_FAAH\_P} \cdot [\text{P\_m}]}{\text{Km\_FAAH\_P} \cdot \text{FAAH\_D\_m}} \tag{129}$$

7.52 Reaction vL_degr_m

This is a fast irreversible reaction of one reactant forming no product influenced by three modifiers.

Name vL_degr_m

Reaction equation

$$\text{L\_m} \xrightarrow{\text{FAAH\_m, FAAH\_m, L\_m}} \emptyset \tag{130}$$

Reactant

Table 108: Properties of each reactant.

Id	Name	SBO
L_m	L_m	

Modifiers

Table 109: Properties of each modifier.

Id	Name	SBO
FAAH_m	FAAH_m	
FAAH_m	FAAH_m	
L_m	L_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{52} = \frac{\text{vol}\,(\text{MEC}) \cdot [\text{FAAH\_m}] \cdot \text{kcat\_FAAH} \cdot \text{a\_FAAH\_L} \cdot [\text{L\_m}]}{\text{Km\_FAAH\_L} \cdot \text{FAAH\_D\_m}} \tag{131}$$

7.53 Reaction vS_degr_m

This is a fast irreversible reaction of one reactant forming no product influenced by three modifiers.

Name vS_degr_m

Reaction equation

$$\text{S\_m} \xrightarrow{\text{FAAH\_m, FAAH\_m, S\_m}} \emptyset \tag{132}$$

Reactant

Table 110: Properties of each reactant.

Id	Name	SBO
S_m	S_m	

Modifiers

Table 111: Properties of each modifier.

Id	Name	SBO
FAAH_m	FAAH_m	
FAAH_m	FAAH_m	
S_m	S_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{53} = \frac{\text{vol}\,(\text{MEC}) \cdot [\text{FAAH\_m}] \cdot \text{kcat\_FAAH} \cdot \text{a\_FAAH\_S} \cdot [\text{S\_m}]}{\text{Km\_FAAH\_S} \cdot \text{FAAH\_D\_m}} \tag{133}$$

7.54 Reaction vFAAH_syn_m

This is a fast irreversible reaction of no reactant forming one product.

Name vFAAH_syn_m

Reaction equation

$$\emptyset \longrightarrow \text{FAAH\_m} \tag{134}$$

Product

Table 112: Properties of each product.

Id	Name	SBO
FAAH_m	FAAH_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{54} = \text{vol}\,(\text{MEC}) \cdot \text{FAAH\_t} \cdot \text{b\_FAAH\_MEC} \cdot \text{k\_deg\_FAAH} \tag{135}$$

7.55 Reaction vFAAH_degr_m

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

Name vFAAH_degr_m

Reaction equation

$$\text{FAAH\_m} \xrightarrow{\text{FAAH\_m}} \emptyset \tag{136}$$

Reactant

Table 113: Properties of each reactant.

Id	Name	SBO
FAAH_m	FAAH_m	

Modifier

Table 114: Properties of each modifier.

Id	Name	SBO
FAAH_m	FAAH_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{55} = \mathrm{vol}\,(\mathrm{MEC}) \cdot \mathrm{k\_deg\_FAAH} \cdot [\mathrm{FAAH\_m}] \tag{137}$$

7.56 Reaction vFAAH_inh_m

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

Name vFAAH_inh_m

Reaction equation

$$\mathrm{FAAH\_m} \xrightarrow{\mathrm{FAAH\_m}} \mathrm{FAAHinh\_m} \tag{138}$$

Reactant

Table 115: Properties of each reactant.

Id	Name	SBO
FAAH_m	FAAH_m	

Modifier

Table 116: Properties of each modifier.

Id	Name	SBO
FAAH_m	FAAH_m	

Product

Table 117: Properties of each product.

Id	Name	SBO
FAAHinh_m	FAAHinh_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{56} = \text{vol}\,(\text{MEC}) \cdot \text{k\_inh} \cdot [\text{FAAH\_m}] \cdot \text{PF\_m} \tag{139}$$

7.57 Reaction vFAAH_inh_degr_m

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

Name vFAAH_inh_degr_m

Reaction equation

$$\text{FAAHinh\_m} \xrightarrow{\text{FAAHinh\_m}} \emptyset \tag{140}$$

Reactant

Table 118: Properties of each reactant.

