

## SBML Model Report

# Model name: “Benson2013 - Identification of key drug targets in nerve growth factor pathway”



May 5, 2016

## 1 General Overview

This is a document in SBML Level 2 Version 4 format. This model was created by the following two authors: Vijayalakshmi Chelliah<sup>1</sup> and Niel Benson<sup>2</sup> at January 29<sup>th</sup> 2016 at 2:30 p. m. and last time modified at February 16<sup>th</sup> 2016 at 7:29 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	2
species types	0	species	76
events	0	constraints	0
reactions	157	function definitions	0
global parameters	222	unit definitions	7
rules	0	initial assignments	0

## Model Notes

Benson2013 - Identification of key drug targets in nerve growth factor pathway

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This model is described in the article: [Systems pharmacology of the nerve growth factor pathway: use of a systems biology model for the identification of key drug targets using sensitivity analysis and the integration of physiology and pharmacology](#). Benson N, Matsuura T, Smirnov S, Demin O, Jones HM, Dua P, van der Graaf PH. Interface Focus 2013 Apr; 3(2): 20120071

Abstract:

The nerve growth factor (NGF) pathway is of great interest as a potential source of drug targets, for example in the management of certain types of pain. However, selecting targets from this pathway either by intuition or by non-contextual measures is likely to be challenging. An alternative approach is to construct a mathematical model of the system and via sensitivity analysis rank order the targets in the known pathway, with respect to an endpoint such as the diphosphorylated extracellular signal-regulated kinase concentration in the nucleus. Using the published literature, a model was created and, via sensitivity analysis, it was concluded that, after NGF itself, tropomyosin receptor kinase A (TrkA) was one of the most sensitive druggable targets. This initial model was subsequently used to develop a further model incorporating physiological and pharmacological parameters. This allowed the exploration of the characteristics required for a successful hypothetical TrkA inhibitor. Using these systems models, we were able to identify candidates for the optimal drug targets in the known pathway. These conclusions were consistent with clinical and human genetic data. We also found that incorporating appropriate physiological context was essential to drawing accurate conclusions about important parameters such as the drug dose required to give pathway inhibition. Furthermore, the importance of the concentration of key reactants such as TrkA kinase means that appropriate contextual data are required before clear conclusions can be drawn. Such models could be of great utility in selecting optimal targets and in the clinical evaluation of novel drugs.

This model is hosted on [BioModels Database](#) and identified by: [BIOMD0000000588](#).

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## 2 Unit Definitions

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

### 2.1 Unit `MWBUILTINUNIT_liter`

**Name** liter

**Definition**  $\text{m}^3 \cdot 0.0010$  dimensionless

### 2.2 Unit `MWBUILTINPREFIX_micro_MWBUILTINUNIT_mole`

**Name** micromole

**Definition**  $10^{-6}$  mol

### 2.3 Unit MWBUILTINPREFIX\_micro\_MWBUILTINUNIT\_molarity

**Name** micromolarity

**Definition**  $\text{m}^{-3} \cdot \text{mol} \cdot 0.0010$  dimensionless

### 2.4 Unit MWDERIVEDUNIT\_1\_\_minute

**Name** 1/minute

**Definition**  $\text{s}^{-1} \cdot 0.0166666666666667$  dimensionless

### 2.5 Unit MWDERIVEDUNIT\_1\_\_micromolarity\_minute

**Name** 1/(micromolarity\*minute)

**Definition**  $\text{m}^3 \cdot \text{mol}^{-1} \cdot \text{s}^{-1} \cdot 16.6666666666667$  dimensionless

### 2.6 Unit MWDERIVEDUNIT\_1\_\_molarity\_second

**Name** 1/(molarity\*second)

**Definition**  $\text{m}^3 \cdot \text{mol}^{-1} \cdot \text{s}^{-1} \cdot 0.0010$  dimensionless

### 2.7 Unit MWDERIVEDUNIT\_1\_\_second

**Name** 1/second

**Definition**  $\text{s}^{-1} \cdot \text{dimensionless}$

### 2.8 Unit substance

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

**Definition** mol

### 2.9 Unit volume

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

**Definition** l

### 2.10 Unit area

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

**Definition**  $\text{m}^2$

## 2.11 Unit `length`

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

**Definition** `m`

## 2.12 Unit `time`

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

**Definition** `s`

# 3 Compartments

This model contains two compartments.

Table 2: Properties of all compartments.

Id	Name	SBO	Spatial Dimensions	Size	Unit
<a href="#">mw3bc142df_1951_4fa9_b0a7_011c95012bbf</a>	Neuron		3	0.0010	$\text{m}^3 \cdot 0.0010 \text{ dimensionless}$
<a href="#">mwc2fe3668_8fb0_4cfb_b795_99057e61e290</a>	Interstitial fluid		3	12	$\text{m}^3 \cdot 0.0010 \text{ dimensionless}$

### 3.1 Compartment [mw3bc142df\\_1951\\_4fa9\\_b0a7\\_011c95012bbf](#)

This is a three dimensional compartment with a constant size of  $0.0010 \text{ m}^3 \cdot 0.0010 \text{ dimensionless}$ .

**Name** Neuron

### 3.2 Compartment [mwc2fe3668\\_8fb0\\_4cfb\\_b795\\_99057e61e290](#)

This is a three dimensional compartment with a constant size of  $\text{twelve m}^3 \cdot 0.0010 \text{ dimensionless}$ .

**Name** Interstitial fluid

## 4 Species

This model contains 76 species. The boundary condition of two of these species is set to true so that these species' amount cannot be changed by any reaction. Section 7 provides further details and the derived rates of change of each species.

Table 3: Properties of each species.

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
NGFR	NGFR	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
L_NGFR	L_NGFR	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
pTrkA	pTrkA	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
pTrkA_endo	pTrkA_endo	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
Shc_pTrkA	Shc_pTrkA	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
Shc_pTrkA_endo	Shc_pTrkA_endo	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
pShc_pTrkA	pShc_pTrkA	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
pShc_pTrkA_endo	pShc_pTrkA_endo	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
Grb2_SOS_pShc-_pTrkA	Grb2_SOS_pShc_pTrkA	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
Grb2_SOS_pShc-_pTrkA_endo	Grb2_SOS_pShc_pTrkA_endo	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
FRS2_pTrkA	FRS2_pTrkA	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$
FRS2_pTrkA_endo	FRS2_pTrkA_endo	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$
pFRS2_pTrkA	pFRS2_pTrkA	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$
pFRS2_pTrkA_endo	pFRS2_pTrkA_endo	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$
Crk_C3G_pFRS2-_pTrkA	Crk_C3G_pFRS2_pTrkA	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$
Crk_C3G_pFRS2-_pTrkA_endo	Crk_C3G_pFRS2_pTrkA_endo	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$
Shc	Shc	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$
Grb2_SOS_pShc	Grb2_SOS_pShc	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$
FRS2	FRS2	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$
Crk_C3G	Crk_C3G	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$
Dok	Dok	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$
pDok	pDok	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$
Grb2	Grb2	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
SOS	SOS	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
Grb2_SOS	Grb2_SOS	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
Ras_GTP	Ras_GTP	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
Ras_GDP	Ras_GDP	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
B_Raf_Ras_GTP	B_Raf_Ras_GTP	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
B_Raf	B_Raf	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
c_Raf	c_Raf	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
Rap1_GTP	Rap1_GTP	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
ppMEKcyt_ERKcyt	ppMEKcyt_ERKcyt	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
ppMEKcyt	ppMEKcyt	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
ppERKcyt	ppERKcyt	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
dppERKcyt	dppERKcyt	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
MEKcyt	MEKcyt	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
ERKcyt	ERKcyt	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\boxplus$	$\boxplus$
MEKcyt_ERKcyt	MEKcyt_ERKcyt	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\boxplus$	$\boxplus$
pMEKcyt	pMEKcyt	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\boxplus$	$\boxplus$
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\boxplus$	$\boxplus$
ppMEKnuc_ERKnuc	ppMEKnuc_ERKnuc	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\boxplus$	$\boxplus$
ppMEKnuc	ppMEKnuc	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\boxplus$	$\boxplus$
ppERKnuc	ppERKnuc	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\boxplus$	$\boxplus$
dppERKnuc	dppERKnuc	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\boxplus$	$\boxplus$
MEKnuc	MEKnuc	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\boxplus$	$\boxplus$
ERKnuc	ERKnuc	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\boxplus$	$\boxplus$
MEKnuc_ERKnuc	MEKnuc_ERKnuc	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\boxplus$	$\boxplus$
pMEKnuc	pMEKnuc	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\boxplus$	$\boxplus$
pMEKnuc_ERKnuc	pMEKnuc_ERKnuc	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	$\boxplus$	$\boxplus$



Id	Name	Compartment	Derived Unit	Constant	Boundary Condi- tion
c_Raf_Ras_GTP	c_Raf_Ras_GTP	mw3bc142df_1951_4fa9- _b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot$ $(0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
B_Raf_Rap1_GTP	B_Raf_Rap1_GTP	mw3bc142df_1951_4fa9- _b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot$ $(0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
Rap1_GDP	Rap1_GDP	mw3bc142df_1951_4fa9- _b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot$ $(0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
Crk	Crk	mw3bc142df_1951_4fa9- _b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot$ $(0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
C3G	C3G	mw3bc142df_1951_4fa9- _b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot$ $(0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
pDok_RasGAP	pDok_RasGAP	mw3bc142df_1951_4fa9- _b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot$ $(0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
RasGAP	RasGAP	mw3bc142df_1951_4fa9- _b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot$ $(0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
Grb2_pSOS	Grb2_pSOS	mw3bc142df_1951_4fa9- _b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot$ $(0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
pShc	pShc	mw3bc142df_1951_4fa9- _b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot$ $(0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
pSOS	pSOS	mw3bc142df_1951_4fa9- _b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot$ $(0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
pFRS2	pFRS2	mw3bc142df_1951_4fa9- _b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot$ $(0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$
mwd4cc05d6- _6e19_4e2e_b540- _45954f2df4f0	trkaI_int	mw3bc142df_1951_4fa9- _b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot$ $(0.0010 \text{ dimensionless})^{-1}$	$\square$	$\square$

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
mwf82ad06a-_b8aa_40fa_a532-_a1da44e3425f	pro_TrkA	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
mwe009ad7f-_90fd_4186_8855-_77780724ddb8	L_NGFR_I	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
mw5afa8250-_0cf0_40a2_a97a-_f7cf20a9cfbd	NGFR_I	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
mwb4295eb0-_bd92_4221_b49d-_bbbd48ca25bc	NGFR_I_deg	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
mwa4903466-_fc58_4bfe_b3ec-_76a90f9d20e2	L_NGFR_I_deg	mw3bc142df_1951_4fa9-_b0a7_011c95012bbf	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
mwe979ec8f-_a55c_470c_a554-_9fa8013eab74	NGFR_interstitial_fluid	mwc2fe3668_8fb0_4cfb-_b795_99057e61e290	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
mw4478fbeb-_51b1_4764_92ad-_a86d314ae0eb	source	mwc2fe3668_8fb0_4cfb-_b795_99057e61e290	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	<input type="checkbox"/>	<input checked="" type="checkbox"/>
mw29fa4e00-_a430_4f11_b62e-_1bcbc0a767a0	NGF	mwc2fe3668_8fb0_4cfb-_b795_99057e61e290	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
mwa81400ac-_76f5_4446_8a4d-_6446ab4b11c9	NGFdeg	mwc2fe3668_8fb0_4cfb-_b795_99057e61e290	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
mw6782adfa- _29ee_41a8_acbb- _4c86c6c81596	NGFR_L_interstitial_fluid	mwc2fe3668_8fb0_4cfb- _b795_99057e61e290	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot$ $(0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$
mwe599c4c1- _2d8e_446c_bf3f- _4c97baced8a9	tanezumab	mwc2fe3668_8fb0_4cfb- _b795_99057e61e290	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot$ $(0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$
mw46e8693e- _348e_4f1d_8c49- _c13485fae7ba	NGF_tanezumab	mwc2fe3668_8fb0_4cfb- _b795_99057e61e290	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot$ $(0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$
mwe0b9d340- _24f5_4c7e_a80f- _4faadae6c0fc	tz_deg	mwc2fe3668_8fb0_4cfb- _b795_99057e61e290	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot$ $(0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$
mw89ebbe2d- _1ec2_457a_9367- _6c5e86a1a924	trkaI	mwc2fe3668_8fb0_4cfb- _b795_99057e61e290	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot$ $(0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$
mw555a08dc- _922d_4b35_8f69- _5c6e8a4ad614	trkaI_deg	mwc2fe3668_8fb0_4cfb- _b795_99057e61e290	$10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot$ $(0.0010 \text{ dimensionless})^{-1}$	$\Xi$	$\Xi$

## 5 Parameters

This model contains 222 global parameters.

Table 4: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
Km_104	Km_104		15.657	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_105	Km_105		15.657	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_106	Km_106		15.657	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_107	Km_107		15.657	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_108	Km_108		0.020	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_109	Km_109		0.020	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_39	Km_39		0.100	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_40	Km_40		0.100	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_41	Km_41		0.100	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_42	Km_42		0.100	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_43	Km_43		0.100	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_44	Km_44		0.100	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_45	Km_45		0.100	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_58	Km_58		0.020	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_59	Km_59		25.641	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_60	Km_60		25.641	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_61	Km_61		25.641	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_62	Km_62		1.000	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓

Id	Name	SBO	Value	Unit	Constant
Km_63	Km_63		1.000	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_64	Km_64		1.000	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_70	Km_70		0.010	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_71	Km_71		1.000	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_72	Km_72		1.000	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_81	Km_81		0.160	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_82	Km_82		0.160	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_83	Km_83		0.160	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_84	Km_84		0.160	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_85	Km_85		0.160	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_86	Km_86		0.160	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_87	Km_87		0.160	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_88	Km_88		0.160	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_89	Km_89		0.160	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_90	Km_90		0.160	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_91	Km_91		0.160	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_92	Km_92		0.160	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_93	Km_93		15.657	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_94	Km_94		15.657	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_95	Km_95		15.657	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓
Km_96	Km_96		15.657	$\text{m}^{-3} \cdot \text{mol} \cdot$ 0.0010 dimensionless	✓

