

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 Chelliah¹ and Niel Benson² 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.

¹EMBL-EBI, viji@ebi.ac.uk

²Xenologiq, Canterbury, Kent, UK, neil@xenologiq.com

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 identified by: [MODEL1402030000](#).

To cite BioModels Database, please use: [BioModels Database: An enhanced, curated and annotated resource for published quantitative kinetic models](#).

To the extent possible under law, all copyright and related neighbouring rights to this encoded model have been dedicated to the public domain worldwide. Please refer to [CC0 Public Domain Dedication](#) for more information.

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	<input checked="" type="checkbox"/>	
BRAIN		0000290	3	1.45000004768372	l	<input checked="" type="checkbox"/>	Default
PLASMA		0000290	3	2.6489999294281	l	<input checked="" type="checkbox"/>	Default
ROB		0000290	3	65.3000030517578	l	<input checked="" type="checkbox"/>	Default
MEC		0000290	3	$1.49999996210681 \cdot 10^{-5}$	l	<input checked="" type="checkbox"/>	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	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
O_b	O_b	BRAIN	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
P_b	P_b	BRAIN	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
L_b	L_b	BRAIN	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
S_b	S_b	BRAIN	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
NAPE_b	NAPE_b	BRAIN	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
NOPE_b	NOPE_b	BRAIN	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
NPPE_b	NPPE_b	BRAIN	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
NLPE_b	NLPE_b	BRAIN	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
NSPE_b	NSPE_b	BRAIN	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
FAAH_b	FAAH_b	BRAIN	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
FAAHinh_b	FAAHinh_b	BRAIN	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
A_r	A_r	ROB	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
O_r	O_r	ROB	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
P_r	P_r	ROB	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
L_r	L_r	ROB	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
S_r	S_r	ROB	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
NAPE_r	NAPE_r	ROB	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
NOPE_r	NOPE_r	ROB	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
NPPE_r	NPPE_r	ROB	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
NLPE_r	NLPE_r	ROB	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
NSPE_r	NSPE_r	ROB	$\text{mol} \cdot \text{l}^{-1}$	\square	\square

Id	Name	Compartment	Derived Unit	Constant	Boundary Condi- tion
FAAH_r	FAAH_r	ROB	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
FAAHinh_r	FAAHinh_r	ROB	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
A_m	A_m	MEC	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
O_m	O_m	MEC	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
P_m	P_m	MEC	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
L_m	L_m	MEC	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
S_m	S_m	MEC	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
FAAH_m	FAAH_m	MEC	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
FAAHinh_m	FAAHinh_m	MEC	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
A_p	A_p	PLASMA	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
O_p	O_p	PLASMA	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
P_p	P_p	PLASMA	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
L_p	L_p	PLASMA	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
S_p	S_p	PLASMA	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
PFM_gut	PFM_gut	Default	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
PFM_p	PFM_p	Default	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
PFM_r	PFM_r	Default	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

5 Parameters

This model contains 155 global parameters.

Table 4: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
AG2_b			0.000		<input type="checkbox"/>
Dose			10.000		<input type="checkbox"/>
ED50			0.530		<input type="checkbox"/>
E _{max} _PFM			0.773		<input type="checkbox"/>
FAAH_t			78.000		<input type="checkbox"/>
Gut			1.650		<input type="checkbox"/>
H			0.480		<input type="checkbox"/>
Heart			0.310		<input type="checkbox"/>
K _d _AG2			3424.000		<input type="checkbox"/>
K _d _CB1_A			239.200		<input type="checkbox"/>
K _i _A			230.000		<input type="checkbox"/>
K _i _L			1000.000		<input type="checkbox"/>
K _i _O			240.000		<input type="checkbox"/>
K _i _P			6700.000		<input type="checkbox"/>
K _i _S			840.000		<input type="checkbox"/>
Kidney			0.280		<input type="checkbox"/>
K _m _FAAH_A			8200.000		<input type="checkbox"/>
K _m _FAAH_L			10800.000		<input type="checkbox"/>
K _m _FAAH_O			52200.000		<input type="checkbox"/>
K _m _FAAH_P			543000.000		<input type="checkbox"/>
K _m _FAAH_S			10000.000		<input type="checkbox"/>
K _m _NA_PE			2800.000		<input type="checkbox"/>
K _m _NL_PE			1000.000		<input type="checkbox"/>
K _m _NO_PE			2900.000		<input type="checkbox"/>
K _m _NP_PE			3300.000		<input type="checkbox"/>
K _m _NS_PE			3400.000		<input type="checkbox"/>
K _m _PFM			26.100		<input type="checkbox"/>
K _m _p_m_A			1.000		<input type="checkbox"/>
K _p _b_PPF			1.300		<input type="checkbox"/>
K _p _m_PPF			1.300		<input type="checkbox"/>
K _p _r_PPF			1.500		<input type="checkbox"/>
K _{tr} _p_m_A			1.890		<input type="checkbox"/>
K _{tr} _p_m_L			2.770		<input type="checkbox"/>
K _{tr} _p_m_O			9.070		<input type="checkbox"/>
K _{tr} _p_m_P			2.650		<input type="checkbox"/>
K _{tr} _p_m_S			30.010		<input type="checkbox"/>
K _{tr} _p_r_A			0.620		<input type="checkbox"/>

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

Id	Name	SBO	Value	Unit	Constant
b_FAAH_Lungs			0.032		<input type="checkbox"/>
b_FAAH_MEC			0.137		<input type="checkbox"/>
b_FAAH- _Spleen			0.030		<input type="checkbox"/>
b_FAAH- _Testis			0.126		<input type="checkbox"/>
b_NAAA_Brain			0.600		<input type="checkbox"/>
b_NAAA_Gut			0.200		<input type="checkbox"/>
b_NAAA_Heart			0.200		<input type="checkbox"/>
b_NAAA- _Kidney			0.600		<input type="checkbox"/>
b_NAAA_Liver			1.000		<input type="checkbox"/>
b_NAAA_Lungs			14.000		<input type="checkbox"/>
b_NAAA- _Spleen			8.000		<input type="checkbox"/>
b_NAAA- _Testis			0.600		<input type="checkbox"/>
b_NAAA- _Thymus			4.000		<input type="checkbox"/>
b_NAT_Brain			1.667		<input type="checkbox"/>
b_NAT_Heart			1.000		<input type="checkbox"/>
b_NAT_Kidney			0.667		<input type="checkbox"/>
b_NAT- _Leucocytes			0.000		<input type="checkbox"/>
b_NAT_Lungs			0.033		<input type="checkbox"/>
b_NAT- _Muscles			0.333		<input type="checkbox"/>
b_NAT- _Pancreas			0.333		<input type="checkbox"/>
b_NAT_Testis			0.667		<input type="checkbox"/>
e1			0.000		<input checked="" type="checkbox"/>
k_NA_PE			202.000		<input type="checkbox"/>
k_NL_PE			100.000		<input type="checkbox"/>
k_NO_PE			230.000		<input type="checkbox"/>
k_NP_PE			270.000		<input type="checkbox"/>
k_NS_PE			280.000		<input type="checkbox"/>
k_deg_FAAH			0.005		<input type="checkbox"/>
k_inh			1.100		<input type="checkbox"/>
kabs_PFM			2.200		<input type="checkbox"/>
kcat_FAAH			18000.000		<input type="checkbox"/>
kcl_A			1.740		<input type="checkbox"/>
kcl_L			1.250		<input type="checkbox"/>