Id	Name	SBO
FAAHinh_m	FAAHinh_m	

Modifier

Table 119: Properties of each modifier.

Id	Name	SBO
FAAHinh_m	FAAHinh_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{57} = \text{vol}\,(\text{MEC}) \cdot \text{k\_deg\_FAAH} \cdot [\text{FAAHinh\_m}] \tag{141}$$

7.58 Reaction vA_m_p

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

Name vA_m_p

Reaction equation

$$\text{A\_m} \xrightarrow{\text{A\_m, A\_p}} \text{A\_p} \tag{142}$$

Reactant

Table 120: Properties of each reactant.

Id	Name	SBO
A_m	A_m	

Modifiers

Table 121: Properties of each modifier.

Id	Name	SBO
A_m	A_m	
A_p	A_p	

Product

Table 122: Properties of each product.

Id	Name	SBO
A_p	A_p	

Kinetic Law

Derived unit contains undeclared units

$$v_{58} = \frac{\mathrm{vol}\,(\mathrm{MEC}) \cdot \mathrm{ktr\_m\_p\_A} \cdot ([\mathrm{A\_m}] - [\mathrm{A\_p}] \cdot \mathrm{Ktr\_p\_m\_A})}{[\mathrm{A\_m}] + [\mathrm{A\_p}] + \mathrm{Km\_p\_m\_A}} \tag{143}$$

7.59 Reaction vo_m_p

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

Name vo_m_p

Reaction equation

$$\mathrm{O\_m} \xrightarrow{\mathrm{O\_m},\ \mathrm{O\_p}} \mathrm{O\_p} \tag{144}$$

Reactant

Table 123: Properties of each reactant.

Id	Name	SBO
O_m	O_m	

Modifiers

Table 124: Properties of each modifier.

Id	Name	SBO
O_m	O_m	
O_p	O_p	

Product

Table 125: Properties of each product.

Id	Name	SBO
O_p	O_p	

Kinetic Law

Derived unit contains undeclared units

$$v_{59} = \mathrm{vol}\,(\mathrm{MEC}) \cdot \mathrm{ktr\_m\_p\_O} \cdot ([\mathrm{O\_m}] - [\mathrm{O\_p}] \cdot \mathrm{Ktr\_p\_m\_O}) \tag{145}$$

7.60 Reaction vP_m_p

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

Name vP_m_p

Reaction equation

$$\mathrm{P\_m} \xrightarrow{\mathrm{P\_m,\ P\_p}} \mathrm{P\_p} \tag{146}$$

Reactant

Table 126: Properties of each reactant.

Id	Name	SBO
P_m	P_m	

Modifiers

Table 127: Properties of each modifier.

Id	Name	SBO
P_m	P_m	
P_p	P_p	

Product

Table 128: Properties of each product.

Id	Name	SBO
P_p	P_p	

Kinetic Law

Derived unit contains undeclared units

$$v_{60} = \text{vol}\,(\text{MEC}) \cdot \text{ktr\_m\_p\_P} \cdot ([\text{P\_m}] - [\text{P\_p}] \cdot \text{Ktr\_p\_m\_P}) \tag{147}$$

7.61 Reaction vL_m_p

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

Name vL_m_p

Reaction equation

$$\text{L\_m} \xrightarrow{\text{L\_m, L\_p}} \text{L\_p} \tag{148}$$

Reactant

Table 129: Properties of each reactant.

Id	Name	SBO
L_m	L_m	

Modifiers

Table 130: Properties of each modifier.

Id	Name	SBO
L_m	L_m	
L_p	L_p	

Product

Table 131: Properties of each product.