Id	Name	SBO	Value	Unit	Constant
Km_97	Km_97		0.020	$\text{m}^{-3} \cdot \text{mol} \cdot$	✓ 0.0010 dimensionless
Km_98	Km_98		0.020	$\text{m}^{-3} \cdot \text{mol} \cdot$	✓ 0.0010 dimensionless
MKP3cyt	MKP3cyt		0.018	$\text{m}^{-3} \cdot \text{mol} \cdot$	✓ 0.0010 dimensionless
MKP3nuc	MKP3nuc		0.006	$\text{m}^{-3} \cdot \text{mol} \cdot$	✓ 0.0010 dimensionless
PP2Acyt	PP2Acyt		0.240	$\text{m}^{-3} \cdot \text{mol} \cdot$	✓ 0.0010 dimensionless
PP2Anuc	PP2Anuc		0.080	$\text{m}^{-3} \cdot \text{mol} \cdot$	✓ 0.0010 dimensionless
Rap1GAP	Rap1GAP		0.012	$\text{m}^{-3} \cdot \text{mol} \cdot$	✓ 0.0010 dimensionless
Vmax_104	Vmax_104		180.000	$\text{s}^{-1} \cdot$	✓ 0.0166666666666667 dimensionless
Vmax_105	Vmax_105		180.000	$\text{s}^{-1} \cdot$	✓ 0.0166666666666667 dimensionless
Vmax_106	Vmax_106		180.000	$\text{s}^{-1} \cdot$	✓ 0.0166666666666667 dimensionless
Vmax_107	Vmax_107		180.000	$\text{s}^{-1} \cdot$	✓ 0.0166666666666667 dimensionless
Vmax_108	Vmax_108		3.600	$\text{s}^{-1} \cdot$	✓ 0.0166666666666667 dimensionless
Vmax_109	Vmax_109		3.600	$\text{s}^{-1} \cdot$	✓ 0.0166666666666667 dimensionless
Vmax_39	Vmax_39		1.200	$\text{s}^{-1} \cdot$	✓ 0.0166666666666667 dimensionless
Vmax_40	Vmax_40		1.200	$\text{s}^{-1} \cdot$	✓ 0.0166666666666667 dimensionless
Vmax_41	Vmax_41		1.200	$\text{s}^{-1} \cdot$	✓ 0.0166666666666667 dimensionless
Vmax_42	Vmax_42		1.200	$\text{s}^{-1} \cdot$	✓ 0.0166666666666667 dimensionless
Vmax_43	Vmax_43		1.200	$\text{s}^{-1} \cdot$	✓ 0.0166666666666667 dimensionless
Vmax_44	Vmax_44		1.200	$\text{s}^{-1} \cdot$	✓ 0.0166666666666667 dimensionless
Vmax_45	Vmax_45		1.200	$\text{s}^{-1} \cdot$	✓ 0.0166666666666667 dimensionless
Vmax_58	Vmax_58		120.000	$\text{s}^{-1} \cdot$	✓ 0.0166666666666667 dimensionless

Id	Name	SBO	Value	Unit	Constant
Vmax_59	Vmax_59		60.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_60	Vmax_60		60.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_61	Vmax_61		60.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_62	Vmax_62		600.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_63	Vmax_63		600.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_64	Vmax_64		600.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_70	Vmax_70		2.880	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_71	Vmax_71		120.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_72	Vmax_72		120.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_81	Vmax_81		30.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_82	Vmax_82		30.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_83	Vmax_83		30.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_84	Vmax_84		30.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_85	Vmax_85		12.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_86	Vmax_86		12.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_87	Vmax_87		12.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_88	Vmax_88		12.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_89	Vmax_89		18.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_90	Vmax_90		18.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_91	Vmax_91		18.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
Vmax_92	Vmax_92		18.000	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless

Id	Name	SBO	Value	Unit	Constant
Vmax_93	Vmax_93		180.000	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
Vmax_94	Vmax_94		180.000	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
Vmax_95	Vmax_95		180.000	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
Vmax_96	Vmax_96		180.000	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
Vmax_97	Vmax_97		3.600	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
Vmax_98	Vmax_98		3.600	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kb_1	kb_1		0.017	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kb_100	kb_100		4.500	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kb_101	kb_101		36.000	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kb_102	kb_102		36.000	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kb_103	kb_103		36.000	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kb_18	kb_18		12.000	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kb_19	kb_19		12.000	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kb_20	kb_20		12.000	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kb_21	kb_21		12.000	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kb_22	kb_22		12.000	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kb_23	kb_23		12.000	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kb_24	kb_24		6.000	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kb_25	kb_25		6.000	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kb_26	kb_26		6.000	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kb_27	kb_27		6.000	s <sup>-1</sup>	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless



Id	Name	SBO	Value	Unit	Constant
kb_46	kb_46		1.008	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kb_47	kb_47		1.008	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kb_48	kb_48		12.000	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kb_49	kb_49		12.000	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kb_50	kb_50		12.000	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kb_55	kb_55		2.000	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kb_56	kb_56		$6 \cdot 10^{-4}$	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kb_65	kb_65		0.120	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kb_66	kb_66		12.000	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kb_67	kb_67		12.000	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kb_73	kb_73		30.000	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kb_74	kb_74		30.000	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kb_75	kb_75		30.000	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kb_77	kb_77		4.500	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kb_78	kb_78		36.000	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kb_79	kb_79		36.000	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kb_80	kb_80		36.000	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_1	kf_1		0.050	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_10	kf_10		0.038	$s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_100	kf_100		600.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					16.66666666666667 dimensionless
kf_101	kf_101		978.240	$m^3 \cdot mol^{-1} \cdot s^{-1}$	$\cdot$ <input checked="" type="checkbox"/>
					16.66666666666667 dimensionless

Id	Name	SBO	Value	Unit	Constant
kf_102	kf_102		978.240	$\text{m}^3 \cdot \text{mol}^{-1} \cdot \text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_103	kf_103		978.240	$\text{m}^3 \cdot \text{mol}^{-1} \cdot \text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_11	kf_11		0.025	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_110	kf_110		6.480	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_111	kf_111		32.400	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_112	kf_112		0.480	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_113	kf_113		2.400	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_114	kf_114		3.120	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_115	kf_115		15.600	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_116	kf_116		0.420	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_117	kf_117		2.100	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_118	kf_118		0.216	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_119	kf_119		1.080	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_12	kf_12		0.025	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_120	kf_120		0.103	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_121	kf_121		0.516	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_122	kf_122		7.320	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_123	kf_123		36.600	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_124	kf_124		0.552	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_125	kf_125		2.760	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
kf_126	kf_126		0.156	$\text{s}^{-1}$	<input checked="" type="checkbox"/>

Id	Name	SBO	Value	Unit	Constant
kf_127	kf_127		0.780	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_128	kf_128		0.084	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_129	kf_129		0.420	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_13	kf_13		0.025	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_130	kf_130		6.480	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_131	kf_131		32.400	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_132	kf_132		0.480	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_133	kf_133		2.400	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_134	kf_134		3.120	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_135	kf_135		15.600	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_136	kf_136		0.420	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_137	kf_137		2.100	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_138	kf_138		0.156	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_139	kf_139		0.780	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_14	kf_14		0.025	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_140	kf_140		0.084	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_141	kf_141		0.420	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_142	kf_142		3.120	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_143	kf_143		15.600	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_144	kf_144		0.420	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless
kf_145	kf_145		2.100	s <sup>-1</sup>	. <input checked="" type="checkbox"/>
					0.0166666666666667 dimensionless

Id	Name	SBO	Value	Unit	Constant
kf_15	kf_15		0.025	$s^{-1}$	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kf_16	kf_16		0.025	$s^{-1}$	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kf_17	kf_17		0.025	$s^{-1}$	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kf_19	kf_19		600.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/> 16.66666666666667 dimensionless
kf_20	kf_20		600.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/> 16.66666666666667 dimensionless
kf_21	kf_21		600.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/> 16.66666666666667 dimensionless
kf_22	kf_22		600.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/> 16.66666666666667 dimensionless
kf_23	kf_23		600.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/> 16.66666666666667 dimensionless
kf_24	kf_24		300.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/> 16.66666666666667 dimensionless
kf_25	kf_25		300.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/> 16.66666666666667 dimensionless
kf_26	kf_26		300.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/> 16.66666666666667 dimensionless
kf_27	kf_27		300.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/> 16.66666666666667 dimensionless
kf_28	kf_28		6.000	$s^{-1}$	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kf_29	kf_29		6.000	$s^{-1}$	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kf_3	kf_3		60.000	$s^{-1}$	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kf_30	kf_30		120.000	$s^{-1}$	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kf_31	kf_31		120.000	$s^{-1}$	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kf_32	kf_32		0.132	$s^{-1}$	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kf_33	kf_33		0.132	$s^{-1}$	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kf_34	kf_34		0.132	$s^{-1}$	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless
kf_35	kf_35		0.132	$s^{-1}$	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless

Id	Name	SBO	Value	Unit	Constant
kf_36	kf_36		0.132	$s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_37	kf_37		0.132	$s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_38	kf_38		0.132	$s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_4	kf_4		0.038	$s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_46	kf_46		1.800	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_47	kf_47		1.800	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_48	kf_48		600.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_49	kf_49		600.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_5	kf_5		0.038	$s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_50	kf_50		600.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_51	kf_51		0.300	$s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_52	kf_52		0.300	$s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_53	kf_53		0.120	$s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_54	kf_54		0.120	$s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_55	kf_55		3.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_56	kf_56		0.120	$s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_57	kf_57		0.007	$s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_6	kf_6		0.038	$s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_65	kf_65		60.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_66	kf_66		60.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/> dimensionless
kf_67	kf_67		60.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/> dimensionless

Id	Name	SBO	Value	Unit	Constant
kf_68	kf_68		0.300	$s^{-1}$	<input checked="" type="checkbox"/>
				0.0166666666666667	dimensionless
kf_69	kf_69		0.007	$s^{-1}$	<input checked="" type="checkbox"/>
				0.0166666666666667	dimensionless
kf_7	kf_7		0.038	$s^{-1}$	<input checked="" type="checkbox"/>
				0.0166666666666667	dimensionless
kf_73	kf_73		3600.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/>
				16.66666666666667	dimensionless
kf_74	kf_74		3600.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/>
				16.66666666666667	dimensionless
kf_75	kf_75		3600.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/>
				16.66666666666667	dimensionless
kf_76	kf_76		9.000	$s^{-1}$	<input checked="" type="checkbox"/>
				0.0166666666666667	dimensionless
kf_77	kf_77		600.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/>
				16.66666666666667	dimensionless
kf_78	kf_78		978.240	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/>
				16.66666666666667	dimensionless
kf_79	kf_79		978.240	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/>
				16.66666666666667	dimensionless
kf_8	kf_8		0.038	$s^{-1}$	<input checked="" type="checkbox"/>
				0.0166666666666667	dimensionless
kf_80	kf_80		978.240	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/>
				16.66666666666667	dimensionless
kf_9	kf_9		0.038	$s^{-1}$	<input checked="" type="checkbox"/>
				0.0166666666666667	dimensionless
kf_99	kf_99		9.000	$s^{-1}$	<input checked="" type="checkbox"/>
				0.0166666666666667	dimensionless
mwdfa3719d- _20cc- _4f14_b45e- _3f097c3aff65	kf_18		600.000	$m^3 \cdot mol^{-1} \cdot s^{-1}$	<input checked="" type="checkbox"/>
				16.66666666666667	dimensionless

## 6 Reactions

This model contains 157 reactions. All reactions are listed in the following table and are subsequently described in detail. If a reaction is affected by a modifier, the identifier of this species is written above the reaction arrow.

Table 5: Overview of all reactions

Nº	Id	Name	Reaction Equation	SBO
1	R1	R1	$\text{mwf82ad06a\_b8aa\_40fa\_a532\_a1da44e3425f} \xrightleftharpoons{\text{mwf82ad06a\_b8aa\_40fa\_a532\_a1da44e3425f}} \text{mwf82ad06a\_b8aa\_40fa\_a532\_a1da44e3425f}$	
2	R3	R3	$\text{L\_NGFR} \xrightarrow{\text{L\_NGFR}} \text{pTrkA}$	
3	R4	R4	$\text{pTrkA} \xrightarrow{\text{pTrkA}} \text{pTrkA\_endo}$	
4	R5	R5	$\text{Shc\_pTrkA} \xrightarrow{\text{Shc\_pTrkA}} \text{Shc\_pTrkA\_endo}$	
5	R6	R6	$\text{pShc\_pTrkA} \xrightarrow{\text{pShc\_pTrkA}} \text{pShc\_pTrkA\_endo}$	
6	R7	R7	$\text{Grb2\_SOS\_pShc\_pTrkA} \xrightarrow{\text{Grb2\_SOS\_pShc\_pTrkA}} \text{Grb2\_SOS\_pShc\_pTrkA\_endo}$	
7	R8	R8	$\text{FRS2\_pTrkA} \xrightarrow{\text{FRS2\_pTrkA}} \text{FRS2\_pTrkA\_endo}$	
8	R9	R9	$\text{pFRS2\_pTrkA} \xrightarrow{\text{pFRS2\_pTrkA}} \text{pFRS2\_pTrkA\_endo}$	
9	R10	R10	$\text{Crk\_C3G\_pFRS2\_pTrkA} \xrightarrow{\text{Crk\_C3G\_pFRS2\_pTrkA}} \text{Crk\_C3G\_pFRS2\_pTrkA\_endo}$	
10	R11	R11	$\text{pTrkA\_endo} \xrightarrow{\text{pTrkA\_endo}} \emptyset$	
11	R12	R12	$\text{Shc\_pTrkA\_endo} \xrightarrow{\text{Shc\_pTrkA\_endo}} \text{Shc}$	
12	R13	R13	$\text{pShc\_pTrkA\_endo} \xrightarrow{\text{pShc\_pTrkA\_endo}} \text{pShc}$	
13	R14	R14	$\text{Grb2\_SOS\_pShc\_pTrkA\_endo} \xrightarrow{\text{Grb2\_SOS\_pShc\_pTrkA\_endo}} \text{Grb2\_SOS\_pShc}$	
14	R15	R15	$\text{FRS2\_pTrkA\_endo} \xrightarrow{\text{FRS2\_pTrkA\_endo}} \text{FRS2}$	
15	R16	R16	$\text{pFRS2\_pTrkA\_endo} \xrightarrow{\text{pFRS2\_pTrkA\_endo}} \text{pFRS2}$	

Nº	Id	Name	Reaction Equation	SBO
16	R17	R17	$\text{Crk\_C3G\_pFRS2\_pTrkA\_endo} \xrightarrow{\text{Crk\_C3G\_pFRS2\_pTrkA\_endo}} \text{Crk\_C3G} + \text{pFRS2}$	
17	R18	R18	$\text{pTrkA} + \text{Shc} \xrightarrow{\text{Shc, pTrkA, Shc\_pTrkA}} \text{Shc\_pTrkA}$	
18	R19	R19	$\text{pTrkA} + \text{pShc} \xrightarrow{\text{pShc, pTrkA, pShc\_pTrkA}} \text{pShc\_pTrkA}$	
19	R20	R20	$\text{pTrkA} + \text{Grb2\_SOS\_pShc} \xrightarrow{\text{Grb2\_SOS\_pShc, pTrkA, Grb2\_SOS\_pShc\_pTrkA}} \text{Grb2\_SOS\_pShc\_pTrkA}$	
20	R21	R21	$\text{pTrkA\_endo} + \text{Shc} \xrightarrow{\text{Shc, pTrkA\_endo, Shc\_pTrkA\_endo}} \text{Shc\_pTrkA\_endo}$	
21	R22	R22	$\text{pTrkA\_endo} + \text{pShc} \xrightarrow{\text{pShc, pTrkA\_endo, pShc\_pTrkA\_endo}} \text{pShc\_pTrkA\_endo}$	
22	R23	R23	$\text{pTrkA\_endo} + \text{Grb2\_SOS\_pShc} \xrightarrow{\text{Grb2\_SOS\_pShc, pTrkA\_endo, Grb2\_SOS\_pShc\_pTrkA\_endo}} \text{Grb2\_SOS\_pShc\_pTrkA\_endo}$	
23	R24	R24	$\text{pTrkA} + \text{FRS2} \xrightarrow{\text{FRS2, pTrkA, FRS2\_pTrkA}} \text{FRS2\_pTrkA}$	
24	R25	R25	$\text{pTrkA} + \text{pFRS2} \xrightarrow{\text{pFRS2, pTrkA, pFRS2\_pTrkA}} \text{pFRS2\_pTrkA}$	
25	R26	R26	$\text{pTrkA\_endo} + \text{FRS2} \xrightarrow{\text{FRS2, pTrkA\_endo, FRS2\_pTrkA\_endo}} \text{FRS2\_pTrkA\_endo}$	
26	R27	R27	$\text{pTrkA\_endo} + \text{pFRS2} \xrightarrow{\text{pFRS2, pTrkA\_endo, pFRS2\_pTrkA\_endo}} \text{pFRS2\_pTrkA\_endo}$	
27	R28	R28	$\text{Shc\_pTrkA} \xrightarrow{\text{Shc\_pTrkA}} \text{pShc\_pTrkA}$	
28	R29	R29	$\text{Shc\_pTrkA\_endo} \xrightarrow{\text{Shc\_pTrkA\_endo}} \text{pShc\_pTrkA\_endo}$	
29	R30	R30	$\text{FRS2\_pTrkA} \xrightarrow{\text{FRS2\_pTrkA}} \text{pFRS2\_pTrkA}$	
30	R31	R31	$\text{FRS2\_pTrkA\_endo} \xrightarrow{\text{FRS2\_pTrkA\_endo}} \text{pFRS2\_pTrkA\_endo}$	
31	R32	R32	$\text{pTrkA} \xrightarrow{\text{pTrkA}} \emptyset$	
32	R33	R33	$\text{Shc\_pTrkA} \xrightarrow{\text{Shc\_pTrkA}} \text{Shc}$	
33	R34	R34	$\text{pShc\_pTrkA} \xrightarrow{\text{pShc\_pTrkA}} \text{pShc}$	
34	R35	R35	$\text{Grb2\_SOS\_pShc\_pTrkA} \xrightarrow{\text{Grb2\_SOS\_pShc\_pTrkA}} \text{Grb2\_SOS\_pShc}$	