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

Id	Name	SBO	Value	Unit	Constant
SG_p			0.000		<input type="checkbox"/>
CB1_b			0.000		<input type="checkbox"/>
tid			0.000		<input type="checkbox"/>

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:

$$F_PFM = \frac{Emax_PFM \cdot Dose}{ED50 + Dose} \quad (1)$$

6.2 Rule MD

Rule MD is an assignment rule for parameter MD:

$$MD = [PFM_gut] + 1000000.0 \cdot Dose \cdot F_PFM \quad (2)$$

6.3 Rule PF_p

Rule PF_p is an assignment rule for parameter PF_p:

$$PF_p = \frac{\frac{1.0}{M_PF} \cdot [PFM_p]}{Vss_PFM} \quad (3)$$

6.4 Rule PF_b

Rule PF_b is an assignment rule for parameter PF_b:

$$PF_b = PF_p \cdot Kp_b_PF \quad (4)$$

6.5 Rule PF_r

Rule PF_r is an assignment rule for parameter PF_r:

$$PF_r = PF_p \cdot Kp_r_PF \quad (5)$$

6.6 Rule PF_m

Rule PF_m is an assignment rule for parameter PF_m:

$$PF_m = PF_p \cdot Kp_m_PF \quad (6)$$

6.7 Rule FAAH_D_b

Rule FAAH_D_b is an assignment rule for parameter FAAH_D_b:

$$\begin{aligned} \text{FAAH_D_b} = 1.0 + & \frac{[\text{A_b}]}{\text{Km_FAAH_A}} + \frac{[\text{O_b}]}{\text{Km_FAAH_O}} \\ & + \frac{[\text{P_b}]}{\text{Km_FAAH_P}} + \frac{[\text{L_b}]}{\text{Km_FAAH_L}} + \frac{[\text{S_b}]}{\text{Km_FAAH_S}} \end{aligned} \quad (7)$$

6.8 Rule slag1_b

Rule slag1_b is an assignment rule for parameter slag1_b:

$$\text{slag1_b} = \frac{[\text{NAPE_b}]}{\text{Km_NA_PE}} + \frac{[\text{NOPE_b}]}{\text{Km_NO_PE}} + \frac{[\text{NPPE_b}]}{\text{Km_NP_PE}} + \frac{[\text{NLPE_b}]}{\text{Km_NL_PE}} + \frac{[\text{NSPE_b}]}{\text{Km_NS_PE}} \quad (8)$$

6.9 Rule slag2_b

Rule slag2_b is an assignment rule for parameter slag2_b:

$$\text{slag2_b} = \frac{[\text{A_b}]}{\text{Ki_A}} + \frac{[\text{O_b}]}{\text{Ki_O}} + \frac{[\text{P_b}]}{\text{Ki_P}} + \frac{[\text{L_b}]}{\text{Ki_L}} + \frac{[\text{S_b}]}{\text{Ki_S}} \quad (9)$$

6.10 Rule den_b

Rule den_b is an assignment rule for parameter den_b:

$$\text{den_b} = 1.0 + \text{slag1_b} + \text{slag2_b} \quad (10)$$

6.11 Rule FAAH_D_r

Rule FAAH_D_r is an assignment rule for parameter FAAH_D_r:

$$\begin{aligned} \text{FAAH_D_r} = 1.0 + & \frac{[\text{A_r}]}{\text{Km_FAAH_A}} + \frac{[\text{O_r}]}{\text{Km_FAAH_O}} \\ & + \frac{[\text{P_r}]}{\text{Km_FAAH_P}} + \frac{[\text{L_r}]}{\text{Km_FAAH_L}} + \frac{[\text{S_r}]}{\text{Km_FAAH_S}} \end{aligned} \quad (11)$$

6.12 Rule c_NAT_ROB

Rule c_NAT_ROB is an assignment rule for parameter c_NAT_ROB:

$$\begin{aligned} \text{c_NAT_ROB} = & \text{Pancreas} \cdot \text{b_NAT_Pancreas} + \text{Kidney} \cdot \text{b_NAT_Kidney} + \text{Heart} \\ & \cdot \text{b_NAT_Heart} + \text{Lungs} \cdot \text{b_NAT_Lungs} + \text{Muscles} \cdot \text{b_NAT_Muscles} \\ & + \text{Testis} \cdot \text{b_NAT_Testis} + \text{Leucocytes} \cdot \text{b_NAT_Leucocytes} \end{aligned} \quad (12)$$

6.13 Rule `slag1_r`

Rule `slag1_r` is an assignment rule for parameter `slag1_r`:

$$\text{slag1_r} = \frac{[\text{NAPE_r}]}{\text{Km_NA_PE}} + \frac{[\text{NOPE_r}]}{\text{Km_NO_PE}} + \frac{[\text{NPPE_r}]}{\text{Km_NP_PE}} + \frac{[\text{NLPE_r}]}{\text{Km_NL_PE}} + \frac{[\text{NSPE_r}]}{\text{Km_NS_PE}} \quad (13)$$

6.14 Rule `slag2_r`

Rule `slag2_r` is an assignment rule for parameter `slag2_r`:

$$\text{slag2_r} = \frac{[\text{A_r}]}{\text{Ki_A}} + \frac{[\text{O_r}]}{\text{Ki_O}} + \frac{[\text{P_r}]}{\text{Ki_P}} + \frac{[\text{L_r}]}{\text{Ki_L}} + \frac{[\text{S_r}]}{\text{Ki_S}} \quad (14)$$

6.15 Rule `den_r`

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

$$\text{den_r} = 1.0 + \text{slag1_r} + \text{slag2_r} \quad (15)$$

6.16 Rule `c_FAAH_ROB`

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

$$\begin{aligned} \text{c_FAAH_ROB} = & \text{LIVER} \cdot \text{b_FAAH_Liver} + \text{Gut} \cdot \text{b_FAAH_Gut} + \text{Spleen} \\ & \cdot \text{b_FAAH_Spleen} + \text{Kidney} \cdot \text{b_FAAH_Kidney} + \text{Lungs} \cdot \text{b_FAAH_Lungs} \\ & + \text{Testis} \cdot \text{b_FAAH_Testis} + \text{Leucocytes} \cdot \text{b_FAAH_Leucocytes} \end{aligned} \quad (16)$$

6.17 Rule `c_NAAA_ROB`

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

$$\begin{aligned} \text{c_NAAA_ROB} = & \text{LIVER} \cdot \text{b_NAAA_Liver} + \text{Gut} \cdot \text{b_NAAA_Gut} + \text{Spleen} \\ & \cdot \text{b_NAAA_Spleen} + \text{Kidney} \cdot \text{b_NAAA_Kidney} + \text{Heart} \\ & \cdot \text{b_NAAA_Heart} + \text{Lungs} \cdot \text{b_NAAA_Lungs} + \text{Thymus} \\ & \cdot \text{b_NAAA_Thymus} + \text{Testis} \cdot \text{b_NAAA_Thymus} \cdot \text{Testis} \end{aligned} \quad (17)$$