Id	Name	SBO
L_p	L_p	

Kinetic Law

Derived unit contains undeclared units

$$v_{61} = \mathrm{vol}\,(\mathrm{MEC}) \cdot \mathrm{ktr\_m\_p\_L} \cdot ([\mathrm{L\_m}] - [\mathrm{L\_p}] \cdot \mathrm{Ktr\_p\_m\_L}) \tag{149}$$

7.62 Reaction vS_m_p

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

Name vS_m_p

Reaction equation

$$\mathrm{S\_m} \xrightarrow{\mathrm{S\_m,\ S\_p}} \mathrm{S\_p} \tag{150}$$

Reactant

Table 132: Properties of each reactant.

Id	Name	SBO
S_m	S_m	

Modifiers

Table 133: Properties of each modifier.

Id	Name	SBO
S_m	S_m	
S_p	S_p	

Product

Table 134: Properties of each product.

Id	Name	SBO
S_p	S_p	

Kinetic Law

Derived unit contains undeclared units

$$v_{62} = \mathrm{vol}\,(\mathrm{MEC}) \cdot \mathrm{ktr\_m\_p\_S} \cdot ([\mathrm{S\_m}] - [\mathrm{S\_p}] \cdot \mathrm{Ktr\_p\_m\_S}) \tag{151}$$

7.63 Reaction vA_b_m

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

Name vA_b_m

Reaction equation

$$\mathrm{A\_b} \xrightarrow{\mathrm{A\_b,\ A\_m}} \mathrm{A\_m} \tag{152}$$

Reactant

Table 135: Properties of each reactant.

Id	Name	SBO
A_b	A_b	

Modifiers

Table 136: Properties of each modifier.

Id	Name	SBO
A_b	A_b	
A_m	A_m	

Product

Table 137: Properties of each product.

Id	Name	SBO
A_m	A_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{63} = \frac{\mathrm{vol}\,(\mathrm{MEC}) \cdot \mathrm{ktr\_m\_p\_A} \cdot ([\mathrm{A\_b}] - [\mathrm{A\_m}])}{[\mathrm{A\_m}] + [\mathrm{A\_b}] + \mathrm{Km\_p\_m\_A}} \tag{153}$$

7.64 Reaction vO_b_m

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

Name vO_b_m

Reaction equation

$$\mathrm{O\_b} \xrightarrow{\mathrm{O\_b,\ O\_m}} \mathrm{O\_m} \tag{154}$$

Reactant

Table 138: Properties of each reactant.

Id	Name	SBO
O_b	O_b	

Modifiers

Table 139: Properties of each modifier.

Id	Name	SBO
O_b	O_b	
O_m	O_m	

Product

Table 140: Properties of each product.

Id	Name	SBO
O_m	O_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{64} = \mathrm{vol}\,(\mathrm{MEC}) \cdot \mathrm{ktr\_m\_p\_O} \cdot ([\mathrm{O\_b}] - [\mathrm{O\_m}]) \tag{155}$$

7.65 Reaction vP_b_m

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

Name vP_b_m

Reaction equation

$$\mathrm{P\_b} \xrightarrow{\mathrm{P\_b,\ P\_m}} \mathrm{P\_m} \tag{156}$$

Reactant

Table 141: Properties of each reactant.

Id	Name	SBO
P_b	P_b	

Modifiers

Table 142: Properties of each modifier.

Id	Name	SBO
P_b	P_b	
P_m	P_m	

Product

Table 143: Properties of each product.

Id	Name	SBO
P_m	P_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{65} = \mathrm{vol}\,(\mathrm{MEC}) \cdot \mathrm{ktr\_m\_p\_P} \cdot ([\mathrm{P\_b}] - [\mathrm{P\_m}]) \tag{157}$$

7.66 Reaction vL_b_m

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

Name vL_b_m

Reaction equation

$$\mathrm{L\_b} \xrightarrow{\mathrm{L\_b,\ L\_m}} \mathrm{L\_m} \tag{158}$$

Reactant

Table 144: Properties of each reactant.

Id	Name	SBO
L_b	L_b	

Modifiers

Table 145: Properties of each modifier.