Nº	Id	Name	Reaction Equation	SBO
35	R36	R36	$\text{FRS2\_pTrkA} \xrightarrow{\text{FRS2\_pTrkA}} \text{FRS2}$	
36	R37	R37	$\text{pFRS2\_pTrkA} \xrightarrow{\text{pFRS2\_pTrkA}} \text{pFRS2}$	
37	R38	R38	$\text{Crk\_C3G\_pFRS2\_pTrkA} \xrightarrow{\text{Crk\_C3G\_pFRS2\_pTrkA}} \text{Crk\_C3G} + \text{pFRS2}$	
38	R39	R39	$\text{Dok} + \text{pTrkA} \xrightarrow{\text{pTrkA, Dok}} \text{pDok} + \text{pTrkA}$	
39	R40	R40	$\text{Dok} + \text{Shc\_pTrkA} \xrightarrow{\text{Shc\_pTrkA, Dok}} \text{pDok} + \text{Shc\_pTrkA}$	
40	R41	R41	$\text{Dok} + \text{pShc\_pTrkA} \xrightarrow{\text{pShc\_pTrkA, Dok}} \text{pDok} + \text{pShc\_pTrkA}$	
41	R42	R42	$\text{Dok} + \text{Grb2\_SOS\_pShc\_pTrkA} \xrightarrow{\text{Grb2\_SOS\_pShc\_pTrkA, Dok}} \text{pDok} + \text{Grb2\_SOS\_pShc\_pTrkA}$	
42	R43	R43	$\text{Dok} + \text{FRS2\_pTrkA} \xrightarrow{\text{FRS2\_pTrkA, Dok}} \text{pDok} + \text{FRS2\_pTrkA}$	
43	R44	R44	$\text{Dok} + \text{pFRS2\_pTrkA} \xrightarrow{\text{pFRS2\_pTrkA, Dok}} \text{pDok} + \text{pFRS2\_pTrkA}$	
44	R45	R45	$\text{Dok} + \text{Crk\_C3G\_pFRS2\_pTrkA} \xrightarrow{\text{Crk\_C3G\_pFRS2\_pTrkA, Dok}} \text{pDok} + \text{Crk\_C3G\_pFRS2\_pTrkA}$	
45	R46	R46	$\text{Grb2} + \text{SOS} \xrightarrow{\text{Grb2, SOS, Grb2\_SOS}} \text{Grb2\_SOS}$	
46	R47	R47	$\text{Grb2} + \text{pSOS} \xrightarrow{\text{Grb2, pSOS, Grb2\_pSOS}} \text{Grb2\_pSOS}$	
47	R48	R48	$\text{Grb2\_SOS} + \text{pShc} \xrightarrow{\text{Grb2\_SOS, pShc, Grb2\_SOS\_pShc}} \text{Grb2\_SOS\_pShc}$	
48	R49	R49	$\text{pShc\_pTrkA} + \text{Grb2\_SOS} \xrightarrow{\text{Grb2\_SOS, pShc\_pTrkA, Grb2\_SOS\_pShc\_pTrkA}} \text{Grb2\_SO}$	

Nº	Id	Name	Reaction Equation	SBO
49	R50	R50	$\text{pShc\_pTrkA\_endo} + \text{Grb2\_SOS} \xrightarrow{\text{Grb2\_SOS, pShc\_pTrkA\_endo, Grb2\_SOS\_pShc\_pTrkA\_endo}} \text{Grb2\_SOS\_pShc\_pTrkA\_endo}$	
50	R51	R51	$\text{pShc} \xrightarrow{\text{pShc}} \text{Shc}$	
51	R52	R52	$\text{Grb2\_SOS\_pShc} \xrightarrow{\text{Grb2\_SOS\_pShc}} \text{Shc} + \text{Grb2\_SOS}$	
52	R53	R53	$\text{pSOS} \xrightarrow{\text{pSOS}} \text{SOS}$	
53	R54	R54	$\text{Grb2\_pSOS} \xrightarrow{\text{Grb2\_pSOS}} \text{Grb2\_SOS}$	
54	R55	R55	$\text{pDok} + \text{RasGAP} \xrightarrow{\text{pDok, RasGAP, pDok\_RasGAP}} \text{pDok\_RasGAP}$	
55	R56	R56	$\text{pDok} \xrightarrow{\text{pDok, Dok}} \text{Dok}$	
56	R57	R57	$\text{Ras\_GTP} \xrightarrow{\text{Ras\_GTP}} \text{Ras\_GDP}$	
57	R58	R58	$\text{Ras\_GDP} + \text{Grb2\_SOS\_pShc\_pTrkA} \xrightarrow{\text{Grb2\_SOS\_pShc\_pTrkA, Ras\_GDP}} \text{Ras\_GTP} + \text{Grb2\_SOS\_pShc\_pTrkA}$	
58	R59	R59	$\text{SOS} + \text{dppERKcyt} \xrightarrow{\text{dppERKcyt, SOS}} \text{pSOS} + \text{dppERKcyt}$	
59	R60	R60	$\text{Grb2\_SOS\_pShc} + \text{dppERKcyt} \xrightarrow{\text{dppERKcyt, Grb2\_SOS\_pShc}} \text{Grb2\_pSOS} + \text{pShc} + \text{dppERKcyt}$	
60	R61	R61	$\text{Grb2\_SOS} + \text{dppERKcyt} \xrightarrow{\text{dppERKcyt, Grb2\_SOS}} \text{Grb2\_pSOS} + \text{dppERKcyt}$	
61	R62	R62	$\text{Ras\_GTP} + \text{pDok\_RasGAP} \xrightarrow{\text{pDok\_RasGAP, Ras\_GTP}} \text{Ras\_GDP} + \text{pDok\_RasGAP}$	
62	R63	R63	$\text{B\_Raf\_Ras\_GTP} + \text{pDok\_RasGAP} \xrightarrow{\text{pDok\_RasGAP, B\_Raf\_Ras\_GTP}} \text{Ras\_GDP} + \text{B\_Raf} + \text{pDok\_RasGAP}$	

Nº	Id	Name	Reaction Equation	SBO
63	R64	R64	$\text{c\_Raf\_Ras\_GTP} + \text{pDok\_RasGAP} \xrightarrow{\text{pDok\_RasGAP, c\_Raf\_Ras\_GTP}} \text{Ras\_GDP} + \text{c\_Raf} + \text{pDok\_RasGAP}$	
64	R65	R65	$\text{Crk} + \text{C3G} \xrightarrow{\text{C3G, Crk, Crk\_C3G}} \text{Crk\_C3G}$	
65	R66	R66	$\text{pFRS2\_pTrkA} + \text{Crk\_C3G} \xrightarrow{\text{Crk\_C3G, pFRS2\_pTrkA, Crk\_C3G\_pFRS2\_pTrkA}} \text{Crk\_C3G\_pFRS2\_pTrkA}$	
66	R67	R67	$\text{pFRS2\_pTrkA\_endo} + \text{Crk\_C3G} \xrightarrow{\text{Crk\_C3G, pFRS2\_pTrkA\_endo, Crk\_C3G\_pFRS2\_pTrkA\_endo}} \text{Crk\_C3G\_pFRS2\_pTrkA\_endo}$	
67	R68	R68	$\text{pFRS2} \xrightarrow{\text{pFRS2}} \text{FRS2}$	
68	R69	R69	$\text{Rap1\_GTP} \xrightarrow{\text{Rap1\_GTP}} \text{Rap1\_GDP}$	
69	R70	R70	$\text{Rap1\_GDP} + \text{Crk\_C3G\_pFRS2\_pTrkA\_endo} \xrightarrow{\text{Crk\_C3G\_pFRS2\_pTrkA\_endo, Rap1\_GDP}} \text{Crk\_C3G\_pFRS2\_pTrkA\_endo}$	
70	R71	R71	$\text{Rap1\_GTP} \xrightarrow{\text{Rap1\_GTP}} \text{Rap1\_GDP}$	
71	R72	R72	$\text{B\_Raf\_Rap1\_GTP} \xrightarrow{\text{B\_Raf\_Rap1\_GTP}} \text{B\_Raf} + \text{Rap1\_GDP}$	
72	R73	R73	$\text{Ras\_GTP} + \text{c\_Raf} \xrightarrow{\text{c\_Raf, Ras\_GTP, c\_Raf\_Ras\_GTP}} \text{c\_Raf\_Ras\_GTP}$	
73	R74	R74	$\text{Ras\_GTP} + \text{B\_Raf} \xrightarrow{\text{B\_Raf, Ras\_GTP, B\_Raf\_Ras\_GTP}} \text{B\_Raf\_Ras\_GTP}$	
74	R75	R75	$\text{B\_Raf} + \text{Rap1\_GTP} \xrightarrow{\text{B\_Raf, Rap1\_GTP, B\_Raf\_Rap1\_GTP}} \text{B\_Raf\_Rap1\_GTP}$	
75	R76	R76	$\text{ppMEKcyt\_ERKcyt} \xrightarrow{\text{ppMEKcyt\_ERKcyt}} \text{ppMEKcyt} + \text{ppERKcyt}$	
76	R77	R77	$2 \text{ ppERKcyt} \xrightarrow{\text{ppERKcyt, dppERKcyt}} \text{dppERKcyt}$	
77	R78	R78	$\text{MEKcyt} + \text{ERKcyt} \xrightarrow{\text{MEKcyt, ERKcyt, MEKcyt\_ERKcyt}} \text{MEKcyt\_ERKcyt}$	
78	R79	R79	$\text{ERKcyt} + \text{pMEKcyt} \xrightarrow{\text{pMEKcyt, ERKcyt, pMEKcyt\_ERKcyt}} \text{pMEKcyt\_ERKcyt}$	

Nº	Id	Name	Reaction Equation	SBO
79	R80	R80	$\text{ppMEKcyt} + \text{ERKcyt} \xrightarrow{\text{ppMEKcyt, ERKcyt, ppMEKcyt\_ERKcyt}} \text{ppMEKcyt\_ERKcyt}$	
80	R81	R81	$\text{MEKcyt} + \text{c\_Raf\_Ras\_GTP} \xrightarrow{\text{c\_Raf\_Ras\_GTP, MEKcyt}} \text{pMEKcyt} + \text{c\_Raf\_Ras\_GTP}$	
81	R82	R82	$\text{pMEKcyt} + \text{c\_Raf\_Ras\_GTP} \xrightarrow{\text{c\_Raf\_Ras\_GTP, pMEKcyt}} \text{ppMEKcyt} + \text{c\_Raf\_Ras\_GTP}$	
82	R83	R83	$\text{MEKcyt\_ERKcyt} + \text{c\_Raf\_Ras\_GTP} \xrightarrow{\text{c\_Raf\_Ras\_GTP, MEKcyt\_ERKcyt}} \text{pMEKcyt\_ERKcyt} + \text{c\_Raf\_Ras\_GTP}$	
83	R84	R84	$\text{pMEKcyt\_ERKcyt} + \text{c\_Raf\_Ras\_GTP} \xrightarrow{\text{c\_Raf\_Ras\_GTP, pMEKcyt\_ERKcyt}} \text{ppMEKcyt\_ERKcyt} + \text{c\_Raf\_Ras\_GTP}$	
84	R85	R85	$\text{MEKcyt} + \text{B\_Raf\_Ras\_GTP} \xrightarrow{\text{B\_Raf\_Ras\_GTP, MEKcyt}} \text{pMEKcyt} + \text{B\_Raf\_Ras\_GTP}$	
85	R86	R86	$\text{pMEKcyt} + \text{B\_Raf\_Ras\_GTP} \xrightarrow{\text{B\_Raf\_Ras\_GTP, pMEKcyt}} \text{ppMEKcyt} + \text{B\_Raf\_Ras\_GTP}$	
86	R87	R87	$\text{MEKcyt\_ERKcyt} + \text{B\_Raf\_Ras\_GTP} \xrightarrow{\text{B\_Raf\_Ras\_GTP, MEKcyt\_ERKcyt}} \text{pMEKcyt\_ERKcyt} + \text{B\_Raf\_Ras\_GTP}$	
87	R88	R88	$\text{pMEKcyt\_ERKcyt} + \text{B\_Raf\_Ras\_GTP} \xrightarrow{\text{B\_Raf\_Ras\_GTP, pMEKcyt\_ERKcyt}} \text{ppMEKcyt\_ERKcyt} + \text{B\_Raf\_Ras\_GTP}$	
88	R89	R89	$\text{MEKcyt} + \text{B\_Raf\_Rap1\_GTP} \xrightarrow{\text{B\_Raf\_Rap1\_GTP, MEKcyt}} \text{pMEKcyt} + \text{B\_Raf\_Rap1\_GTP}$	