6.18 Rule `FAAH_D_m`

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

$$\begin{aligned} \text{FAAH_D_m} = & 1.0 + \frac{[\text{A_m}]}{\text{Km_FAAH_A}} + \frac{[\text{O_m}]}{\text{Km_FAAH_O}} \\ & + \frac{[\text{P_m}]}{\text{Km_FAAH_P}} + \frac{[\text{L_m}]}{\text{Km_FAAH_L}} + \frac{[\text{S_m}]}{\text{Km_FAAH_S}} \end{aligned} \quad (18)$$

6.19 Rule F_r

Rule F_r is an assignment rule for parameter F_r:

$$F_r = \frac{1500.0 \cdot [FAAH_r]}{[FAAH_{inh_r}] + [FAAH_r]} \quad (19)$$

6.20 Rule PFG_p

Rule PFG_p is an assignment rule for parameter PFG_p:

$$PFG_p = \frac{0.0010 \cdot [PFM_p]}{V_{ss_PFM}} \quad (20)$$

6.21 Rule AG_p

Rule AG_p is an assignment rule for parameter AG_p:

$$AG_p = 0.0010 \cdot [A_p] \cdot M_A \quad (21)$$

6.22 Rule OG_p

Rule OG_p is an assignment rule for parameter OG_p:

$$OG_p = 0.0010 \cdot [O_p] \cdot M_O \quad (22)$$

6.23 Rule PG_p

Rule PG_p is an assignment rule for parameter PG_p:

$$PG_p = 0.0010 \cdot [P_p] \cdot M_P \quad (23)$$

6.24 Rule LG_p

Rule LG_p is an assignment rule for parameter LG_p:

$$LG_p = 0.0010 \cdot [L_p] \cdot M_L \quad (24)$$

6.25 Rule SG_p

Rule SG_p is an assignment rule for parameter SG_p:

$$SG_p = 0.0010 \cdot [S_p] \cdot M_S \quad (25)$$

6.26 Rule CB1_b

Rule CB1_b is an assignment rule for parameter CB1_b:

$$CB1_b = \frac{\frac{[A_b]}{Kd_CB1_A} + \frac{AG2_b}{Kd_AG2}}{1.0 + \frac{[A_b]}{Kd_CB1_A} + \frac{AG2_b}{Kd_AG2}} \quad (26)$$

6.27 Rule `tid`

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

$$\text{tid} = \frac{t}{24.0} \quad (27)$$

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

Nº	Id	Name	Reaction Equation	SBO
1	vA_degr_b	vA_degr_b	$A_b \xrightarrow{FAAH_b, FAAH_b, A_b} \emptyset$	
2	vO_degr_b	vO_degr_b	$O_b \xrightarrow{FAAH_b, FAAH_b, O_b} \emptyset$	
3	vP_degr_b	vP_degr_b	$P_b \xrightarrow{FAAH_b, FAAH_b, P_b} \emptyset$	
4	vL_degr_b	vL_degr_b	$L_b \xrightarrow{FAAH_b, FAAH_b, L_b} \emptyset$	
5	vS_degr_b	vS_degr_b	$S_b \xrightarrow{FAAH_b, FAAH_b, S_b} \emptyset$	
6	vNAPE_syn_b	vNAPE_syn_b	$\emptyset \longrightarrow NAPE_b$	
7	vNOPE_syn_b	vNOPE_syn_b	$\emptyset \longrightarrow NOPE_b$	
8	vNPPE_syn_b	vNPPE_syn_b	$\emptyset \longrightarrow NPPE_b$	
9	vNLPE_syn_b	vNLPE_syn_b	$\emptyset \longrightarrow NLPE_b$	
10	vNSPE_syn_b	vNSPE_syn_b	$\emptyset \longrightarrow NSPE_b$	
11	vA_syn_b	vA_syn_b	$NAPE_b \xrightarrow{NAPE_b} A_b$	
12	vO_syn_b	vO_syn_b	$NOPE_b \xrightarrow{NOPE_b} O_b$	
13	vP_syn_b	vP_syn_b	$NPPE_b \xrightarrow{NPPE_b} P_b$	
14	vL_syn_b	vL_syn_b	$NLPE_b \xrightarrow{NLPE_b} L_b$	
15	vS_syn_b	vS_syn_b	$NSPE_b \xrightarrow{NSPE_b} S_b$	
16	vFAAH_syn_b	vFAAH_syn_b	$\emptyset \longrightarrow FAAH_b$	
17	vFAAH_degr_b	vFAAH_degr_b	$FAAH_b \xrightarrow{FAAH_b} \emptyset$	
18	vFAAH_inh_b	vFAAH_inh_b	$FAAH_b \xrightarrow{FAAH_b} FAAHinh_b$	

Nº	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	$\emptyset \longrightarrow \text{FAAH_r}$	

Nº	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	$\text{A}_m \xrightarrow{\text{FAAH}_m, \text{FAAH}_m, \text{A}_m} \emptyset$	
50	vO_degr_m	vO_degr_m	$\text{O}_m \xrightarrow{\text{FAAH}_m, \text{FAAH}_m, \text{O}_m} \emptyset$	
51	vP_degr_m	vP_degr_m	$\text{P}_m \xrightarrow{\text{FAAH}_m, \text{FAAH}_m, \text{P}_m} \emptyset$	
52	vL_degr_m	vL_degr_m	$\text{L}_m \xrightarrow{\text{FAAH}_m, \text{FAAH}_m, \text{L}_m} \emptyset$	
53	vS_degr_m	vS_degr_m	$\text{S}_m \xrightarrow{\text{FAAH}_m, \text{FAAH}_m, \text{S}_m} \emptyset$	
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	$\text{A}_m \xrightarrow{\text{A}_m, \text{A}_p} \text{A}_p$	
59	vo_m_p	vo_m_p	$\text{O}_m \xrightarrow{\text{O}_m, \text{O}_p} \text{O}_p$	

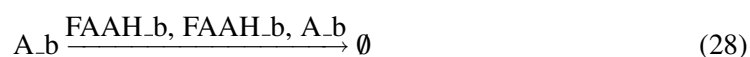
Nº	Id	Name	Reaction Equation	SBO
60	vP_m_p	vP_m_p	$P_m \xrightarrow{P_m, P_p} P_p$	
61	vL_m_p	vL_m_p	$L_m \xrightarrow{L_m, L_p} L_p$	
62	vS_m_p	vS_m_p	$S_m \xrightarrow{S_m, S_p} S_p$	
63	vA_b_m	vA_b_m	$A_b \xrightarrow{A_b, A_m} A_m$	
64	vO_b_m	vO_b_m	$O_b \xrightarrow{O_b, O_m} O_m$	
65	vP_b_m	vP_b_m	$P_b \xrightarrow{P_b, P_m} P_m$	
66	vL_b_m	vL_b_m	$L_b \xrightarrow{L_b, L_m} L_m$	
67	vS_b_m	vS_b_m	$S_b \xrightarrow{S_b, S_m} S_m$	
68	vA_r_p	vA_r_p	$A_r \xrightarrow{A_r, A_p} A_p$	
69	vO_r_p	vO_r_p	$O_r \xrightarrow{O_r, O_p} O_p$	
70	vP_r_p	vP_r_p	$P_r \xrightarrow{P_r, P_p} P_p$	
71	vL_r_p	vL_r_p	$L_r \xrightarrow{L_r, L_p} L_p$	
72	vS_r_p	vS_r_p	$S_r \xrightarrow{S_r, S_p} S_p$	
73	absorp	absorp	$PFM_{gut} \longrightarrow PFM_p$	
74	dist	dist	$PFM_p \xrightarrow{PFM_p, PFM_r} PFM_r$	
75	elim	elim	$PFM_p \xrightarrow{PFM_p} \emptyset$	