Id	Name	SBO
L_b	L_b	
L_m	L_m	

Product

Table 146: Properties of each product.

Id	Name	SBO
L_m	L_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{66} = \mathrm{vol}\,(\mathrm{MEC}) \cdot \mathrm{ktr\_m\_p\_L} \cdot ([\mathrm{L\_b}] - [\mathrm{L\_m}]) \tag{159}$$

7.67 Reaction vS_b_m

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

Name vS_b_m

Reaction equation

$$\mathrm{S\_b} \xrightarrow{\mathrm{S\_b,\ S\_m}} \mathrm{S\_m} \tag{160}$$

Reactant

Table 147: Properties of each reactant.

Id	Name	SBO
S_b	S_b	

Modifiers

Table 148: Properties of each modifier.

Id	Name	SBO
S_b	S_b	
S_m	S_m	

Product

Table 149: Properties of each product.

Id	Name	SBO
S_m	S_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{67} = \mathrm{vol}\,(\mathrm{MEC}) \cdot \mathrm{ktr\_m\_p\_S} \cdot ([\mathrm{S\_b}] - [\mathrm{S\_m}]) \tag{161}$$

7.68 Reaction vA_r_p

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

Name vA_r_p

Reaction equation

$$\mathrm{A\_r} \xrightarrow{\mathrm{A\_r,\ A\_p}} \mathrm{A\_p} \tag{162}$$

Reactant

Table 150: Properties of each reactant.

Id	Name	SBO
A_r	A_r	

Modifiers

Table 151: Properties of each modifier.

Id	Name	SBO
A_r	A_r	
A_p	A_p	

Product

Table 152: Properties of each product.

Id	Name	SBO
A_p	A_p	

Kinetic Law

Derived unit contains undeclared units

$$v_{68} = \frac{\text{vol}\,(\text{PLASMA}) \cdot \text{ktr\_r\_p} \cdot ([\text{A\_r}] - [\text{A\_p}] \cdot \text{Ktr\_p\_r\_A})}{[\text{A\_r}] + [\text{A\_p}] + \text{Km\_p\_m\_A}} \tag{163}$$

7.69 Reaction v0_r_p

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

Name vO_r_p

Reaction equation

$$\text{O\_r} \xrightarrow{\text{O\_r, O\_p}} \text{O\_p} \tag{164}$$

Reactant

Table 153: Properties of each reactant.

Id	Name	SBO
O_r	O_r	

Modifiers

Table 154: Properties of each modifier.

Id	Name	SBO
O_r	O_r	
O_p	O_p	

Product

Table 155: Properties of each product.

Id	Name	SBO
O_p	O_p	

Kinetic Law

Derived unit contains undeclared units

$$v_{69} = \mathrm{vol}\,(\mathrm{PLASMA}) \cdot \mathrm{ktr\_r\_p} \cdot ([\mathrm{O\_r}] - [\mathrm{O\_p}] \cdot \mathrm{Ktr\_p\_r\_O}) \tag{165}$$

7.70 Reaction vP_r_p

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

Name vP_r_p

Reaction equation

$$\mathrm{P\_r} \xrightarrow{\mathrm{P\_r,\ P\_p}} \mathrm{P\_p} \tag{166}$$

Reactant

Table 156: Properties of each reactant.

Id	Name	SBO
P_r	P_r	

Modifiers

Table 157: Properties of each modifier.

Id	Name	SBO
P_r	P_r	
P_p	P_p	

Product

Table 158: Properties of each product.

Id	Name	SBO
P_p	P_p	

Kinetic Law

Derived unit contains undeclared units

$$v_{70} = \mathrm{vol}\,(\mathrm{PLASMA}) \cdot \mathrm{ktr\_r\_p} \cdot ([\mathrm{P\_r}] - [\mathrm{P\_p}] \cdot \mathrm{Ktr\_p\_r\_P}) \tag{167}$$

7.71 Reaction vL_r_p

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

Name vL_r_p

Reaction equation

$$\mathrm{L\_r} \xrightarrow{\mathrm{L\_r,\ L\_p}} \mathrm{L\_p} \tag{168}$$

Reactant

Table 159: Properties of each reactant.