Nº	Id	Name	Reaction Equation	SBO
89	R90	R90	$\text{pMEKcyt} + \text{B\_Raf\_Rap1\_GTP} \xrightarrow{\text{B\_Raf\_Rap1\_GTP, pMEKcyt}} \text{ppMEKcyt} + \text{B\_Raf\_Rap1\_GTP}$	
90	R91	R91	$\text{MEKcyt\_ERKcyt} + \text{B\_Raf\_Rap1\_GTP} \xrightarrow{\text{B\_Raf\_Rap1\_GTP, MEKcyt\_ERKcyt}} \text{pMEKcyt\_ERKcyt} + \text{B\_Raf\_Rap1\_GTP}$	
91	R92	R92	$\text{pMEKcyt\_ERKcyt} + \text{B\_Raf\_Rap1\_GTP} \xrightarrow{\text{B\_Raf\_Rap1\_GTP, pMEKcyt\_ERKcyt}} \text{ppMEKcyt\_ERKcyt} + \text{B\_Raf\_Rap1\_GTP}$	
92	R93	R93	$\text{pMEKcyt} \xrightarrow{\text{pMEKcyt}} \text{MEKcyt}$	
93	R94	R94	$\text{ppMEKcyt} \xrightarrow{\text{ppMEKcyt}} \text{pMEKcyt}$	
94	R95	R95	$\text{pMEKcyt\_ERKcyt} \xrightarrow{\text{pMEKcyt\_ERKcyt}} \text{MEKcyt\_ERKcyt}$	
95	R96	R96	$\text{ppMEKcyt\_ERKcyt} \xrightarrow{\text{ppMEKcyt\_ERKcyt}} \text{pMEKcyt\_ERKcyt}$	
96	R97	R97	$\text{ppERKcyt} \xrightarrow{\text{ppERKcyt}} \text{ERKcyt}$	
97	R98	R98	$\text{dppERKcyt} \xrightarrow{\text{dppERKcyt}} \text{ppERKcyt} + \text{ERKcyt}$	
98	R99	R99	$\text{ppMEKnuc\_ERKnuc} \xrightarrow{\text{ppMEKnuc\_ERKnuc}} \text{ppMEKnuc} + \text{ppERKnuc}$	
99	R100	R100	$2 \text{ ppERKnuc} \xrightarrow{\text{ppERKnuc, dppERKnuc}} \text{dppERKnuc}$	
100	R101	R101	$\text{MEKnuc} + \text{ERKnuc} \xrightarrow{\text{MEKnuc, ERKnuc, MEKnuc\_ERKnuc}} \text{MEKnuc\_ERKnuc}$	
101	R102	R102	$\text{ERKnuc} + \text{pMEKnuc} \xrightarrow{\text{pMEKnuc, ERKnuc, pMEKnuc\_ERKnuc}} \text{pMEKnuc\_ERKnuc}$	
102	R103	R103	$\text{ppMEKnuc} + \text{ERKnuc} \xrightarrow{\text{ppMEKnuc, ERKnuc, ppMEKnuc\_ERKnuc}} \text{ppMEKnuc\_ERKnuc}$	
103	R104	R104	$\text{pMEKnuc} \xrightarrow{\text{pMEKnuc}} \text{MEKnuc}$	

Nº	Id	Name	Reaction Equation	SBO
104	R105	R105	$\text{ppMEKnuc} \xrightarrow{\text{ppMEKnuc}} \text{pMEKnuc}$	
105	R106	R106	$\text{pMEKnuc\_ERKnuc} \xrightarrow{\text{pMEKnuc\_ERKnuc}} \text{MEKnuc\_ERKnuc}$	
106	R107	R107	$\text{ppMEKnuc\_ERKnuc} \xrightarrow{\text{ppMEKnuc\_ERKnuc}} \text{pMEKnuc\_ERKnuc}$	
107	R108	R108	$\text{ppERKnuc} \xrightarrow{\text{ppERKnuc}} \text{ERKnuc}$	
108	R109	R109	$\text{dppERKnuc} \xrightarrow{\text{dppERKnuc}} \text{ppERKnuc} + \text{ERKnuc}$	
109	R110	R110	$\text{pMEKcyt} \xrightarrow{\text{pMEKcyt}} \emptyset$	
110	R111	R111	$\text{pMEKcyt} \xrightarrow{\text{pMEKcyt}} \text{pMEKnuc} + \text{pMEKcyt}$	
111	R112	R112	$\text{pMEKnuc} \xrightarrow{\text{pMEKnuc}} \text{pMEKcyt} + \text{pMEKnuc}$	
112	R113	R113	$\text{pMEKnuc} \xrightarrow{\text{pMEKnuc}} \emptyset$	
113	R114	R114	$\text{MEKcyt\_ERKcyt} \xrightarrow{\text{MEKcyt\_ERKcyt}} \emptyset$	
114	R115	R115	$\text{MEKcyt\_ERKcyt} \xrightarrow{\text{MEKcyt\_ERKcyt}} \text{MEKnuc\_ERKnuc} + \text{MEKcyt\_ERKcyt}$	
115	R116	R116	$\text{MEKnuc\_ERKnuc} \xrightarrow{\text{MEKnuc\_ERKnuc}} \text{MEKcyt\_ERKcyt} + \text{MEKnuc\_ERKnuc}$	
116	R117	R117	$\text{MEKnuc\_ERKnuc} \xrightarrow{\text{MEKnuc\_ERKnuc}} \emptyset$	
117	R118	R118	$\text{ERKcyt} \xrightarrow{\text{ERKcyt}} \emptyset$	
118	R119	R119	$\text{ERKcyt} \xrightarrow{\text{ERKcyt}} \text{ERKnuc} + \text{ERKcyt}$	
119	R120	R120	$\text{ERKnuc} \xrightarrow{\text{ERKnuc}} \text{ERKcyt} + \text{ERKnuc}$	
120	R121	R121	$\text{ERKnuc} \xrightarrow{\text{ERKnuc}} \emptyset$	
121	R122	R122	$\text{MEKcyt} \xrightarrow{\text{MEKcyt}} \emptyset$	

Nº	Id	Name	Reaction Equation	SBO
122	R123	R123	$\text{MEKcyt} \xrightarrow{\text{MEKcyt}} \text{MEKnuc} + \text{MEKcyt}$	
123	R124	R124	$\text{MEKnuc} \xrightarrow{\text{MEKnuc}} \text{MEKcyt} + \text{MEKnuc}$	
124	R125	R125	$\text{MEKnuc} \xrightarrow{\text{MEKnuc}} \emptyset$	
125	R126	R126	$\text{ppERKcyt} \xrightarrow{\text{ppERKcyt}} \emptyset$	
126	R127	R127	$\text{ppERKcyt} \xrightarrow{\text{ppERKcyt}} \text{ppERKnuc} + \text{ppERKcyt}$	
127	R128	R128	$\text{ppERKnuc} \xrightarrow{\text{ppERKnuc}} \text{ppERKcyt} + \text{ppERKnuc}$	
128	R129	R129	$\text{ppERKnuc} \xrightarrow{\text{ppERKnuc}} \emptyset$	
129	R130	R130	$\text{ppMEKcyt} \xrightarrow{\text{ppMEKcyt}} \emptyset$	
130	R131	R131	$\text{ppMEKcyt} \xrightarrow{\text{ppMEKcyt}} \text{ppMEKnuc} + \text{ppMEKcyt}$	
131	R132	R132	$\text{ppMEKnuc} \xrightarrow{\text{ppMEKnuc}} \text{ppMEKcyt} + \text{ppMEKnuc}$	
132	R133	R133	$\text{ppMEKnuc} \xrightarrow{\text{ppMEKnuc}} \emptyset$	
133	R134	R134	$\text{ppMEKcyt\_ERKcyt} \xrightarrow{\text{ppMEKcyt\_ERKcyt}} \emptyset$	
134	R135	R135	$\text{ppMEKcyt\_ERKcyt} \xrightarrow{\text{ppMEKcyt\_ERKcyt}} \text{ppMEKnuc\_ERKnuc} + \text{ppMEKcyt\_ERKcyt}$	
135	R136	R136	$\text{ppMEKnuc\_ERKnuc} \xrightarrow{\text{ppMEKnuc\_ERKnuc}} \text{ppMEKcyt\_ERKcyt} + \text{ppMEKnuc\_ERKnuc}$	
136	R137	R137	$\text{ppMEKnuc\_ERKnuc} \xrightarrow{\text{ppMEKnuc\_ERKnuc}} \emptyset$	
137	R138	R138	$\text{dppERKcyt} \xrightarrow{\text{dppERKcyt}} \emptyset$	
138	R139	R139	$\text{dppERKcyt} \xrightarrow{\text{dppERKcyt}} \text{dppERKnuc} + \text{dppERKcyt}$	
139	R140	R140	$\text{dppERKnuc} \xrightarrow{\text{dppERKnuc}} \text{dppERKcyt} + \text{dppERKnuc}$	

Nº	Id	Name	Reaction Equation	SBO
140	R141	R141	$\text{dppERKnuc} \xrightarrow{\text{dppERKnuc}} \emptyset$	
141	R142	R142	$\text{pMEKcyt\_ERKcyt} \xrightarrow{\text{pMEKcyt\_ERKcyt}} \emptyset$	
142	R143	R143	$\text{pMEKcyt\_ERKcyt} \xrightarrow{\text{pMEKcyt\_ERKcyt}} \text{pMEKnuc\_ERKnuc} + \text{pMEKcyt\_ERKcyt}$	
143	R144	R144	$\text{pMEKnuc\_ERKnuc} \xrightarrow{\text{pMEKnuc\_ERKnuc}} \text{pMEKcyt\_ERKcyt} + \text{pMEKnuc\_ERKnuc}$	
144	R145	R145	$\text{pMEKnuc\_ERKnuc} \xrightarrow{\text{pMEKnuc\_ERKnuc}} \emptyset$	
145	mwe8ee00ff- _3d59- _44d5_8d7f- _a2074823f29d	reaction_1	$\text{mw4478fbeb\_51b1\_4764\_92ad\_a86d314ae0eb} \xrightarrow{\text{mw4478fbeb\_51b1\_4764\_92ad\_a86d314ae0eb}}$	
146	mw711542fd- _b235- _40f7_9782- _f78eb654d773	reaction_2	$\text{mw29fa4e00\_a430\_4f11\_b62e\_1bcbc0a767a0} \xrightarrow{\text{mw29fa4e00\_a430\_4f11\_b62e\_1bcbc0a767a0}}$	
147	mwc7ff2b7b- _e2c9- _4420_87bc- _f285d98de30b	reaction_3	$\text{mwe979ec8f\_a55c\_470c\_a554\_9fa8013eab74} + \text{mw29fa4e00\_a430\_4f11\_b62e\_1bcbc0a767a0} \xrightarrow{\text{mwe979ec8f\_a55c\_470c\_a554\_9fa8013eab74}}$	
148	mw02775189- _5c04- _4c2f_a5f4- _2f15723e1ece	reaction_4	$\text{mw29fa4e00\_a430\_4f11\_b62e\_1bcbc0a767a0} + \text{mwe599c4c1\_2d8e\_446c\_bf3f\_4c97baced8a9} \xrightarrow{\text{mw29fa4e00\_a430\_4f11\_b62e\_1bcbc0a767a0}}$	



Nº	Id	Name	Reaction Equation	SBO
149	mwfb02ea2a- _1f06- _4f8f_80a0- _721149f213ff	reaction_5	mwe599c4c1_2d8e_446c_bf3f_4c97baced8a9	<u>mwe599c4c1_2d8e_446c_bf3f_4c97baced8a9</u>
150	mw12b652db- _d0da- _4723_b160- _001fa36f9190	reaction_6	mw89ebbe2d_1ec2_457a_9367_6c5e86a1a924	<u>mw89ebbe2d_1ec2_457a_9367_6c5e86a1a924</u>
151	mwffc6fab3- _9f90- _4da4_bf71- _214b9b723899	reaction_7	mw89ebbe2d_1ec2_457a_9367_6c5e86a1a924	<u>mw89ebbe2d_1ec2_457a_9367_6c5e86a1a924</u>
152	mwf371eb20- _7bda- _4140_9a43- _dfad70900057	reaction_8	mw6782adfa_29ee_41a8_acbb_4c86c6c81596	<u>mw6782adfa_29ee_41a8_acbb_4c86c6c81596</u>
153	mw8105f0dc- _19ad- _4f7a_80df- _3f84de216c42	Intercomp mass transfer	NGFR	<u>NGFR, mwe979ec8f_a55c_470c_a554_9fa8013eab74</u> mwe979ec8f_a55c_470c_a554_9fa8013eab74
154	mw9da48a51- _bbd0- _4395_9883- _8441d8153b00	reaction_9	L_NGFR + mwd4cc05d6_6e19_4e2e_b540_45954f2df4f0	<u>L_NGFR, mwd4cc05d6_6e19_4e2e_b540_45954f2df4f0</u>

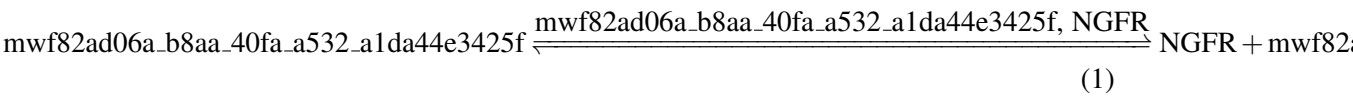
Nº	Id	Name	Reaction Equation	SBO
155	mwc467edb6- _a255- _45d6_8014- _33bd0209b36f	reaction_10	$\text{mwd4cc05d6\_6e19\_4e2e\_b540\_45954f2df4f0} + \text{mwd4cc05d6\_6e19\_4e2e\_b540\_45954f2df4f0, NGFR, mw5afa8250\_0cf0\_40a2}$ $\text{NGFR} \xrightarrow{\hspace{1cm}}$	
156	mwe4f77287- _e0fe- _47f7_a74e- _312151e578a4	reaction_14	$\text{mw5afa8250\_0cf0\_40a2\_a97a\_f7cf20a9cfbd} \xrightarrow{\text{mw5afa8250\_0cf0\_40a2\_a97a\_f7cf20a9cfbd}}$	
157	mw4f0ee780- _12f5- _436d_a227- _c5e7cd420259	reaction_15	$\text{mwe009ad7f\_90fd\_4186\_8855\_77780724ddb8} \xrightarrow{\text{mwe009ad7f\_90fd\_4186\_8855\_77780724ddb8}}$	

6.1 Reaction R1

This is a fast reversible reaction of one reactant forming two products influenced by two modifiers.

Name R1

Reaction equation



Reactant

Table 6: Properties of each reactant.

Id	Name	SBO
mwf82ad06a_b8aa_40fa_a532_a1da44e3425f	pro_TrkA	

Modifiers

Table 7: Properties of each modifier.

Id	Name	SBO
mwf82ad06a_b8aa_40fa_a532_a1da44e3425f	pro_TrkA	
NGFR	NGFR	

Products

Table 8: Properties of each product.

Id	Name	SBO
NGFR	NGFR	
mwf82ad06a_b8aa_40fa_a532_a1da44e3425f	pro_TrkA	

Kinetic Law

Derived unit  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_1 = k_{f_1} \cdot [\text{mwf82ad06a_b8aa_40fa_a532_a1da44e3425f}] - k_{b_1} \cdot [\text{NGFR}]$$

(2)

## 6.2 Reaction R3

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

**Name** R3

### Reaction equation



### Reactant

Table 9: Properties of each reactant.

Id	Name	SBO
L\_NGFR	L\_NGFR	

### Modifier

Table 10: Properties of each modifier.

Id	Name	SBO
L\_NGFR	L\_NGFR	

### Product

Table 11: Properties of each product.

Id	Name	SBO
pTrkA	pTrkA	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_2 = \text{kf\_3} \cdot [\text{L\_NGFR}] \quad (4)$$

## 6.3 Reaction R4

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

**Name** R4

### Reaction equation



### Reactant

Table 12: Properties of each reactant.

Id	Name	SBO
pTrkA	pTrkA	

### Modifier

Table 13: Properties of each modifier.

Id	Name	SBO
pTrkA	pTrkA	

### Product

Table 14: Properties of each product.

Id	Name	SBO
pTrkA_endo	pTrkA_endo	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_3 = \text{kf\_4} \cdot [\text{pTrkA}] \quad (6)$$

## 6.4 Reaction R5

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

**Name** R5

### Reaction equation



## Reactant

Table 15: Properties of each reactant.

Id	Name	SBO
Shc_pTrkA	Shc_pTrkA	

## Modifier

Table 16: Properties of each modifier.

Id	Name	SBO
Shc_pTrkA	Shc_pTrkA	

## Product

Table 17: Properties of each product.