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



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

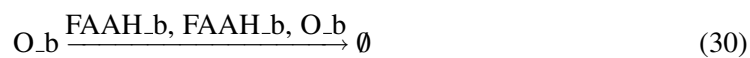
$$v_1 = \frac{\text{vol}(\text{BRAIN}) \cdot [\text{FAAH_b}] \cdot \text{kcat_FAAH} \cdot a_{\text{FAAH_A}} \cdot [\text{A_b}]}{\text{Km_FAAH_A} \cdot \text{FAAH_D_b}} \quad (29)$$

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



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

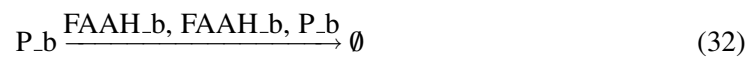
$$v_2 = \frac{\text{vol}(\text{BRAIN}) \cdot [\text{FAAH_b}] \cdot \text{kcat_FAAH} \cdot \text{a_FAAH_O} \cdot [\text{O_b}]}{\text{Km_FAAH_O} \cdot \text{FAAH_D_b}} \quad (31)$$

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



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

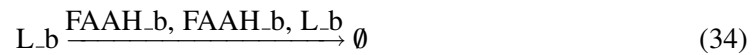
$$v_3 = \frac{\text{vol}(\text{BRAIN}) \cdot [\text{FAAH_b}] \cdot \text{kcat_FAAH} \cdot \text{a_FAAH_P} \cdot [\text{P_b}]}{\text{Km_FAAH_P} \cdot \text{FAAH_D_b}} \quad (33)$$

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



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

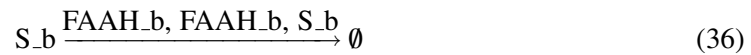
$$v_4 = \frac{\text{vol}(\text{BRAIN}) \cdot [\text{FAAH_b}] \cdot \text{kcat_FAAH} \cdot \text{a_FAAH_L} \cdot [\text{L_b}]}{\text{Km_FAAH_L} \cdot \text{FAAH_D_b}} \quad (35)$$

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



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

$$v_5 = \frac{\text{vol}(\text{BRAIN}) \cdot [\text{FAAH_b}] \cdot \text{kcat_FAAH} \cdot \text{a_FAAH_S} \cdot [\text{S_b}]}{\text{Km_FAAH_S} \cdot \text{FAAH_D_b}} \quad (37)$$

7.6 Reaction vNAPE_syn_b

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

Name vNAPE_syn_b

Reaction equation



Product

Table 16: Properties of each product.

Id	Name	SBO
NAPE_b	NAPE_b	

Kinetic Law

Derived unit contains undeclared units

$$v_6 = \text{vol}(\text{BRAIN}) \cdot V_{\text{max_NAT}} \cdot p_A \cdot a_{\text{NAT_A}} \cdot b_{\text{NAT_Brain}} \quad (39)$$

7.7 Reaction vNOPE_syn_b

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

Name vNOPE_syn_b

Reaction equation



Product

Table 17: Properties of each product.

Id	Name	SBO
NOPE_b	NOPE_b	

Kinetic Law

Derived unit contains undeclared units

$$v_7 = \text{vol}(\text{BRAIN}) \cdot V_{\text{max_NAT}} \cdot p_O \cdot a_{\text{NAT_O}} \cdot b_{\text{NAT_Brain}} \quad (41)$$

7.8 Reaction $v_{NPPE_syn_b}$

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

Name $v_{NPPE_syn_b}$

Reaction equation



Product

Table 18: Properties of each product.

Id	Name	SBO
NPPE_b	NPPE_b	

Kinetic Law

Derived unit contains undeclared units

$$v_8 = \text{vol}(\text{BRAIN}) \cdot V_{\text{max_NAT}} \cdot p_P \cdot a_{\text{NAT_P}} \cdot b_{\text{NAT_Brain}} \quad (43)$$

7.9 Reaction $v_{NLPE_syn_b}$

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

Name $v_{NLPE_syn_b}$

Reaction equation



Product

Table 19: Properties of each product.

Id	Name	SBO
NLPE_b	NLPE_b	

Kinetic Law

Derived unit contains undeclared units

$$v_9 = \text{vol}(\text{BRAIN}) \cdot V_{\text{max_NAT}} \cdot p_L \cdot a_{\text{NAT_L}} \cdot b_{\text{NAT_Brain}} \quad (45)$$

7.10 Reaction $v_{\text{NSPE_syn_b}}$

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

Name $v_{\text{NSPE_syn_b}}$

Reaction equation



Product

Table 20: Properties of each product.

Id	Name	SBO
NSPE_b	NSPE_b	

Kinetic Law

Derived unit contains undeclared units

$$v_{10} = \text{vol}(\text{BRAIN}) \cdot V_{\text{max_NAT}} \cdot p_S \cdot a_{\text{NAT_S}} \cdot b_{\text{NAT_Brain}} \quad (47)$$

7.11 Reaction $v_{\text{A_syn_b}}$

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

Name $v_{\text{A_syn_b}}$

Reaction equation



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

$$v_{11} = \frac{\frac{\text{vol}(\text{BRAIN}) \cdot \text{PLD_b} \cdot k_{\text{NA_PE}} \cdot [\text{NAPE_b}]}{\text{Km_NA_PE}}}{\text{den_b}} \quad (49)$$

7.12 Reaction vO_syn_b

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

Name vO_syn_b

Reaction equation



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

$$v_{12} = \frac{\frac{\text{vol}(\text{BRAIN}) \cdot \text{PLD_b} \cdot k_{\text{NO_PE}} \cdot [\text{NOPE_b}]}{\text{Km_NO_PE}}}{\text{den_b}} \quad (51)$$

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



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

$$v_{13} = \frac{\frac{\text{vol}(\text{BRAIN}) \cdot \text{PLD_b} \cdot k_{\text{NP_PE}} \cdot [\text{NPPE_b}]}{\text{Km_NP_PE}}}{\text{den_b}} \quad (53)$$

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



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

$$v_{14} = \frac{\frac{\text{vol}(\text{BRAIN}) \cdot \text{PLD_b} \cdot k_{\text{NL_PE}} \cdot [\text{NLPE_b}]}{\text{Km_NL_PE}}}{\text{den_b}} \quad (55)$$

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



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

$$v_{15} = \frac{\frac{\text{vol}(\text{BRAIN}) \cdot \text{PLD_b} \cdot k_{\text{NS_PE}} \cdot [\text{NSPE_b}]}{\text{Km_NS_PE}}}{\text{den_b}} \quad (57)$$

7.16 Reaction vFAAH_syn_b

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

Name vFAAH_syn_b

Reaction equation



Product

Table 36: Properties of each product.