Id	Name	SBO
L_r	L_r	

Modifiers

Table 160: Properties of each modifier.

Id	Name	SBO
L_r	L_r	
L_p	L_p	

Product

Table 161: Properties of each product.

Id	Name	SBO
L_p	L_p	

Kinetic Law

Derived unit contains undeclared units

$$v_{71} = \mathrm{vol}\,(\mathrm{PLASMA}) \cdot \mathrm{ktr\_r\_p} \cdot ([\mathrm{L\_r}] - [\mathrm{L\_p}] \cdot \mathrm{Ktr\_p\_r\_L}) \tag{169}$$

7.72 Reaction vS_r_p

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

Name vS_r_p

Reaction equation

$$\mathrm{S\_r} \xrightarrow{\mathrm{S\_r,\ S\_p}} \mathrm{S\_p} \tag{170}$$

Reactant

Table 162: Properties of each reactant.

Id	Name	SBO
S_r	S_r	

Modifiers

Table 163: Properties of each modifier.

Id	Name	SBO
S_r	S_r	
S_p	S_p	

Product

Table 164: Properties of each product.

Id	Name	SBO
S_p	S_p	

Kinetic Law

Derived unit contains undeclared units

$$v_{72} = \mathrm{vol}\,(\mathrm{PLASMA}) \cdot \mathrm{ktr\_r\_p} \cdot ([\mathrm{S\_r}] - [\mathrm{S\_p}] \cdot \mathrm{Ktr\_p\_r\_S}) \tag{171}$$

7.73 Reaction absorp

This is a fast irreversible reaction of one reactant forming one product.

Name absorp

Reaction equation

$$\mathrm{PFM\_gut} \longrightarrow \mathrm{PFM\_p} \tag{172}$$

Reactant

Table 165: Properties of each reactant.

Id	Name	SBO
PFM_gut	PFM_gut	

Product

Table 166: Properties of each product.

Id	Name	SBO
PFM_p	PFM_p	

Kinetic Law

Derived unit not available

$$v_{73} = \text{kabs\_PFM} \cdot \text{MD} \tag{173}$$

7.74 Reaction dist

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

Name dist

Reaction equation

$$\text{PFM\_p} \xrightarrow{\text{PFM\_p, PFM\_r}} \text{PFM\_r} \tag{174}$$

Reactant

Table 167: Properties of each reactant.

Id	Name	SBO
PFM_p	PFM_p	

Modifiers

Table 168: Properties of each modifier.

Id	Name	SBO
PFM_p	PFM_p	
PFM_r	PFM_r	

Product

Table 169: Properties of each product.

Id	Name	SBO
PFM_r	PFM_r	

Kinetic Law

Derived unit contains undeclared units

$$v_{74} = \text{kout\_PFM} \cdot [\text{PFM\_p}] - \text{kin\_PFM} \cdot [\text{PFM\_r}] \tag{175}$$

7.75 Reaction elim

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

Name elim

Reaction equation

$$\text{PFM\_p} \xrightarrow{\text{PFM\_p}} \emptyset \tag{176}$$

Reactant

Table 170: Properties of each reactant.

Id	Name	SBO
PFM_p	PFM_p	

Modifier

Table 171: Properties of each modifier.

Id	Name	SBO
PFM_p	PFM_p	

Kinetic Law

Derived unit contains undeclared units

$$v_{75} = \text{klinear\_PFM} \cdot [\text{PFM\_p}] + \frac{\frac{\text{Vm\_PFM} \cdot [\text{PFM\_p}]}{\text{Km\_PFM} + \frac{[\text{PFM\_p}]}{\text{Vss\_PFM}}}}{\text{Vss\_PFM}} \tag{177}$$

8 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.