Id	Name	SBO
Shc_pTrkA_endo	Shc_pTrkA_endo	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_4 = \text{kf\_5} \cdot [\text{Shc\_pTrkA}] \quad (8)$$

## 6.5 Reaction R6

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

**Name** R6

### Reaction equation



## Reactant

Table 18: Properties of each reactant.

Id	Name	SBO
pShc_pTrkA	pShc_pTrkA	

## Modifier

Table 19: Properties of each modifier.

Id	Name	SBO
pShc_pTrkA	pShc_pTrkA	

## Product

Table 20: Properties of each product.

Id	Name	SBO
pShc_pTrkA_endo	pShc_pTrkA_endo	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_5 = k_{f\_6} \cdot [\text{pShc\_pTrkA}] \quad (10)$$

## 6.6 Reaction R7

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

**Name** R7

### Reaction equation



## Reactant

Table 21: Properties of each reactant.

Id	Name	SBO
Grb2_SOS_pShc_pTrkA	Grb2_SOS_pShc_pTrkA	

### Modifier

Table 22: Properties of each modifier.

Id	Name	SBO
Grb2_SOS_pShc_pTrkA	Grb2_SOS_pShc_pTrkA	

### Product

Table 23: Properties of each product.

Id	Name	SBO
Grb2_SOS_pShc_pTrkA_endo	Grb2_SOS_pShc_pTrkA_endo	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

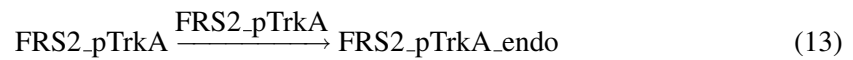
$$v_6 = \text{kf\_7} \cdot [\text{Grb2\_SOS\_pShc\_pTrkA}] \quad (12)$$

## 6.7 Reaction R8

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

**Name** R8

### Reaction equation



### Reactant



Table 24: Properties of each reactant.

Id	Name	SBO
FRS2_pTrkA	FRS2_pTrkA	

## Modifier

Table 25: Properties of each modifier.

Id	Name	SBO
FRS2_pTrkA	FRS2_pTrkA	

## Product

Table 26: Properties of each product.

Id	Name	SBO
FRS2_pTrkA_endo	FRS2_pTrkA_endo	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_7 = \text{kf\_8} \cdot [\text{FRS2\_pTrkA}] \quad (14)$$

## 6.8 Reaction R9

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

**Name** R9

## Reaction equation



## Reactant

Table 27: Properties of each reactant.

Id	Name	SBO
pFRS2_pTrkA	pFRS2_pTrkA	

## Modifier

Table 28: Properties of each modifier.

Id	Name	SBO
pFRS2_pTrkA	pFRS2_pTrkA	

## Product

Table 29: Properties of each product.

Id	Name	SBO
pFRS2_pTrkA_endo	pFRS2_pTrkA_endo	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

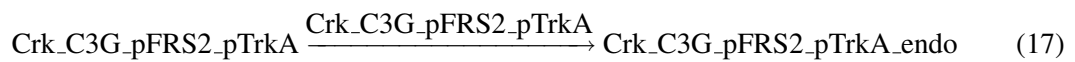
$$v_8 = \text{kf\_9} \cdot [\text{pFRS2\_pTrkA}] \quad (16)$$

## 6.9 Reaction R10

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

**Name** R10

### Reaction equation



## Reactant

Table 30: Properties of each reactant.

Id	Name	SBO
Crk_C3G_pFRS2_pTrkA	Crk_C3G_pFRS2_pTrkA	

### Modifier

Table 31: Properties of each modifier.

Id	Name	SBO
Crk_C3G_pFRS2_pTrkA	Crk_C3G_pFRS2_pTrkA	

### Product

Table 32: Properties of each product.

Id	Name	SBO
Crk_C3G_pFRS2_pTrkA_endo	Crk_C3G_pFRS2_pTrkA_endo	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_9 = k_{f\_10} \cdot [\text{Crk\_C3G\_pFRS2\_pTrkA}] \quad (18)$$

## 6.10 Reaction R11

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

**Name** R11

### Reaction equation



### Reactant

Table 33: Properties of each reactant.

Id	Name	SBO
pTrkA_endo	pTrkA_endo	

## Modifier

Table 34: Properties of each modifier.

Id	Name	SBO
pTrkA_endo	pTrkA_endo	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

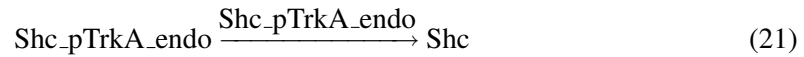
$$v_{10} = \text{kf\_11} \cdot [\text{pTrkA\_endo}] \quad (20)$$

## 6.11 Reaction R12

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

**Name** R12

## Reaction equation



## Reactant

Table 35: Properties of each reactant.

Id	Name	SBO
Shc_pTrkA_endo	Shc_pTrkA_endo	

## Modifier

Table 36: Properties of each modifier.

Id	Name	SBO
Shc_pTrkA_endo	Shc_pTrkA_endo	

## Product

Table 37: Properties of each product.

Id	Name	SBO
Shc	Shc	

**Kinetic Law****Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$ 

$$v_{11} = k_{f\_12} \cdot [\text{Shc\_pTrkA\_endo}] \quad (22)$$

**6.12 Reaction R13**

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

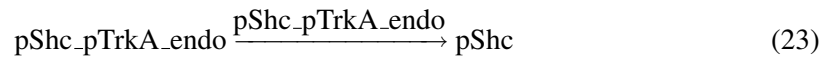
**Name** R13**Reaction equation****Reactant**

Table 38: Properties of each reactant.

Id	Name	SBO
pShc_pTrkA_endo	pShc_pTrkA_endo	

**Modifier**

Table 39: Properties of each modifier.

Id	Name	SBO
pShc_pTrkA_endo	pShc_pTrkA_endo	

**Product**

Table 40: Properties of each product.

Id	Name	SBO
pShc	pShc	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

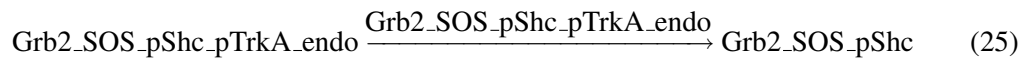
$$v_{12} = \text{kf\_13} \cdot [\text{pShc\_pTrkA\_endo}] \quad (24)$$

### 6.13 Reaction R14

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

**Name** R14

### Reaction equation



### Reactant

Table 41: Properties of each reactant.

Id	Name	SBO
Grb2_SOS_pShc_pTrkA_endo	Grb2_SOS_pShc_pTrkA_endo	

### Modifier

Table 42: Properties of each modifier.

Id	Name	SBO
Grb2_SOS_pShc_pTrkA_endo	Grb2_SOS_pShc_pTrkA_endo	

### Product

Table 43: Properties of each product.

Id	Name	SBO
Grb2_SOS_pShc	Grb2_SOS_pShc	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

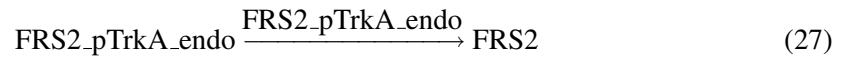
$$v_{13} = k_{f.14} \cdot [\text{Grb2\_SOS\_pShc\_pTrkA\_endo}] \quad (26)$$

### 6.14 Reaction R15

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

**Name** R15

### Reaction equation



### Reactant

Table 44: Properties of each reactant.

Id	Name	SBO
FRS2_pTrkA_endo	FRS2_pTrkA_endo	

### Modifier

Table 45: Properties of each modifier.

Id	Name	SBO
FRS2_pTrkA_endo	FRS2_pTrkA_endo	

### Product

Table 46: Properties of each product.

Id	Name	SBO
FRS2	FRS2	

**Kinetic Law****Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$ 

$$v_{14} = \text{kf\_15} \cdot [\text{FRS2\_pTrkA\_endo}] \quad (28)$$

**6.15 Reaction R16**

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

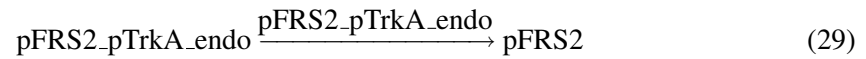
**Name** R16**Reaction equation****Reactant**

Table 47: Properties of each reactant.

Id	Name	SBO
pFRS2_pTrkA_endo	pFRS2_pTrkA_endo	

**Modifier**

Table 48: Properties of each modifier.

Id	Name	SBO
pFRS2_pTrkA_endo	pFRS2_pTrkA_endo	

**Product**



Table 49: Properties of each product.

Id	Name	SBO
pFRS2	pFRS2	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{15} = \text{kf\_16} \cdot [\text{pFRS2\_pTrkA\_endo}] \quad (30)$$

## 6.16 Reaction R17

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

**Name** R17

### Reaction equation



### Reactant

Table 50: Properties of each reactant.

Id	Name	SBO
Crk_C3G_pFRS2_pTrkA_endo	Crk_C3G_pFRS2_pTrkA_endo	

### Modifier

Table 51: Properties of each modifier.

Id	Name	SBO
Crk_C3G_pFRS2_pTrkA_endo	Crk_C3G_pFRS2_pTrkA_endo	

### Products

Table 52: Properties of each product.

Id	Name	SBO
Crk_C3G	Crk_C3G	
pFRS2	pFRS2	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{mol} \cdot \text{m}^{-3}$

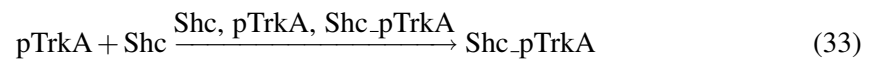
$$v_{16} = \text{kf\_17} \cdot [\text{Crk\_C3G\_pFRS2\_pTrkA\_endo}] \quad (32)$$

### 6.17 Reaction R18

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

**Name** R18

### Reaction equation



### Reactants

Table 53: Properties of each reactant.

Id	Name	SBO
pTrkA	pTrkA	
Shc	Shc	

### Modifiers

Table 54: Properties of each modifier.

Id	Name	SBO
Shc	Shc	
pTrkA	pTrkA	
Shc_pTrkA	Shc_pTrkA	

### Product

Table 55: Properties of each product.

Id	Name	SBO
Shc_pTrkA	Shc_pTrkA	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{17} = \text{mwdfa3719d\_20cc\_4f14\_b45e\_3f097c3aff65} \cdot [\text{Shc}] \cdot [\text{pTrkA}] - \text{kb\_18} \cdot [\text{Shc\_pTrkA}] \quad (34)$$

### 6.18 Reaction R19

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

**Name** R19

### Reaction equation



### Reactants

Table 56: Properties of each reactant.

Id	Name	SBO
pTrkA	pTrkA	
pShc	pShc	

### Modifiers

Table 57: Properties of each modifier.

Id	Name	SBO
pShc	pShc	
pTrkA	pTrkA	
pShc_pTrkA	pShc_pTrkA	

### Product

Table 58: Properties of each product.

Id	Name	SBO
pShc_pTrkA	pShc_pTrkA	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

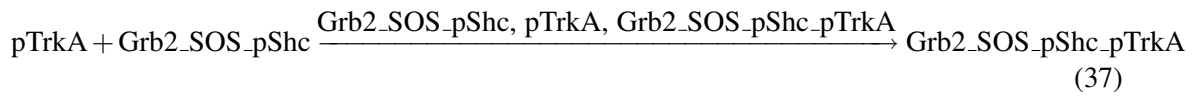
$$v_{18} = k_{f\_19} \cdot [\text{pShc}] \cdot [\text{pTrkA}] - k_{b\_19} \cdot [\text{pShc\_pTrkA}] \quad (36)$$

### 6.19 Reaction R20

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

**Name** R20

### Reaction equation



### Reactants

Table 59: Properties of each reactant.

Id	Name	SBO
pTrkA	pTrkA	
Grb2_SOS_pShc	Grb2_SOS_pShc	

### Modifiers

Table 60: Properties of each modifier.

Id	Name	SBO
Grb2_SOS_pShc	Grb2_SOS_pShc	
pTrkA	pTrkA	
Grb2_SOS_pShc_pTrkA	Grb2_SOS_pShc_pTrkA	

### Product

Table 61: Properties of each product.

Id	Name	SBO
Grb2_SOS_pShc_pTrkA	Grb2_SOS_pShc_pTrkA	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

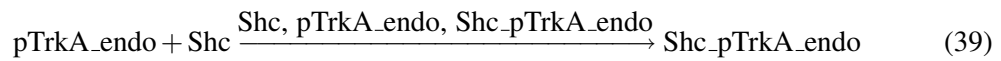
$$v_{19} = k_{f\_20} \cdot [\text{Grb2\_SOS\_pShc}] \cdot [\text{pTrkA}] - k_{b\_20} \cdot [\text{Grb2\_SOS\_pShc\_pTrkA}] \quad (38)$$

### 6.20 Reaction R21

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

**Name** R21

### Reaction equation



### Reactants

Table 62: Properties of each reactant.

Id	Name	SBO
pTrkA_endo Shc	pTrkA_endo Shc	

### Modifiers

Table 63: Properties of each modifier.

Id	Name	SBO
Shc pTrkA_endo Shc_pTrkA_endo	Shc pTrkA_endo Shc_pTrkA_endo	

### Product

Table 64: Properties of each product.

Id	Name	SBO
Shc_pTrkA_endo	Shc_pTrkA_endo	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

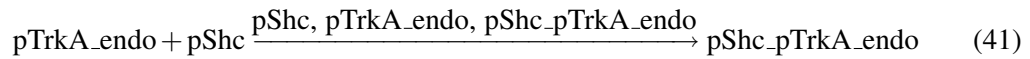
$$v_{20} = k_{f\_21} \cdot [\text{Shc}] \cdot [\text{pTrkA\_endo}] - k_{b\_21} \cdot [\text{Shc\_pTrkA\_endo}] \quad (40)$$

### 6.21 Reaction R22

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

**Name** R22

### Reaction equation



### Reactants

Table 65: Properties of each reactant.

Id	Name	SBO
pTrkA_endo	pTrkA_endo	
pShc	pShc	

### Modifiers

Table 66: Properties of each modifier.

Id	Name	SBO
pShc	pShc	
pTrkA_endo	pTrkA_endo	
pShc_pTrkA_endo	pShc_pTrkA_endo	

### Product

Table 67: Properties of each product.

Id	Name	SBO
pShc_pTrkA_endo	pShc_pTrkA_endo	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

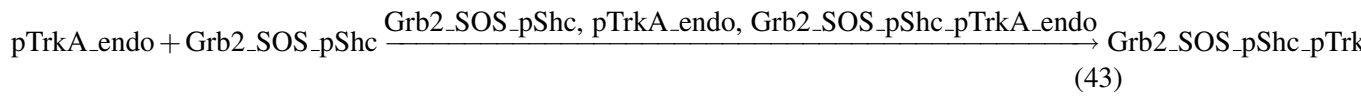
$$v_{21} = k_{f\_22} \cdot [\text{pShc}] \cdot [\text{pTrkA\_endo}] - k_{b\_22} \cdot [\text{pShc\_pTrkA\_endo}] \quad (42)$$

### 6.22 Reaction R23

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

**Name** R23

### Reaction equation



### Reactants

Table 68: Properties of each reactant.

Id	Name	SBO
pTrkA_endo	pTrkA_endo	
Grb2_SOS_pShc	Grb2_SOS_pShc	

### Modifiers

Table 69: Properties of each modifier.

Id	Name	SBO
Grb2_SOS_pShc	Grb2_SOS_pShc	
pTrkA_endo	pTrkA_endo	
Grb2_SOS_pShc_pTrkA_endo	Grb2_SOS_pShc_pTrkA_endo	

### Product

Table 70: Properties of each product.