Id	Name	SBO
FAAH_b	FAAH_b	

Kinetic Law

Derived unit contains undeclared units

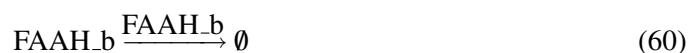
$$v_{16} = \text{vol}(\text{BRAIN}) \cdot \text{FAAH_t} \cdot b_{\text{FAAH_Brain}} \cdot k_{\text{deg_FAAH}} \quad (59)$$

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



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

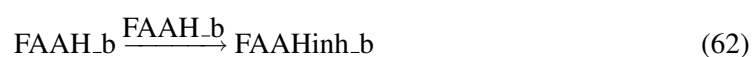
$$v_{17} = \text{vol}(\text{BRAIN}) \cdot k_{\text{deg_FAAH}} \cdot [\text{FAAH_b}] \quad (61)$$

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



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

$$v_{18} = \text{vol}(\text{BRAIN}) \cdot k_{\text{inh}} \cdot [\text{FAAH}_b] \cdot \text{PF}_b \quad (63)$$

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



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

$$v_{19} = \text{vol}(\text{BRAIN}) \cdot k_{\text{deg_FAAH}} \cdot [\text{FAAHinh_b}] \quad (65)$$

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



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

$$v_{20} = \text{vol}(\text{BRAIN}) \cdot b_{\text{FAAH_Brain}} \cdot k_{\text{cl_A}} \cdot [\text{A_b}] \quad (67)$$

7.21 Reaction v_{O_b}

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

Name v_{O_b}

Reaction equation



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

$$v_{21} = vol(BRAIN) \cdot b_{FAAH_Brain} \cdot kcl_O \cdot [O_b]$$

(69)

7.22 Reaction v_{P_b}

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

Name v_{P_b}

Reaction equation



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

$$v_{22} = \text{vol}(\text{BRAIN}) \cdot b_{\text{FAAH.Brain}} \cdot kcl_P \cdot [P_b] \quad (71)$$

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



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

$$v_{23} = \text{vol}(\text{BRAIN}) \cdot b_{\text{FAAH_Brain}} \cdot \text{kcl_L} \cdot [\text{L_b}] \quad (73)$$

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



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

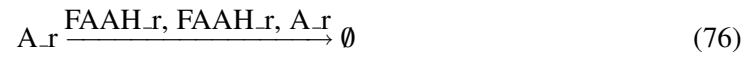
$$v_{24} = \text{vol}(\text{BRAIN}) \cdot b_{\text{FAAH_Brain}} \cdot \text{kcl_S} \cdot [\text{S_b}] \quad (75)$$

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



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

$$v_{25} = \frac{\text{vol}(\text{ROB}) \cdot [\text{FAAH}_r] \cdot \text{kcat_FAAH} \cdot a_{\text{FAAH_A}} \cdot [A_r]}{K_{m_FAAH_A} \cdot \text{FAAH_D}_r} \quad (77)$$

7.26 Reaction vO_degr_r

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

Name vO_degr_r

Reaction equation



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

$$v_{26} = \frac{\text{vol}(\text{ROB}) \cdot [\text{FAAH}_r] \cdot \text{kcat_FAAH} \cdot a_{\text{FAAH_O}} \cdot [\text{O}_r]}{\text{Km_FAAH_O} \cdot \text{FAAH_D}_r} \quad (79)$$

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



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

$$v_{27} = \frac{\text{vol}(\text{ROB}) \cdot [\text{FAAH}_r] \cdot \text{kcat_FAAH} \cdot \text{a_FAAH_P} \cdot [\text{P}_r]}{\text{Km_FAAH_P} \cdot \text{FAAH_D}_r} \quad (81)$$

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



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

$$v_{28} = \frac{\text{vol}(\text{ROB}) \cdot [\text{FAAH}_r] \cdot \text{kcat_FAAH} \cdot a_{\text{FAAH_L}} \cdot [\text{L}_r]}{\text{Km_FAAH_L} \cdot \text{FAAH_D}_r} \quad (83)$$

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



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

$$v_{29} = \frac{\text{vol}(\text{ROB}) \cdot [\text{FAAH}_r] \cdot \text{kcat_FAAH} \cdot a_{\text{FAAH_S}} \cdot [S_r]}{\text{Km_FAAH_S} \cdot \text{FAAH_D}_r} \quad (85)$$

7.30 Reaction $vNAPE_syn_r$

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

Name vNAPE_syn_r

Reaction equation



Product

Table 64: Properties of each product.

Id	Name	SBO
NAPE_r	NAPE_r	

Kinetic Law

Derived unit not available

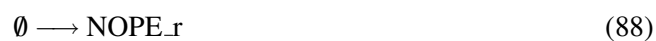
$$v_{30} = V_{\max_NAT} \cdot p_A \cdot a_{NAT_A} \cdot c_{NAT_ROB} \quad (87)$$

7.31 Reaction vNOPE_syn_r

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

Name vNOPE_syn_r

Reaction equation



Product

Table 65: Properties of each product.

Id	Name	SBO
NOPE_r	NOPE_r	

Kinetic Law

Derived unit not available

$$v_{31} = V_{\max_NAT} \cdot p_O \cdot a_{NAT_O} \cdot c_{NAT_ROB} \quad (89)$$

7.32 Reaction $v_{\text{NPPE_syn_r}}$

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

Name $v_{\text{NPPE_syn_r}}$

Reaction equation



Product

Table 66: Properties of each product.

Id	Name	SBO
NPPE_r	NPPE_r	

Kinetic Law

Derived unit not available

$$v_{32} = V_{\text{max_NAT}} \cdot p_{\text{P}} \cdot a_{\text{NAT_P}} \cdot c_{\text{NAT_ROB}} \quad (91)$$

7.33 Reaction $v_{\text{NLPE_syn_r}}$

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

Name $v_{\text{NLPE_syn_r}}$

Reaction equation



Product

Table 67: Properties of each product.

Id	Name	SBO
NLPE_r	NLPE_r	

Kinetic Law

Derived unit not available

$$v_{33} = V_{\text{max_NAT}} \cdot p_{\text{L}} \cdot a_{\text{NAT_L}} \cdot c_{\text{NAT_ROB}} \quad (93)$$

7.34 Reaction $v_{\text{NSPE_syn_r}}$

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

Name $v_{\text{NSPE_syn_r}}$

Reaction equation



Product

Table 68: Properties of each product.

Id	Name	SBO
NSPE_r	NSPE_r	

Kinetic Law

Derived unit not available

$$v_{34} = V_{\text{max_NAT}} \cdot p_{\text{S}} \cdot a_{\text{NAT_S}} \cdot c_{\text{NAT_ROB}} \quad (95)$$

7.35 Reaction $v_{\text{A_syn_r}}$

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

Name $v_{\text{A_syn_r}}$

Reaction equation



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

$$v_{35} = \frac{\text{vol}(\text{ROB}) \cdot \text{PLD}_r \cdot k_{\text{NA_PE}} \cdot [\text{NAPE}_r]}{\text{Km}_{\text{NA_PE}} \cdot \text{den}_r} \quad (97)$$

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



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

$$v_{36} = \frac{\text{vol}(\text{ROB}) \cdot \text{PLD}_r \cdot k_{\text{NO_PE}} \cdot [\text{NOPE}_r]}{\text{Km}_{\text{NO_PE}} \cdot \text{den}_r} \quad (99)$$