8.1 Species A_b

Name A_b

Initial concentration $0.7493309\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in seven reactions (as a reactant in vA_degr_b, vA_UE_b, vA_b_m and as a product in vA_syn_b and as a modifier in vA_degr_b, vA_UE_b, vA_b_m).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{A\_b} = v_{11} - v_{1} - v_{20} - v_{63} \tag{178}$$

8.2 Species O_b

Name O_b

Initial concentration $20.77858\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in seven reactions (as a reactant in vO_degr_b, vO_UE_b, vO_b_m and as a product in vO_syn_b and as a modifier in vO_degr_b, vO_UE_b, vO_b_m).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{O\_b} = v_{12} - v_{2} - v_{21} - v_{64} \tag{179}$$

8.3 Species P_b

Name P_b

Initial concentration $6.541209\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in seven reactions (as a reactant in vP_degr_b, vP_UE_b, vP_b_m and as a product in vP_syn_b and as a modifier in vP_degr_b, vP_UE_b, vP_b_m).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{P\_b} = v_{13} - v_{3} - v_{22} - v_{65} \tag{180}$$

8.4 Species L_b

Name L_b

Initial concentration $2.319571\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in seven reactions (as a reactant in vL_degr_b, vL_UE_b, vL_b_m and as a product in vL_syn_b and as a modifier in vL_degr_b, vL_UE_b, vL_b_m).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{L\_b} = v_{14} - v_4 - v_{23} - v_{66} \tag{181}$$

8.5 Species S_b

Name S_b

Initial concentration $3.427807\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in seven reactions (as a reactant in vS_degr_b, vS_UE_b, vS_b_m and as a product in vS_syn_b and as a modifier in vS_degr_b, vS_UE_b, vS_b_m).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{S\_b} = v_{15} - v_5 - v_{24} - v_{67} \tag{182}$$

8.6 Species NAPE_b

Name NAPE_b

Notes precursor of anandamide

Initial concentration $3.879041 \cdot 10^{-5}\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{NAPE\_b} = v_6 - v_{11} \tag{183}$$

8.7 Species NOPE_b

Name NOPE_b

Notes precursor of oleoyl ethanolamide

Initial concentration $8.814287 \cdot 10^{-4}\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{NOPE\_b} = v_7 - v_{12} \tag{184}$$

8.8 Species NPPE_b

Name NPPE_b

Notes precursor of palmitoyl ethanolamide

Initial concentration $1.732296 \cdot 10^{-4}\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{NPPE\_b} = v_8 - v_{13} \tag{185}$$

8.9 Species NLPE_b

Name NLPE_b

Notes precursor of linoleoyl ethanolamide

Initial concentration $7.550331 \cdot 10^{-5}\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{NLPE\_b} = v_9 - v_{14} \tag{186}$$

8.10 Species NSPE_b

Name NSPE_b

Notes precursor of stearoyl ethanolamide

Initial concentration $1.272629 \cdot 10^{-4}\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{NSPE\_b} = v_{10} - v_{15} \tag{187}$$

8.11 Species FAAH_b

Name FAAH_b

Initial concentration $15.366\ \mathrm{mol} \cdot \mathrm{l}^{-1}$

This species takes part in 15 reactions (as a reactant in vFAAH_degr_b, vFAAH_inh_b and as a product in vFAAH_syn_b and as a modifier in vA_degr_b, vA_degr_b, vO_degr_b, vO_degr_b, vP_degr_b, vP_degr_b, vL_degr_b, vL_degr_b, vS_degr_b, vS_degr_b, vFAAH_degr_b, vFAAH_inh_b).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{FAAH\_b} = v_{16} - v_{17} - v_{18} \tag{188}$$

8.12 Species FAAHinh_b

Name FAAHinh_b

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{FAAHinh\_b} = v_{18} - v_{19} \tag{189}$$

8.13 Species A_r

Name A_r

Initial concentration $0.5419204\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in seven reactions (as a reactant in vA_degr_r, vA_UE_r, vA_r_p and as a product in vA_syn_r and as a modifier in vA_degr_r, vA_UE_r, vA_r_p).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{A\_r} = v_{35} - v_{25} - v_{44} - v_{68} \tag{190}$$