Id	Name	SBO
Grb2_SOS_pShc_pTrkA_endo	Grb2_SOS_pShc_pTrkA_endo	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

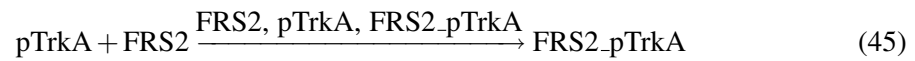
$$v_{22} = k_{f\_23} \cdot [\text{Grb2\_SOS\_pShc}] \cdot [\text{pTrkA\_endo}] - k_{b\_23} \cdot [\text{Grb2\_SOS\_pShc\_pTrkA\_endo}] \quad (44)$$

### 6.23 Reaction R24

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

**Name** R24

### Reaction equation



### Reactants

Table 71: Properties of each reactant.

Id	Name	SBO
pTrkA	pTrkA	
FRS2	FRS2	

### Modifiers

Table 72: Properties of each modifier.

Id	Name	SBO
FRS2	FRS2	
pTrkA	pTrkA	
FRS2_pTrkA	FRS2_pTrkA	

### Product



Table 73: Properties of each product.

Id	Name	SBO
FRS2_pTrkA	FRS2_pTrkA	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

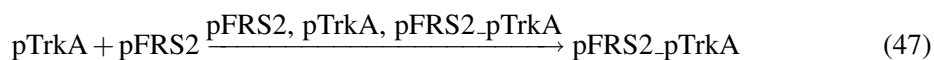
$$v_{23} = k_{f\_24} \cdot [\text{FRS2}] \cdot [\text{pTrkA}] - k_{b\_24} \cdot [\text{FRS2\_pTrkA}] \quad (46)$$

### 6.24 Reaction R25

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

**Name** R25

### Reaction equation



### Reactants

Table 74: Properties of each reactant.

Id	Name	SBO
pTrkA	pTrkA	
pFRS2	pFRS2	

### Modifiers

Table 75: Properties of each modifier.

Id	Name	SBO
pFRS2	pFRS2	
pTrkA	pTrkA	
pFRS2_pTrkA	pFRS2_pTrkA	

### Product

Table 76: Properties of each product.

Id	Name	SBO
pFRS2_pTrkA	pFRS2_pTrkA	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{24} = k_{f\_25} \cdot [\text{pFRS2}] \cdot [\text{pTrkA}] - k_{b\_25} \cdot [\text{pFRS2\_pTrkA}] \quad (48)$$

### 6.25 Reaction R26

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

**Name** R26

### Reaction equation



### Reactants

Table 77: Properties of each reactant.

Id	Name	SBO
pTrkA_endo	pTrkA_endo	
FRS2	FRS2	

### Modifiers

Table 78: Properties of each modifier.

Id	Name	SBO
FRS2	FRS2	
pTrkA_endo	pTrkA_endo	
FRS2_pTrkA_endo	FRS2_pTrkA_endo	

### Product

Table 79: Properties of each product.

Id	Name	SBO
FRS2_pTrkA_endo	FRS2_pTrkA_endo	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

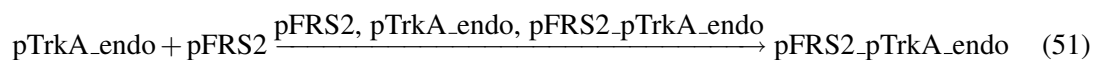
$$v_{25} = k_{f\_26} \cdot [\text{FRS2}] \cdot [\text{pTrkA\_endo}] - k_{b\_26} \cdot [\text{FRS2\_pTrkA\_endo}] \quad (50)$$

### 6.26 Reaction R27

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

**Name** R27

### Reaction equation



### Reactants

Table 80: Properties of each reactant.

Id	Name	SBO
pTrkA_endo	pTrkA_endo	
pFRS2	pFRS2	

### Modifiers

Table 81: Properties of each modifier.

Id	Name	SBO
pFRS2	pFRS2	
pTrkA_endo	pTrkA_endo	
pFRS2_pTrkA_endo	pFRS2_pTrkA_endo	

### Product

Table 82: Properties of each product.

Id	Name	SBO
pFRS2_pTrkA_endo	pFRS2_pTrkA_endo	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{26} = k_{f\_27} \cdot [\text{pFRS2}] \cdot [\text{pTrkA\_endo}] - k_{b\_27} \cdot [\text{pFRS2\_pTrkA\_endo}] \quad (52)$$

### 6.27 Reaction R28

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

**Name** R28

### Reaction equation



### Reactant

Table 83: Properties of each reactant.

Id	Name	SBO
Shc_pTrkA	Shc_pTrkA	

### Modifier

Table 84: Properties of each modifier.

Id	Name	SBO
Shc_pTrkA	Shc_pTrkA	

### Product

Table 85: Properties of each product.

Id	Name	SBO
pShc_pTrkA	pShc_pTrkA	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

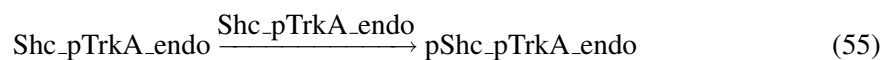
$$v_{27} = k_{f\_28} \cdot [\text{Shc\_pTrkA}] \quad (54)$$

## 6.28 Reaction R29

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

**Name** R29

### Reaction equation



### Reactant

Table 86: Properties of each reactant.

Id	Name	SBO
Shc_pTrkA_endo	Shc_pTrkA_endo	

### Modifier

Table 87: Properties of each modifier.

Id	Name	SBO
Shc_pTrkA_endo	Shc_pTrkA_endo	

### Product

Table 88: Properties of each product.

Id	Name	SBO
pShc_pTrkA_endo	pShc_pTrkA_endo	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

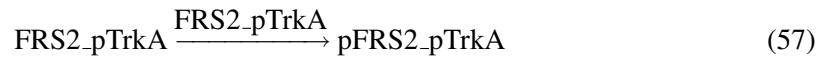
$$v_{28} = k_{f\_29} \cdot [\text{Shc\_pTrkA\_endo}] \quad (56)$$

### 6.29 Reaction R30

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

**Name** R30

### Reaction equation



### Reactant

Table 89: Properties of each reactant.

Id	Name	SBO
FRS2_pTrkA	FRS2_pTrkA	

### Modifier

Table 90: Properties of each modifier.

Id	Name	SBO
FRS2_pTrkA	FRS2_pTrkA	

### Product

Table 91: Properties of each product.

Id	Name	SBO
pFRS2_pTrkA	pFRS2_pTrkA	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

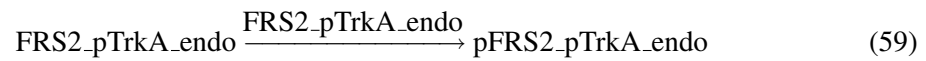
$$v_{29} = k_{f\_30} \cdot [\text{FRS2\_pTrkA}] \quad (58)$$

### 6.30 Reaction R31

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

**Name** R31

### Reaction equation



### Reactant

Table 92: Properties of each reactant.

Id	Name	SBO
FRS2_pTrkA_endo	FRS2_pTrkA_endo	

### Modifier

Table 93: Properties of each modifier.

Id	Name	SBO
FRS2_pTrkA_endo	FRS2_pTrkA_endo	

### Product

Table 94: Properties of each product.

Id	Name	SBO
pFRS2_pTrkA_endo	pFRS2_pTrkA_endo	

**Kinetic Law****Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$ 

$$v_{30} = \text{kf\_31} \cdot [\text{FRS2\_pTrkA\_endo}] \quad (60)$$

**6.31 Reaction R32**

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

**Name** R32**Reaction equation****Reactant**

Table 95: Properties of each reactant.

Id	Name	SBO
pTrkA	pTrkA	

**Modifier**

Table 96: Properties of each modifier.

Id	Name	SBO
pTrkA	pTrkA	

**Kinetic Law****Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$ 

$$v_{31} = \text{kf\_32} \cdot [\text{pTrkA}] \quad (62)$$

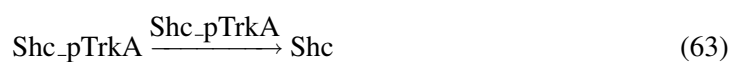


### 6.32 Reaction R33

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

**Name** R33

#### Reaction equation



#### Reactant

Table 97: Properties of each reactant.

Id	Name	SBO
Shc_pTrkA	Shc_pTrkA	

#### Modifier

Table 98: Properties of each modifier.

Id	Name	SBO
Shc_pTrkA	Shc_pTrkA	

#### Product

Table 99: Properties of each product.

Id	Name	SBO
Shc	Shc	

#### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

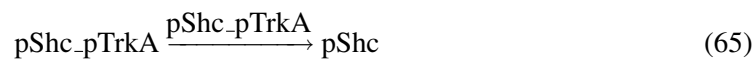
$$v_{32} = \text{kf\_33} \cdot [\text{Shc\_pTrkA}] \quad (64)$$

### 6.33 Reaction R34

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

**Name** R34

### Reaction equation



### Reactant

Table 100: Properties of each reactant.

Id	Name	SBO
pShc_pTrkA	pShc_pTrkA	

### Modifier

Table 101: Properties of each modifier.

Id	Name	SBO
pShc_pTrkA	pShc_pTrkA	

### Product

Table 102: Properties of each product.

Id	Name	SBO
pShc	pShc	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

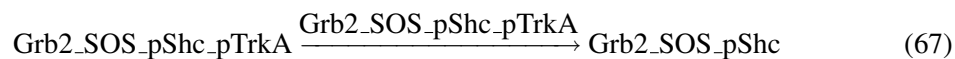
$$v_{33} = \text{kf\_34} \cdot [\text{pShc\_pTrkA}] \quad (66)$$

## 6.34 Reaction R35

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

**Name** R35

### Reaction equation



### Reactant

Table 103: Properties of each reactant.

Id	Name	SBO
Grb2_SOS_pShc_pTrkA	Grb2_SOS_pShc_pTrkA	

### Modifier

Table 104: Properties of each modifier.

Id	Name	SBO
Grb2_SOS_pShc_pTrkA	Grb2_SOS_pShc_pTrkA	

### Product

Table 105: Properties of each product.

Id	Name	SBO
Grb2_SOS_pShc	Grb2_SOS_pShc	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{34} = \text{kf\_35} \cdot [\text{Grb2\_SOS\_pShc\_pTrkA}] \quad (68)$$

## 6.35 Reaction R36

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

**Name** R36

### Reaction equation



Reactant

Table 106: Properties of each reactant.

Id	Name	SBO
FRS2_pTrkA	FRS2_pTrkA	

Modifier

Table 107: Properties of each modifier.

Id	Name	SBO
FRS2_pTrkA	FRS2_pTrkA	

Product

Table 108: Properties of each product.

Id	Name	SBO
FRS2	FRS2	

Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{35} = \text{kf\_36} \cdot [\text{FRS2\_pTrkA}] \tag{70}$$

6.36 Reaction R37

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

**Name** R37

Reaction equation



Reactant

Table 109: Properties of each reactant.

Id	Name	SBO
pFRS2_pTrkA	pFRS2_pTrkA	

## Modifier

Table 110: Properties of each modifier.

Id	Name	SBO
pFRS2_pTrkA	pFRS2_pTrkA	

## Product

Table 111: Properties of each product.

Id	Name	SBO
pFRS2	pFRS2	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

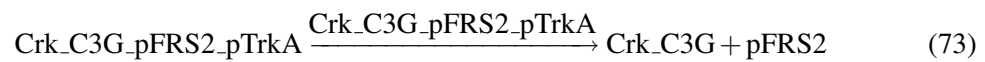
$$v_{36} = k_{f\_37} \cdot [\text{pFRS2\_pTrkA}] \quad (72)$$

## 6.37 Reaction R38

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

**Name** R38

## Reaction equation



## Reactant

Table 112: Properties of each reactant.

Id	Name	SBO
Crk_C3G_pFRS2_pTrkA	Crk_C3G_pFRS2_pTrkA	

## Modifier

Table 113: Properties of each modifier.

Id	Name	SBO
Crk_C3G_pFRS2_pTrkA	Crk_C3G_pFRS2_pTrkA	

## Products

Table 114: Properties of each product.

Id	Name	SBO
Crk_C3G pFRS2	Crk_C3G pFRS2	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

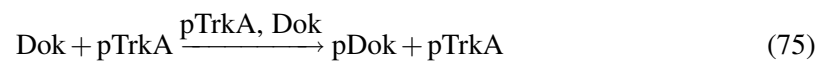
$$v_{37} = \text{kf\_38} \cdot [\text{Crk\_C3G\_pFRS2\_pTrkA}] \quad (74)$$

## 6.38 Reaction R39

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R39

## Reaction equation



## Reactants

Table 115: Properties of each reactant.

Id	Name	SBO
Dok	Dok	
pTrkA	pTrkA	

## Modifiers

Table 116: Properties of each modifier.

Id	Name	SBO
pTrkA	pTrkA	
Dok	Dok	

## Products

Table 117: Properties of each product.

Id	Name	SBO
pDok	pDok	
pTrkA	pTrkA	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

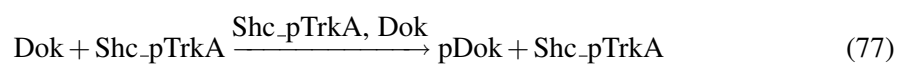
$$v_{38} = \frac{V_{\max\_39} \cdot [\text{pTrkA}] \cdot [\text{Dok}]}{K_{\text{m\_39}} + [\text{Dok}]} \quad (76)$$

### 6.39 Reaction R40

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R40

#### Reaction equation



## Reactants

Table 118: Properties of each reactant.

Id	Name	SBO
Dok	Dok	
Shc_pTrkA	Shc_pTrkA	

## Modifiers

Table 119: Properties of each modifier.

Id	Name	SBO
Shc_pTrkA	Shc_pTrkA	
Dok	Dok	

## Products

Table 120: Properties of each product.

Id	Name	SBO
pDok	pDok	
Shc_pTrkA	Shc_pTrkA	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

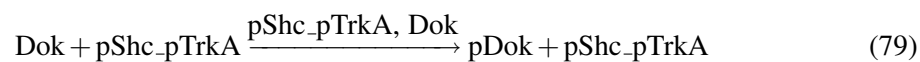
$$v_{39} = \frac{V_{\max\_40} \cdot [\text{Shc\_pTrkA}] \cdot [\text{Dok}]}{K_{\text{m\_40}} + [\text{Dok}]} \quad (78)$$

### 6.40 Reaction R41

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R41

### Reaction equation



## Reactants



Table 121: Properties of each reactant.

Id	Name	SBO
Dok	Dok	
pShc_pTrkA	pShc_pTrkA	

## Modifiers

Table 122: Properties of each modifier.

Id	Name	SBO
pShc_pTrkA	pShc_pTrkA	
Dok	Dok	

## Products

Table 123: Properties of each product.

Id	Name	SBO
pDok	pDok	
pShc_pTrkA	pShc_pTrkA	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

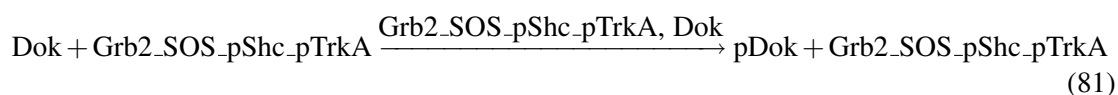
$$v_{40} = \frac{V_{\max\_41} \cdot [\text{pShc\_pTrkA}] \cdot [\text{Dok}]}{K_{\text{m\_41}} + [\text{Dok}]} \quad (80)$$

### 6.41 Reaction R42

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R42

#### Reaction equation



## Reactants

Table 124: Properties of each reactant.