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



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

$$v_{37} = \frac{\text{vol(ROB)} \cdot \text{PLD}_r \cdot k_{\text{NP_PE}} \cdot [\text{NPPE}_r]}{\text{Km}_{\text{NP_PE}} \cdot \text{den}_r} \quad (101)$$

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



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

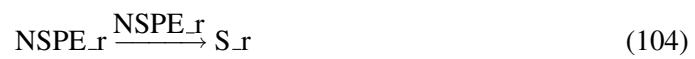
$$v_{38} = \frac{\text{vol}(\text{ROB}) \cdot \text{PLD}_r \cdot k_{\text{NL_PE}} \cdot [\text{NLPE}_r]}{\text{Km}_{\text{NL_PE}} \cdot \text{den}_r} \quad (103)$$

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



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

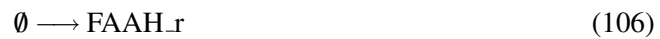
$$v_{39} = \frac{\frac{\text{vol}(\text{ROB}) \cdot \text{PLD}_r \cdot k_{\text{NS_PE}} \cdot [\text{NSPE}_r]}{\text{Km}_{\text{NS_PE}}}}{\text{den}_r} \quad (105)$$

7.40 Reaction vFAAH_syn_r

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

Name vFAAH_syn_r

Reaction equation



Product

Table 84: Properties of each product.

Id	Name	SBO
FAAH_r	FAAH_r	

Kinetic Law

Derived unit not available

$$v_{40} = \text{FAAH}_t \cdot c_{\text{FAAH_ROB}} \cdot k_{\text{deg_FAAH}} \quad (107)$$

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



Reactant

Table 85: Properties of each reactant.

Id	Name	SBO
<code>FAAH_r</code>	<code>FAAH_r</code>	

Modifier

Table 86: Properties of each modifier.

Id	Name	SBO
<code>FAAH_r</code>	<code>FAAH_r</code>	

Kinetic Law

Derived unit contains undeclared units

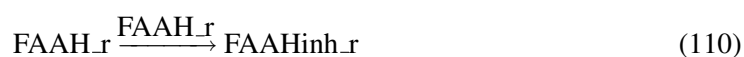
$$v_{41} = \text{vol}(\text{ROB}) \cdot k_{\text{deg_FAAH}} \cdot [\text{FAAH}_r] \quad (109)$$

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



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

$$v_{42} = \text{vol}(\text{ROB}) \cdot k_{\text{inh}} \cdot [\text{FAAH}_r] \cdot \text{PF}_r \quad (111)$$

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



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

$$v_{43} = \text{vol}(\text{ROB}) \cdot k_{\text{deg_FAAH}} \cdot [\text{FAAHinh_r}] \quad (113)$$

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



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

$$v_{44} = c_{\text{NAAA_ROB}} \cdot k_{\text{cl_A}} \cdot [\text{A_r}] \quad (115)$$

7.45 Reaction v_{O_r}

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

Name v_{O_r}

Reaction equation



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

$$v_{45} = c_{NAAA_ROB} \cdot k_{cl_O} \cdot [O_r]$$

(117)

7.46 Reaction v_{P_r}

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

Name v_{P_r}

Reaction equation



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

$$v_{46} = c_NAAA_ROB \cdot kcl_P \cdot [P_r] \quad (119)$$

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



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

$$v_{47} = c_NAAA_ROB \cdot kcl_L \cdot [L_r] \quad (121)$$

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



Reactant

Table 100: Properties of each reactant.

Id	Name	SBO
<code>S_r</code>	<code>S_r</code>	

Modifier

Table 101: Properties of each modifier.

Id	Name	SBO
<code>S_r</code>	<code>S_r</code>	

Kinetic Law

Derived unit contains undeclared units

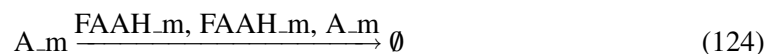
$$v_{48} = c_NAAA_ROB \cdot kcl_S \cdot [S_r] \quad (123)$$

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



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

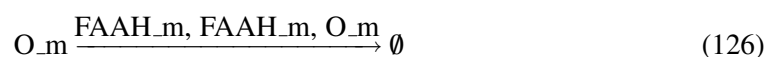
$$v_{49} = \frac{\text{vol}(\text{MEC}) \cdot [\text{FAAH_m}] \cdot \text{kcat_FAAH} \cdot a_{\text{FAAH_A}} \cdot [A_m]}{\text{Km_FAAH_A} \cdot \text{FAAH_D_m}} \quad (125)$$

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



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

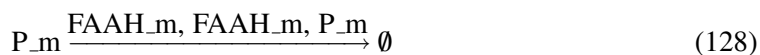
$$v_{50} = \frac{\text{vol}(\text{MEC}) \cdot [\text{FAAH}_m] \cdot k_{\text{cat_FAAH}} \cdot a_{\text{FAAH_O}} \cdot [\text{O}_m]}{K_{\text{m_FAAH_O}} \cdot \text{FAAH_D}_m} \quad (127)$$

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



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

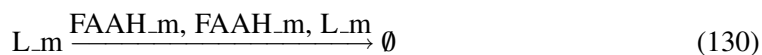
$$v_{51} = \frac{\text{vol}(\text{MEC}) \cdot [\text{FAAH_m}] \cdot \text{kcat_FAAH} \cdot \text{a_FAAH_P} \cdot [\text{P_m}]}{\text{Km_FAAH_P} \cdot \text{FAAH_D_m}} \quad (129)$$

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



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

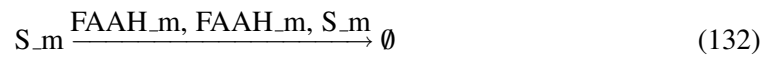
$$v_{52} = \frac{\text{vol}(\text{MEC}) \cdot [\text{FAAH_m}] \cdot \text{kcat_FAAH} \cdot \text{a_FAAH_L} \cdot [\text{L_m}]}{\text{Km_FAAH_L} \cdot \text{FAAH_D_m}} \quad (131)$$

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



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

$$v_{53} = \frac{\text{vol}(\text{MEC}) \cdot [\text{FAAH_m}] \cdot \text{kcat_FAAH} \cdot \text{a_FAAH_S} \cdot [\text{S_m}]}{\text{Km_FAAH_S} \cdot \text{FAAH_D_m}} \quad (133)$$

7.54 Reaction `vFAAH_syn_m`

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

Name vFAAH_syn_m

Reaction equation



Product

Table 112: Properties of each product.