8.14 Species O_r

Name O_r

Initial concentration $14.23822\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in seven reactions (as a reactant in vO_degr_r, vO_UE_r, vO_r_p and as a product in vO_syn_r and as a modifier in vO_degr_r, vO_UE_r, vO_r_p).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{O\_r} = v_{36} - v_{26} - v_{45} - v_{69} \tag{191}$$

8.15 Species P_r

Name P_r

Initial concentration $4.121915\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in seven reactions (as a reactant in vP_degr_r, vP_UE_r, vP_r_p and as a product in vP_syn_r and as a modifier in vP_degr_r, vP_UE_r, vP_r_p).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{P\_r} = v_{37} - v_{27} - v_{46} - v_{70} \tag{192}$$

8.16 Species L_r

Name L_r

Initial concentration $1.705466\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in seven reactions (as a reactant in vL_degr_r, vL_UE_r, vL_r_p and as a product in vL_syn_r and as a modifier in vL_degr_r, vL_UE_r, vL_r_p).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{L\_r} = v_{38} - v_{28} - v_{47} - v_{71} \tag{193}$$

8.17 Species S_r

Name S_r

Initial concentration $2.515968\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in seven reactions (as a reactant in vS_degr_r, vS_UE_r, vS_r_p and as a product in vS_syn_r and as a modifier in vS_degr_r, vS_UE_r, vS_r_p).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{S\_r} = v_{39} - v_{29} - v_{48} - v_{72} \tag{194}$$

8.18 Species NAPE_r

Name NAPE_r

Notes precursor of anandamide

Initial concentration $4.241633 \cdot 10^{-6}\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in three reactions (as a reactant in vA_syn_r and as a product in vNAPE-_syn_r and as a modifier in vA_syn_r).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{NAPE\_r} = v_{30} - v_{35} \tag{195}$$

8.19 Species NOPE_r

Name NOPE_r

Notes precursor of oleoyl ethanolamide

Initial concentration $9.638198 \cdot 10^{-5}$ mol $\cdot$ l^{-1}

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{NOPE\_r} = v_{31} - v_{36} \tag{196}$$

8.20 Species NPPE_r

Name NPPE_r

Notes precursor of palmitoyl ethanolamide

Initial concentration $1.894222 \cdot 10^{-5}$ mol $\cdot$ l^{-1}

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{NPPE\_r} = v_{32} - v_{37} \tag{197}$$

8.21 Species NLPE_r

Name NLPE_r

Notes precursor of linoleoyl ethanolamide

Initial concentration $8.256095 \cdot 10^{-6}$ mol $\cdot$ l^{-1}

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{NLPE\_r} = v_{33} - v_{38} \tag{198}$$

8.22 Species NSPE_r

Name NSPE_r

Notes precursor of stearoyl ethanolamide

Initial concentration $1.391587 \cdot 10^{-5}$ mol $\cdot$ l^{-1}

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{NSPE\_r} = v_{34} - v_{39} \tag{199}$$

8.23 Species FAAH_r

Name FAAH_r

Initial concentration $2.165868\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in 15 reactions (as a reactant in vFAAH_degr_r, vFAAH_inh_r and as a product in vFAAH_syn_r and as a modifier in vA_degr_r, vA_degr_r, vO_degr_r, vO_degr_r, vP_degr_r, vP_degr_r, vL_degr_r, vL_degr_r, vS_degr_r, vS_degr_r, vFAAH_degr_r, vFAAH_inh_r).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{FAAH\_r} = v_{40} - v_{41} - v_{42} \tag{200}$$

8.24 Species FAAHinh_r

Name FAAHinh_r

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{FAAHinh\_r} = v_{42} - v_{43} \tag{201}$$

8.25 Species A_m

Name A_m

Initial concentration $0.97761\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in vA_degr_m, vA_m_p and as a product in vA_b_m and as a modifier in vA_degr_m, vA_m_p, vA_b_m).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{A\_m} = v_{63} - v_{49} - v_{58} \tag{202}$$