Id	Name	SBO
Dok	Dok	
Grb2_SOS_pShc_pTrkA	Grb2_SOS_pShc_pTrkA	

## Modifiers

Table 125: Properties of each modifier.

Id	Name	SBO
Grb2_SOS_pShc_pTrkA	Grb2_SOS_pShc_pTrkA	
Dok	Dok	

## Products

Table 126: Properties of each product.

Id	Name	SBO
pDok	pDok	
Grb2_SOS_pShc_pTrkA	Grb2_SOS_pShc_pTrkA	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

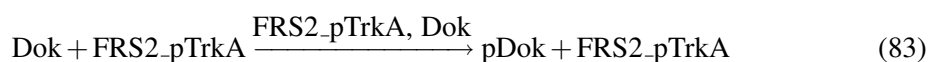
$$v_{41} = \frac{V_{\max\_42} \cdot [\text{Grb2\_SOS\_pShc\_pTrkA}] \cdot [\text{Dok}]}{K_{\text{m\_42}} + [\text{Dok}]} \quad (82)$$

### 6.42 Reaction R43

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R43

### Reaction equation



## Reactants

Table 127: Properties of each reactant.

Id	Name	SBO
Dok	Dok	
FRS2_pTrkA	FRS2_pTrkA	

## Modifiers

Table 128: Properties of each modifier.

Id	Name	SBO
FRS2_pTrkA	FRS2_pTrkA	
Dok	Dok	

## Products

Table 129: Properties of each product.

Id	Name	SBO
pDok	pDok	
FRS2_pTrkA	FRS2_pTrkA	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

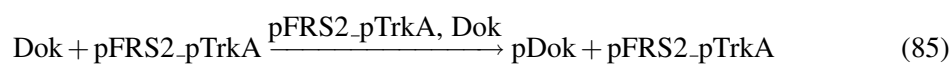
$$v_{42} = \frac{V_{\max\_43} \cdot [\text{FRS2\_pTrkA}] \cdot [\text{Dok}]}{K_{\text{m\_43}} + [\text{Dok}]} \quad (84)$$

### 6.43 Reaction R44

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R44

#### Reaction equation



## Reactants

Table 130: Properties of each reactant.

Id	Name	SBO
Dok	Dok	
pFRS2_pTrkA	pFRS2_pTrkA	

## Modifiers

Table 131: Properties of each modifier.

Id	Name	SBO
pFRS2_pTrkA	pFRS2_pTrkA	
Dok	Dok	

## Products

Table 132: Properties of each product.

Id	Name	SBO
pDok	pDok	
pFRS2_pTrkA	pFRS2_pTrkA	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

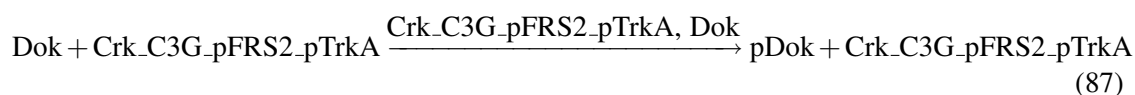
$$v_{43} = \frac{V_{\max\_44} \cdot [\text{pFRS2\_pTrkA}] \cdot [\text{Dok}]}{K_{\text{m\_44}} + [\text{Dok}]} \quad (86)$$

### 6.44 Reaction R45

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R45

#### Reaction equation



## Reactants

Table 133: Properties of each reactant.

Id	Name	SBO
Dok	Dok	
Crk_C3G_pFRS2_pTrkA	Crk_C3G_pFRS2_pTrkA	

## Modifiers

Table 134: Properties of each modifier.

Id	Name	SBO
Crk_C3G_pFRS2_pTrkA	Crk_C3G_pFRS2_pTrkA	
Dok	Dok	

## Products

Table 135: Properties of each product.

Id	Name	SBO
pDok	pDok	
Crk_C3G_pFRS2_pTrkA	Crk_C3G_pFRS2_pTrkA	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

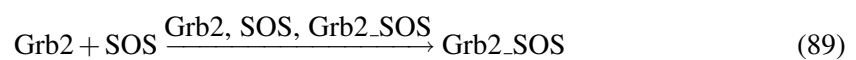
$$v_{44} = \frac{V_{\max\_45} \cdot [\text{Crk\_C3G\_pFRS2\_pTrkA}] \cdot [\text{Dok}]}{K_{m\_45} + [\text{Dok}]} \quad (88)$$

### 6.45 Reaction R46

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

**Name** R46

### Reaction equation



## Reactants

Table 136: Properties of each reactant.

Id	Name	SBO
Grb2	Grb2	
SOS	SOS	

## Modifiers

Table 137: Properties of each modifier.

Id	Name	SBO
Grb2	Grb2	
SOS	SOS	
Grb2_SOS	Grb2_SOS	

## Product

Table 138: Properties of each product.

Id	Name	SBO
Grb2_SOS	Grb2_SOS	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{45} = k_{f\_46} \cdot [\text{Grb2}] \cdot [\text{SOS}] - k_{b\_46} \cdot [\text{Grb2\_SOS}] \quad (90)$$

### 6.46 Reaction R47

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

**Name** R47

#### Reaction equation



## Reactants

Table 139: Properties of each reactant.

Id	Name	SBO
Grb2	Grb2	
pSOS	pSOS	

## Modifiers

Table 140: Properties of each modifier.

Id	Name	SBO
Grb2	Grb2	
pSOS	pSOS	
Grb2_pSOS	Grb2_pSOS	

## Product

Table 141: Properties of each product.

Id	Name	SBO
Grb2_pSOS	Grb2_pSOS	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

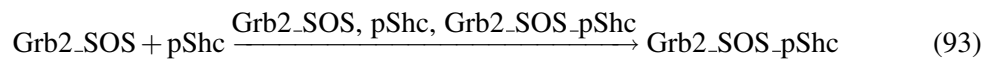
$$v_{46} = k_{f\_47} \cdot [\text{Grb2}] \cdot [\text{pSOS}] - k_{b\_47} \cdot [\text{Grb2\_pSOS}] \quad (92)$$

### 6.47 Reaction R48

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

**Name** R48

#### Reaction equation



## Reactants

Table 142: Properties of each reactant.

Id	Name	SBO
Grb2_SOS	Grb2_SOS	
pShc	pShc	

## Modifiers

Table 143: Properties of each modifier.

Id	Name	SBO
Grb2_SOS	Grb2_SOS	
pShc	pShc	
Grb2_SOS_pShc	Grb2_SOS_pShc	

## Product

Table 144: Properties of each product.

Id	Name	SBO
Grb2_SOS_pShc	Grb2_SOS_pShc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

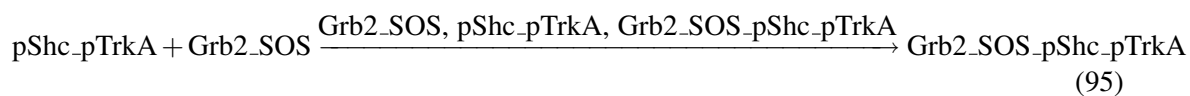
$$v_{47} = k_{f\_48} \cdot [\text{Grb2\_SOS}] \cdot [\text{pShc}] - k_{b\_48} \cdot [\text{Grb2\_SOS\_pShc}] \quad (94)$$

### 6.48 Reaction R49

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

**Name** R49

#### Reaction equation



## Reactants



Table 145: Properties of each reactant.

Id	Name	SBO
pShc_pTrkA	pShc_pTrkA	
Grb2_SOS	Grb2_SOS	

## Modifiers

Table 146: Properties of each modifier.

Id	Name	SBO
Grb2_SOS	Grb2_SOS	
pShc_pTrkA	pShc_pTrkA	
Grb2_SOS_pShc_pTrkA	Grb2_SOS_pShc_pTrkA	

## Product

Table 147: Properties of each product.

Id	Name	SBO
Grb2_SOS_pShc_pTrkA	Grb2_SOS_pShc_pTrkA	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

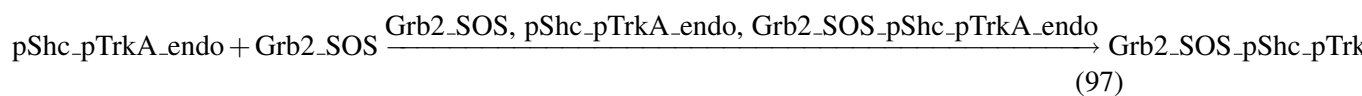
$$v_{48} = k_{f\_49} \cdot [\text{Grb2\_SOS}] \cdot [\text{pShc\_pTrkA}] - k_{b\_49} \cdot [\text{Grb2\_SOS\_pShc\_pTrkA}] \quad (96)$$

### 6.49 Reaction R50

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

**Name** R50

#### Reaction equation



## Reactants

Table 148: Properties of each reactant.

Id	Name	SBO
pShc_pTrkA_endo	pShc_pTrkA_endo	
Grb2_SOS	Grb2_SOS	

## Modifiers

Table 149: Properties of each modifier.

Id	Name	SBO
Grb2_SOS	Grb2_SOS	
pShc_pTrkA_endo	pShc_pTrkA_endo	
Grb2_SOS_pShc_pTrkA_endo	Grb2_SOS_pShc_pTrkA_endo	

## Product

Table 150: Properties of each product.

Id	Name	SBO
Grb2_SOS_pShc_pTrkA_endo	Grb2_SOS_pShc_pTrkA_endo	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{49} = k_{f\_50} \cdot [\text{Grb2\_SOS}] \cdot [\text{pShc\_pTrkA\_endo}] - k_{b\_50} \cdot [\text{Grb2\_SOS\_pShc\_pTrkA\_endo}] \quad (98)$$

### 6.50 Reaction R51

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

**Name** R51

### Reaction equation



## Reactant

Table 151: Properties of each reactant.

Id	Name	SBO
pShc	pShc	

## Modifier

Table 152: Properties of each modifier.

Id	Name	SBO
pShc	pShc	

## Product

Table 153: Properties of each product.

Id	Name	SBO
Shc	Shc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

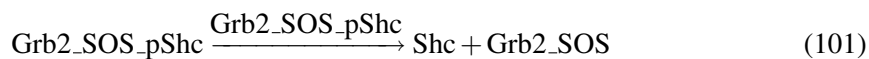
$$v_{50} = k_{f\_51} \cdot [\text{pShc}] \quad (100)$$

## 6.51 Reaction R52

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

**Name** R52

## Reaction equation



## Reactant

Table 154: Properties of each reactant.

Id	Name	SBO
Grb2_SOS_pShc	Grb2_SOS_pShc	

## Modifier

Table 155: Properties of each modifier.

Id	Name	SBO
Grb2_SOS_pShc	Grb2_SOS_pShc	

## Products

Table 156: Properties of each product.

Id	Name	SBO
Shc	Shc	
Grb2_SOS	Grb2_SOS	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{51} = \text{kf\_52} \cdot [\text{Grb2\_SOS\_pShc}] \quad (102)$$

### 6.52 Reaction R53

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

**Name** R53

## Reaction equation



## Reactant

Table 157: Properties of each reactant.

Id	Name	SBO
pSOS	pSOS	

## Modifier

Table 158: Properties of each modifier.

Id	Name	SBO
pSOS	pSOS	

## Product

Table 159: Properties of each product.

Id	Name	SBO
SOS	SOS	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{52} = k_{f\_53} \cdot [\text{pSOS}] \quad (104)$$

## 6.53 Reaction R54

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

**Name** R54

## Reaction equation



## Reactant

Table 160: Properties of each reactant.

Id	Name	SBO
Grb2_pSOS	Grb2_pSOS	

## Modifier

Table 161: Properties of each modifier.

Id	Name	SBO
Grb2_pSOS	Grb2_pSOS	

## Product

Table 162: Properties of each product.

Id	Name	SBO
Grb2_SOS	Grb2_SOS	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{53} = \text{kf\_54} \cdot [\text{Grb2\_pSOS}] \quad (106)$$

## 6.54 Reaction R55

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

**Name** R55

## Reaction equation



## Reactants

Table 163: Properties of each reactant.

Id	Name	SBO
pDok	pDok	
RasGAP	RasGAP	

## Modifiers

Table 164: Properties of each modifier.

Id	Name	SBO
pDok	pDok	
RasGAP	RasGAP	
pDok_RasGAP	pDok_RasGAP	

## Product

Table 165: Properties of each product.

Id	Name	SBO
pDok_RasGAP	pDok_RasGAP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{54} = k_{f\_55} \cdot [\text{pDok}] \cdot [\text{RasGAP}] - k_{b\_55} \cdot [\text{pDok\_RasGAP}] \quad (108)$$

### 6.55 Reaction R56

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

**Name** R56

#### Reaction equation



## Reactant

Table 166: Properties of each reactant.

Id	Name	SBO
pDok	pDok	

## Modifiers

Table 167: Properties of each modifier.

Id	Name	SBO
pDok	pDok	
Dok	Dok	

## Product

Table 168: Properties of each product.

Id	Name	SBO
Dok	Dok	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{55} = k_{f\_56} \cdot [\text{pDok}] - k_{b\_56} \cdot [\text{Dok}] \quad (110)$$

## 6.56 Reaction R57

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

**Name** R57

## Reaction equation



## Reactant



Table 169: Properties of each reactant.

Id	Name	SBO
Ras_GTP	Ras_GTP	

## Modifier

Table 170: Properties of each modifier.

Id	Name	SBO
Ras_GTP	Ras_GTP	

## Product

Table 171: Properties of each product.

Id	Name	SBO
Ras_GDP	Ras_GDP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

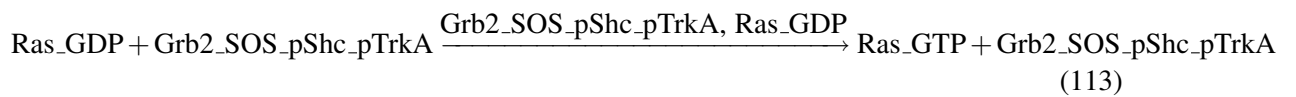
$$v_{56} = k_{f\_57} \cdot [\text{Ras\_GTP}] \quad (112)$$

## 6.57 Reaction R58

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R58

## Reaction equation



## Reactants

Table 172: Properties of each reactant.

Id	Name	SBO
Ras_GDP	Ras_GDP	
Grb2_SOS_pShc_pTrkA	Grb2_SOS_pShc_pTrkA	

## Modifiers

Table 173: Properties of each modifier.

Id	Name	SBO
Grb2_SOS_pShc_pTrkA	Grb2_SOS_pShc_pTrkA	
Ras_GDP	Ras_GDP	

## Products

Table 174: Properties of each product.

Id	Name	SBO
Ras_GTP	Ras_GTP	
Grb2_SOS_pShc_pTrkA	Grb2_SOS_pShc_pTrkA	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

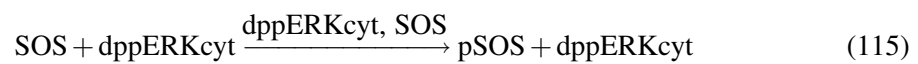
$$v_{57} = \frac{V_{\max\_58} \cdot [\text{Grb2\_SOS\_pShc\_pTrkA}] \cdot [\text{Ras\_GDP}]}{K_{\text{m\_58}} + [\text{Ras\_GDP}]} \quad (114)$$

### 6.58 Reaction R59

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R59

### Reaction equation



## Reactants

Table 175: Properties of each reactant.