Id	Name	SBO
FAAH_m	FAAH_m	

Kinetic Law

Derived unit contains undeclared units

$$v_{54} = \text{vol}(\text{MEC}) \cdot \text{FAAH_t} \cdot b_{\text{FAAH_MEC}} \cdot k_{\text{deg_FAAH}} \quad (135)$$

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



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

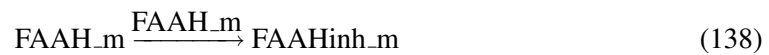
$$v_{55} = \text{vol}(\text{MEC}) \cdot k_{\text{deg_FAAH}} \cdot [\text{FAAH_m}] \quad (137)$$

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



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

$$v_{56} = \text{vol}(\text{MEC}) \cdot k_{\text{inh}} \cdot [\text{FAAH_m}] \cdot \text{PF_m} \quad (139)$$

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



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

$$v_{57} = \text{vol}(\text{MEC}) \cdot k_{\text{deg.FAAH}} \cdot [\text{FAAHinh_m}] \quad (141)$$

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



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

$$v_{58} = \frac{\text{vol}(\text{MEC}) \cdot \text{ktr_m_p_A} \cdot ([A_m] - [A_p] \cdot \text{Ktr_p_m_A})}{[A_m] + [A_p] + \text{Km_p_m_A}}$$

(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



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

$$v_{59} = \text{vol}(\text{MEC}) \cdot \text{ktr_m_p_O} \cdot ([\text{O_m}] - [\text{O_p}] \cdot \text{Ktr_p_m_O}) \quad (145)$$

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



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

$$v_{60} = \text{vol}(\text{MEC}) \cdot \text{ktr_m_p_P} \cdot ([P_m] - [P_p] \cdot \text{Ktr_p_m_P}) \quad (147)$$

7.61 Reaction $v_{L_m_p}$

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

Name $v_{L_m_p}$

Reaction equation



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

$$v_{61} = \text{vol}(\text{MEC}) \cdot \text{ktr_m_p_L} \cdot ([L_m] - [L_p] \cdot K_{\text{tr_p_m_L}}) \quad (149)$$

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



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

$$v_{62} = \text{vol}(\text{MEC}) \cdot \text{ktr_m_S} \cdot ([S_m] - [S_p] \cdot \text{Ktr_p_m_S}) \quad (151)$$

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



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

$$v_{63} = \frac{\text{vol}(\text{MEC}) \cdot \text{ktr_m_p_A} \cdot ([A_b] - [A_m])}{[A_m] + [A_b] + \text{Km_p_m_A}} \quad (153)$$

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



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

$$v_{64} = \text{vol}(\text{MEC}) \cdot \text{ktr_m_p_O} \cdot ([\text{O_b}] - [\text{O_m}]) \quad (155)$$

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



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

$$v_{65} = \text{vol}(\text{MEC}) \cdot \text{ktr}_{\text{m}_\text{p}} \cdot P \cdot ([P_\text{b}] - [P_\text{m}]) \quad (157)$$

7.66 Reaction $v_{L_\text{b}_\text{m}}$

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

Name $v_{L_\text{b}_\text{m}}$

Reaction equation



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

$$v_{66} = \text{vol}(\text{MEC}) \cdot \text{ktr_m_p_L} \cdot ([L_b] - [L_m]) \quad (159)$$

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



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

$$v_{67} = \text{vol}(\text{MEC}) \cdot \text{ktr_m_p_S} \cdot ([S_b] - [S_m]) \quad (161)$$

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



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

$$v_{68} = \frac{\text{vol}(\text{PLASMA}) \cdot \text{ktr}_{r_p} \cdot ([A_r] - [A_p] \cdot \text{Ktr}_{p_r_A})}{[A_r] + [A_p] + \text{Km}_{p_m_A}} \quad (163)$$

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



Reactant

Table 153: Properties of each reactant.

Id	Name	SBO
0_r	O_r	

Modifiers

Table 154: Properties of each modifier.

Id	Name	SBO
0_r	O_r	
0_p	O_p	

Product

Table 155: Properties of each product.

Id	Name	SBO
0_p	O_p	

Kinetic Law

Derived unit contains undeclared units

$$v_{69} = \text{vol}(\text{PLASMA}) \cdot \text{ktr}_{r.p} \cdot ([O_r] - [O_p] \cdot \text{Ktr}_{p.r.O}) \quad (165)$$

7.70 Reaction $v_{P_r.p}$

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

Name $v_{P_r.p}$

Reaction equation



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

$$v_{70} = \text{vol}(\text{PLASMA}) \cdot k_{\text{tr_r_p}} \cdot ([\text{P_r}] - [\text{P_p}] \cdot K_{\text{tr_p_r_P}}) \quad (167)$$

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



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

$$v_{71} = \text{vol}(\text{PLASMA}) \cdot k_{\text{tr_r_p}} \cdot ([L_r] - [L_p] \cdot K_{\text{tr_p_r_L}}) \quad (169)$$

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



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

$$v_{72} = \text{vol}(\text{PLASMA}) \cdot \text{ktr_r_p} \cdot ([S_r] - [S_p] \cdot \text{Ktr_p_r_S}) \quad (171)$$

7.73 Reaction `absorp`

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

Name `absorp`

Reaction equation



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

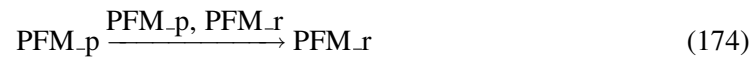
$$v_{73} = k_{\text{abs_PFM}} \cdot \text{MD} \quad (173)$$

7.74 Reaction *dist*

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

Name *dist*

Reaction equation



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

$$v_{74} = k_{out_PFM} \cdot [PFM_p] - k_{in_PFM} \cdot [PFM_r] \quad (175)$$

7.75 Reaction `elim`

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

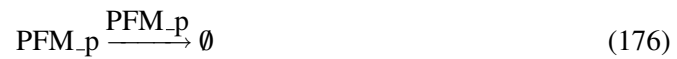
Name `elim`**Reaction equation****Reactant**

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

$$v_{75} = k_{linear_PFM} \cdot [PFM_p] + \frac{\frac{V_{m_PFM} \cdot [PFM_p]}{K_{m_PFM} + \frac{[PFM_p]}{V_{ss_PFM}}}}{V_{ss_PFM}} \quad (177)$$

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 `spatialDimensions` > 0 for certain species.

8.1 Species A_b

Name A_b

Initial concentration 0.7493309 mol · 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`).

$$\frac{d}{dt}A_b = v_{11} - v_1 - v_{20} - v_{63} \quad (178)$$

8.2 Species O_b

Name O_b

Initial concentration 20.77858 mol · 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`).

$$\frac{d}{dt}O_b = v_{12} - v_2 - v_{21} - v_{64} \quad (179)$$

8.3 Species P_b

Name P_b

Initial concentration 6.541209 mol · 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`).

$$\frac{d}{dt}P_b = v_{13} - v_3 - v_{22} - v_{65} \quad (180)$$

8.4 Species L_b

Name L_b

Initial concentration 2.319571 mol · 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](#)).

$$\frac{d}{dt}L_b = v_{14} - v_4 - v_{23} - v_{66} \quad (181)$$

8.5 Species S_b

Name S_b

Initial concentration 3.427807 mol · 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](#)).

$$\frac{d}{dt}S_b = v_{15} - v_5 - v_{24} - v_{67} \quad (182)$$

8.6 Species NAPE_b

Name NAPE_b

Notes precursor of anandamide

Initial concentration 3.879041 · 10⁻⁵ mol · 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](#)).

$$\frac{d}{dt}NAPE_b = v_6 - v_{11} \quad (183)$$

8.7 Species NOPE_b

Name NOPE_b

Notes precursor of oleoyl ethanolamide

Initial concentration 8.814287 · 10⁻⁴ mol · 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](#)).

$$\frac{d}{dt}NOPE_b = v_7 - v_{12} \quad (184)$$

8.8 Species NPPE_b

Name NPPE_b

Notes precursor of palmitoyl ethanolamide

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

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](#)).

$$\frac{d}{dt}\text{NPPE}_b = v_8 - v_{13} \quad (185)$$

8.9 Species NLPE_b

Name NLPE_b

Notes precursor of linoleoyl ethanolamide

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

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](#)).