8.26 Species O_m

Name O_m

Initial concentration $16.3219\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in vO_degr_m, vo_m_p and as a product in vO_b_m and as a modifier in vO_degr_m, vo_m_p, vO_b_m).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{O\_m} = v_{64} - v_{50} - v_{59} \tag{203}$$

8.27 Species P_m

Name P_m

Initial concentration $5.809415\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in vP_degr_m, vP_m_p and as a product in vP_b_m and as a modifier in vP_degr_m, vP_m_p, vP_b_m).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{P\_m} = v_{65} - v_{51} - v_{60} \tag{204}$$

8.28 Species L_m

Name L_m

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

This species takes part in six reactions (as a reactant in vL_degr_m, vL_m_p and as a product in vL_b_m and as a modifier in vL_degr_m, vL_m_p, vL_b_m).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{L\_m} = v_{66} - v_{52} - v_{61} \tag{205}$$

8.29 Species S_m

Name S_m

Initial concentration $2.968774\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in six reactions (as a reactant in vS_degr_m, vS_m_p and as a product in vS_b_m and as a modifier in vS_degr_m, vS_m_p, vS_b_m).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{S\_m} = v_{67} - v_{53} - v_{62} \tag{206}$$

8.30 Species FAAH_m

Name FAAH_m

Initial concentration $10.686\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in 15 reactions (as a reactant in vFAAH_degr_m, vFAAH_inh_m and as a product in vFAAH_syn_m and as a modifier in vA_degr_m, vA_degr_m, vO_degr_m, vO_degr_m, vP_degr_m, vP_degr_m, vL_degr_m, vL_degr_m, vS_degr_m, vS_degr_m, vFAAH_degr_m, vFAAH_inh_m).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{FAAH\_m} = v_{54} - v_{55} - v_{56} \tag{207}$$

8.31 Species FAAHinh_m

Name FAAHinh_m

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{FAAHinh\_m} = v_{56} - v_{57} \tag{208}$$

8.32 Species A_p

Name A_p

Initial concentration $0.8740574\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in four reactions (as a product in vA_m_p, vA_r_p and as a modifier in vA_m_p, vA_r_p).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{A\_p} = v_{58} + v_{68} \tag{209}$$

8.33 Species O_p

Name O_p

Initial concentration $5.085073\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in four reactions (as a product in vo_m_p, vO_r_p and as a modifier in vo_m_p, vO_r_p).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{O\_p} = v_{59} + v_{69} \tag{210}$$

8.34 Species P_p

Name P_p

Initial concentration $4.849307\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in four reactions (as a product in vP_m_p, vP_r_p and as a modifier in vP_m_p, vP_r_p).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{P\_p} = v_{60} + v_{70} \tag{211}$$

8.35 Species L_p

Name L_p

Initial concentration $1.916254\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in four reactions (as a product in vL_m_p, vL_r_p and as a modifier in vL_m_p, vL_r_p).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{L\_p} = v_{61} + v_{71} \tag{212}$$

8.36 Species S_p

Name S_p

Initial concentration $0.273772\ \mathrm{mol}\cdot\mathrm{l}^{-1}$

This species takes part in four reactions (as a product in vS_m_p, vS_r_p and as a modifier in vS_m_p, vS_r_p).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{S\_p} = v_{62} + v_{72} \tag{213}$$

8.37 Species PFM_gut

Name PFM_gut

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{PFM\_gut} = -v_{73} \tag{214}$$

8.38 Species PFM_p

Name PFM_p

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

This species takes part in five reactions (as a reactant in dist, elim and as a product in absorp and as a modifier in dist, elim).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{PFM\_p} = v_{73} - v_{74} - v_{75} \tag{215}$$

8.39 Species PFM_r

Name PFM_r

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

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

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{PFM\_r} = v_{74} \tag{216}$$

A Glossary of Systems Biology Ontology Terms

SBO:0000290 physical compartment: Specific location of space, that can be bounded or not. A physical compartment can have 1, 2 or 3 dimensions

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