$$\frac{d}{dt}\text{NLPE}_b = v_9 - v_{14} \quad (186)$$

8.10 Species NSPE_b

Name NSPE_b

Notes precursor of stearoyl ethanolamide

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

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](#)).

$$\frac{d}{dt}\text{NSPE}_b = v_{10} - v_{15} \quad (187)$$

8.11 Species FAAH_b

Name FAAH_b

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

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](#)).

$$\frac{d}{dt}\text{FAAH}_b = v_{16} - v_{17} - v_{18} \quad (188)$$

8.12 Species [FAAHinh_b](#)

Name FAAHinh_b

Initial concentration 0 mol · 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](#)).

$$\frac{d}{dt}\text{FAAHinh}_b = v_{18} - v_{19} \quad (189)$$

8.13 Species [A_r](#)

Name A_r

Initial concentration 0.5419204 mol · 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](#)).

$$\frac{d}{dt}\text{A}_r = v_{35} - v_{25} - v_{44} - v_{68} \quad (190)$$

8.14 Species [O_r](#)

Name O_r

Initial concentration 14.23822 mol · 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](#)).

$$\frac{d}{dt}\text{O}_r = v_{36} - v_{26} - v_{45} - v_{69} \quad (191)$$

8.15 Species P_r

Name P_r

Initial concentration 4.121915 mol · 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](#)).

$$\frac{d}{dt}P_r = v_{37} - v_{27} - v_{46} - v_{70} \quad (192)$$

8.16 Species L_r

Name L_r

Initial concentration 1.705466 mol · 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](#)).

$$\frac{d}{dt}L_r = v_{38} - v_{28} - v_{47} - v_{71} \quad (193)$$

8.17 Species S_r

Name S_r

Initial concentration 2.515968 mol · 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](#)).

$$\frac{d}{dt}S_r = v_{39} - v_{29} - v_{48} - v_{72} \quad (194)$$

8.18 Species NAPE_r

Name NAPE_r

Notes precursor of anandamide

Initial concentration 4.241633 · 10⁻⁶ mol · 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](#)).

$$\frac{d}{dt}NAPE_r = v_{30} - v_{35} \quad (195)$$

8.19 Species NOPE_r

Name NOPE_r

Notes precursor of oleoyl ethanolamide

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

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](#)).

$$\frac{d}{dt}\text{NOPE}_r = v_{31} - v_{36} \quad (196)$$

8.20 Species NPPE_r

Name NPPE_r

Notes precursor of palmitoyl ethanolamide

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

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](#)).

$$\frac{d}{dt}\text{NPPE}_r = v_{32} - v_{37} \quad (197)$$

8.21 Species NLPE_r

Name NLPE_r

Notes precursor of linoleoyl ethanolamide

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

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](#)).

$$\frac{d}{dt}\text{NLPE}_r = v_{33} - v_{38} \quad (198)$$

8.22 Species NSPE_r

Name NSPE_r

Notes precursor of stearoyl ethanolamide

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

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](#)).

$$\frac{d}{dt}\text{NSPE}_r = v_{34} - v_{39} \quad (199)$$

8.23 Species FAAH_r

Name FAAH_r

Initial concentration 2.165868 mol · 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](#)).

$$\frac{d}{dt}\text{FAAH}_r = v_{40} - v_{41} - v_{42} \quad (200)$$

8.24 Species FAAHinh_r

Name FAAHinh_r

Initial concentration 0 mol · 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](#)).

$$\frac{d}{dt}\text{FAAHinh}_r = v_{42} - v_{43} \quad (201)$$

8.25 Species A_m

Name A_m

Initial concentration 0.97761 mol · 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](#)).

$$\frac{d}{dt}\text{A}_m = v_{63} - v_{49} - v_{58} \quad (202)$$

8.26 Species O_m

Name O_m

Initial concentration 16.3219 mol · 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](#)).

$$\frac{d}{dt}\text{O}_m = v_{64} - v_{50} - v_{59} \quad (203)$$

8.27 Species P_m

Name P_m

Initial concentration 5.809415 mol · 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](#)).

$$\frac{d}{dt}P_m = v_{65} - v_{51} - v_{60} \quad (204)$$

8.28 Species L_m

Name L_m

Initial concentration 0 mol · 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](#)).

$$\frac{d}{dt}L_m = v_{66} - v_{52} - v_{61} \quad (205)$$

8.29 Species S_m

Name S_m

Initial concentration 2.968774 mol · 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](#)).

$$\frac{d}{dt}S_m = v_{67} - v_{53} - v_{62} \quad (206)$$

8.30 Species FAAH_m

Name FAAH_m

Initial concentration 10.686 mol · 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](#)).

$$\frac{d}{dt}FAAH_m = v_{54} - v_{55} - v_{56} \quad (207)$$

8.31 Species FAAHinh_m

Name FAAHinh_m

Initial concentration 0 mol · 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](#)).

$$\frac{d}{dt}\text{FAAHinh_m} = v_{56} - v_{57} \quad (208)$$

8.32 Species A_p

Name A_p

Initial concentration 0.8740574 mol · 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](#)).

$$\frac{d}{dt}\text{A_p} = v_{58} + v_{68} \quad (209)$$

8.33 Species O_p

Name O_p

Initial concentration 5.085073 mol · 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](#)).

$$\frac{d}{dt}\text{O_p} = v_{59} + v_{69} \quad (210)$$

8.34 Species P_p

Name P_p

Initial concentration 4.849307 mol · 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](#)).

$$\frac{d}{dt}\text{P_p} = v_{60} + v_{70} \quad (211)$$

8.35 Species L_p

Name L_p

Initial concentration 1.916254 mol · 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}](#)).

$$\frac{d}{dt}L_p = v_{61} + v_{71} \quad (212)$$

8.36 Species S_p

Name S_p

Initial concentration 0.273772 mol · 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}](#)).

$$\frac{d}{dt}S_p = v_{62} + v_{72} \quad (213)$$

8.37 Species PFM_{gut}

Name PFM_{gut}

Initial concentration 0 mol · l⁻¹

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

$$\frac{d}{dt}PFM_{gut} = -v_{73} \quad (214)$$

8.38 Species PFM_p

Name PFM_p

Initial concentration 0 mol · 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](#)).

$$\frac{d}{dt}PFM_p = v_{73} - v_{74} - v_{75} \quad (215)$$

8.39 Species PFM_r

Name PFM_r

Initial concentration 0 mol · l⁻¹

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

$$\frac{d}{dt} \text{PFM}_r = v_{74} \quad (216)$$

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

SBML2^{AT}EX was developed by Andreas Dräger^a, Hannes Planatscher^a, Dieudonné M Wouamba^a, Adrian Schröder^a, Michael Hucka^b, Lukas Endler^c, Martin Golebiewski^d and Andreas Zell^a. Please see <http://www.ra.cs.uni-tuebingen.de/software/SBML2LaTeX> for more information.

^aCenter for Bioinformatics Tübingen (ZBIT), Germany

^bCalifornia Institute of Technology, Beckman Institute BNMC, Pasadena, United States

^cEuropean Bioinformatics Institute, Wellcome Trust Genome Campus, Hinxton, United Kingdom

^dEML Research gGmbH, Heidelberg, Germany