Id	Name	SBO
SOS	SOS	
dppERKcyt	dppERKcyt	

## Modifiers

Table 176: Properties of each modifier.

Id	Name	SBO
dppERKcyt	dppERKcyt	
SOS	SOS	

## Products

Table 177: Properties of each product.

Id	Name	SBO
pSOS	pSOS	
dppERKcyt	dppERKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

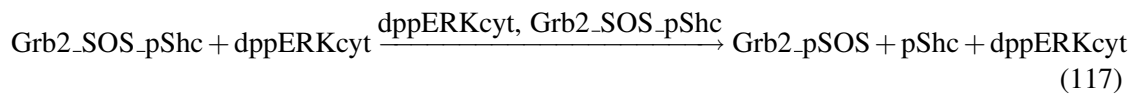
$$v_{58} = \frac{V_{\max\_59} \cdot [\text{dppERKcyt}] \cdot [\text{SOS}]}{K_{\text{m\_59}} + [\text{SOS}]} \quad (116)$$

### 6.59 Reaction R60

This is a fast irreversible reaction of two reactants forming three products influenced by two modifiers.

**Name** R60

#### Reaction equation



## Reactants

Table 178: Properties of each reactant.

Id	Name	SBO
Grb2_SOS_pShc	Grb2_SOS_pShc	
dppERKcyt	dppERKcyt	

## Modifiers

Table 179: Properties of each modifier.

Id	Name	SBO
dppERKcyt	dppERKcyt	
Grb2_SOS_pShc	Grb2_SOS_pShc	

## Products

Table 180: Properties of each product.

Id	Name	SBO
Grb2_pSOS	Grb2_pSOS	
pShc	pShc	
dppERKcyt	dppERKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

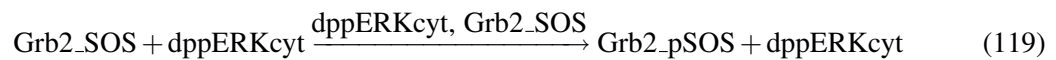
$$v_{59} = \frac{V_{\max.60} \cdot [\text{dppERKcyt}] \cdot [\text{Grb2\_SOS\_pShc}]}{K_{\text{m}.60} + [\text{Grb2\_SOS\_pShc}]} \quad (118)$$

### 6.60 Reaction R61

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R61

#### Reaction equation



## Reactants

Table 181: Properties of each reactant.

Id	Name	SBO
Grb2_SOS	Grb2_SOS	
dppERKcyt	dppERKcyt	

## Modifiers

Table 182: Properties of each modifier.

Id	Name	SBO
dppERKcyt	dppERKcyt	
Grb2_SOS	Grb2_SOS	

## Products

Table 183: Properties of each product.

Id	Name	SBO
Grb2_pSOS	Grb2_pSOS	
dppERKcyt	dppERKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

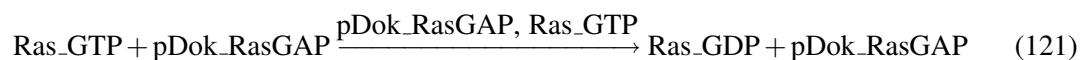
$$v_{60} = \frac{V_{\max.61} \cdot [\text{dppERKcyt}] \cdot [\text{Grb2\_SOS}]}{K_{\text{m}.61} + [\text{Grb2\_SOS}]} \quad (120)$$

### 6.61 Reaction R62

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R62

#### Reaction equation



## Reactants

Table 184: Properties of each reactant.

Id	Name	SBO
Ras_GTP	Ras_GTP	
pDok_RasGAP	pDok_RasGAP	

## Modifiers

Table 185: Properties of each modifier.

Id	Name	SBO
pDok_RasGAP	pDok_RasGAP	
Ras_GTP	Ras_GTP	

## Products

Table 186: Properties of each product.

Id	Name	SBO
Ras_GDP	Ras_GDP	
pDok_RasGAP	pDok_RasGAP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

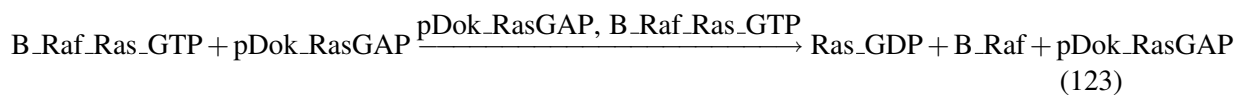
$$v_{61} = \frac{V_{\max\_62} \cdot [\text{pDok\_RasGAP}] \cdot [\text{Ras\_GTP}]}{K_{\text{m\_62}} + [\text{Ras\_GTP}]} \quad (122)$$

### 6.62 Reaction R63

This is a fast irreversible reaction of two reactants forming three products influenced by two modifiers.

**Name** R63

#### Reaction equation



## Reactants

Table 187: Properties of each reactant.

Id	Name	SBO
B_Raf_Ras_GTP	B_Raf_Ras_GTP	
pDok_RasGAP	pDok_RasGAP	

## Modifiers

Table 188: Properties of each modifier.

Id	Name	SBO
pDok_RasGAP	pDok_RasGAP	
B_Raf_Ras_GTP	B_Raf_Ras_GTP	

## Products

Table 189: Properties of each product.

Id	Name	SBO
Ras_GDP	Ras_GDP	
B_Raf	B_Raf	
pDok_RasGAP	pDok_RasGAP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

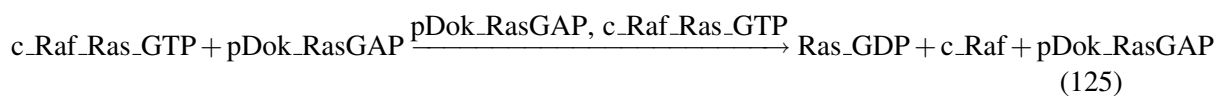
$$v_{62} = \frac{V_{\max.63} \cdot [\text{pDok\_RasGAP}] \cdot [\text{B\_Raf\_Ras\_GTP}]}{K_{\text{m}.63} + [\text{B\_Raf\_Ras\_GTP}]} \quad (124)$$

### 6.63 Reaction R64

This is a fast irreversible reaction of two reactants forming three products influenced by two modifiers.

**Name** R64

#### Reaction equation



## Reactants



Table 190: Properties of each reactant.

Id	Name	SBO
c_Raf_Ras_GTP	c_Raf_Ras_GTP	
pDok_RasGAP	pDok_RasGAP	

## Modifiers

Table 191: Properties of each modifier.

Id	Name	SBO
pDok_RasGAP	pDok_RasGAP	
c_Raf_Ras_GTP	c_Raf_Ras_GTP	

## Products

Table 192: Properties of each product.

Id	Name	SBO
Ras_GDP	Ras_GDP	
c_Raf	c_Raf	
pDok_RasGAP	pDok_RasGAP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

$$v_{63} = \frac{V_{\max\_64} \cdot [\text{pDok\_RasGAP}] \cdot [\text{c\_Raf\_Ras\_GTP}]}{K_{\text{m\_64}} + [\text{c\_Raf\_Ras\_GTP}]} \quad (126)$$

### 6.64 Reaction R65

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

**Name** R65

#### Reaction equation



## Reactants

Table 193: Properties of each reactant.

Id	Name	SBO
Crk	Crk	
C3G	C3G	

## Modifiers

Table 194: Properties of each modifier.

Id	Name	SBO
C3G	C3G	
Crk	Crk	
Crk_C3G	Crk_C3G	

## Product

Table 195: Properties of each product.

Id	Name	SBO
Crk_C3G	Crk_C3G	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

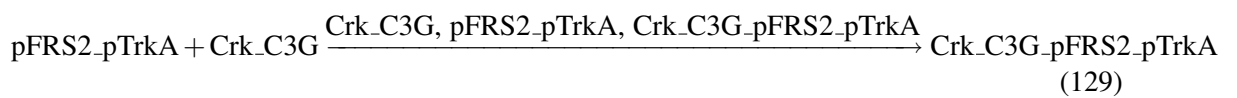
$$v_{64} = k_{f\_65} \cdot [\text{C3G}] \cdot [\text{Crk}] - k_{b\_65} \cdot [\text{Crk\_C3G}] \quad (128)$$

### 6.65 Reaction R66

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

**Name** R66

#### Reaction equation



## Reactants

Table 196: Properties of each reactant.

Id	Name	SBO
pFRS2_pTrkA	pFRS2_pTrkA	
Crk_C3G	Crk_C3G	

## Modifiers

Table 197: Properties of each modifier.

Id	Name	SBO
Crk_C3G	Crk_C3G	
pFRS2_pTrkA	pFRS2_pTrkA	
Crk_C3G_pFRS2_pTrkA	Crk_C3G_pFRS2_pTrkA	

## Product

Table 198: Properties of each product.

Id	Name	SBO
Crk_C3G_pFRS2_pTrkA	Crk_C3G_pFRS2_pTrkA	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

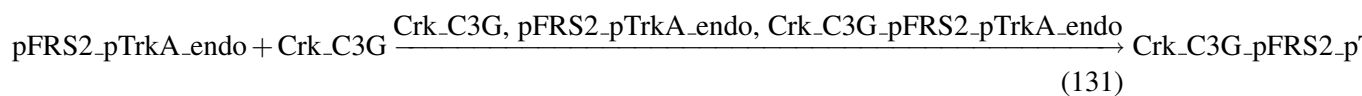
$$v_{65} = k_{f\_66} \cdot [\text{Crk\_C3G}] \cdot [\text{pFRS2\_pTrkA}] - k_{b\_66} \cdot [\text{Crk\_C3G\_pFRS2\_pTrkA}] \quad (130)$$

### 6.66 Reaction R67

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

**Name** R67

#### Reaction equation



## Reactants

Table 199: Properties of each reactant.

Id	Name	SBO
pFRS2_pTrkA_endo	pFRS2_pTrkA_endo	
Crk_C3G	Crk_C3G	

## Modifiers

Table 200: Properties of each modifier.

Id	Name	SBO
Crk_C3G	Crk_C3G	
pFRS2_pTrkA_endo	pFRS2_pTrkA_endo	
Crk_C3G_pFRS2_pTrkA_endo	Crk_C3G_pFRS2_pTrkA_endo	

## Product

Table 201: Properties of each product.

Id	Name	SBO
Crk_C3G_pFRS2_pTrkA_endo	Crk_C3G_pFRS2_pTrkA_endo	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{66} = k_{f.67} \cdot [\text{Crk\_C3G}] \cdot [\text{pFRS2\_pTrkA\_endo}] - k_{b.67} \cdot [\text{Crk\_C3G\_pFRS2\_pTrkA\_endo}] \quad (132)$$

### 6.67 Reaction R68

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

**Name** R68

### Reaction equation



## Reactant

Table 202: Properties of each reactant.

Id	Name	SBO
pFRS2	pFRS2	

## Modifier

Table 203: Properties of each modifier.

Id	Name	SBO
pFRS2	pFRS2	

## Product

Table 204: Properties of each product.

Id	Name	SBO
FRS2	FRS2	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{67} = k_{f\_68} \cdot [\text{pFRS2}] \quad (134)$$

## 6.68 Reaction R69

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

**Name** R69

## Reaction equation



## Reactant

Table 205: Properties of each reactant.

Id	Name	SBO
Rap1_GTP	Rap1_GTP	

## Modifier

Table 206: Properties of each modifier.

Id	Name	SBO
Rap1_GTP	Rap1_GTP	

## Product

Table 207: Properties of each product.

Id	Name	SBO
Rap1_GDP	Rap1_GDP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

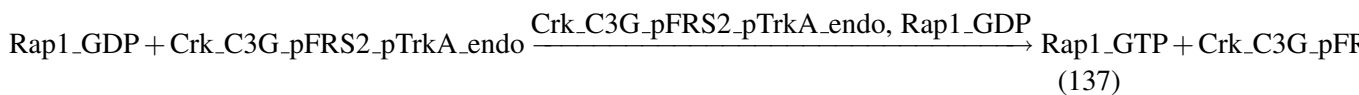
$$v_{68} = k_{f.69} \cdot [\text{Rap1\_GTP}] \quad (136)$$

## 6.69 Reaction R70

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R70

## Reaction equation



## Reactants

Table 208: Properties of each reactant.

Id	Name	SBO
Rap1_GDP	Rap1_GDP	
Crk_C3G_pFRS2_pTrkA_endo	Crk_C3G_pFRS2_pTrkA_endo	

## Modifiers

Table 209: Properties of each modifier.

Id	Name	SBO
Crk_C3G_pFRS2_pTrkA_endo	Crk_C3G_pFRS2_pTrkA_endo	
Rap1_GDP	Rap1_GDP	

## Products

Table 210: Properties of each product.

Id	Name	SBO
Rap1_GTP	Rap1_GTP	
Crk_C3G_pFRS2_pTrkA_endo	Crk_C3G_pFRS2_pTrkA_endo	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

$$v_{69} = \frac{V_{\max\_70} \cdot [\text{Crk\_C3G\_pFRS2\_pTrkA\_endo}] \cdot [\text{Rap1\_GDP}]}{K_{\text{m\_70}} + [\text{Rap1\_GDP}]} \quad (138)$$

### 6.70 Reaction R71

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

**Name** R71

#### Reaction equation



## Reactant

Table 211: Properties of each reactant.

Id	Name	SBO
Rap1_GTP	Rap1_GTP	

## Modifier

Table 212: Properties of each modifier.

Id	Name	SBO
Rap1_GTP	Rap1_GTP	

## Product

Table 213: Properties of each product.

Id	Name	SBO
Rap1_GDP	Rap1_GDP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot \text{m}^{-3} \cdot 10^{-6} \text{ mol}$

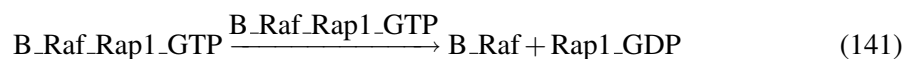
$$v_{70} = \frac{V_{\max\_71} \cdot \text{Rap1GAP} \cdot [\text{Rap1\_GTP}]}{K_{\text{m\_71}} + [\text{Rap1\_GTP}]} \quad (140)$$

## 6.71 Reaction R72

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

**Name** R72

## Reaction equation



## Reactant



Table 214: Properties of each reactant.

Id	Name	SBO
B_Raf_Rap1_GTP	B_Raf_Rap1_GTP	

## Modifier

Table 215: Properties of each modifier.

Id	Name	SBO
B_Raf_Rap1_GTP	B_Raf_Rap1_GTP	

## Products

Table 216: Properties of each product.

Id	Name	SBO
B_Raf	B_Raf	
Rap1_GDP	Rap1_GDP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot \text{m}^{-3} \cdot 10^{-6} \text{ mol}$

$$v_{71} = \frac{V_{\max\_72} \cdot \text{Rap1GAP} \cdot [\text{B\_Raf\_Rap1\_GTP}]}{K_{\text{m\_72}} + [\text{B\_Raf\_Rap1\_GTP}]} \quad (142)$$

## 6.72 Reaction R73

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

**Name** R73

### Reaction equation



## Reactants

Table 217: Properties of each reactant.

Id	Name	SBO
Ras_GTP	Ras_GTP	
c_Raf	c_Raf	

## Modifiers

Table 218: Properties of each modifier.

Id	Name	SBO
c_Raf	c_Raf	
Ras_GTP	Ras_GTP	
c_Raf_Ras_GTP	c_Raf_Ras_GTP	

## Product

Table 219: Properties of each product.

Id	Name	SBO
c_Raf_Ras_GTP	c_Raf_Ras_GTP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

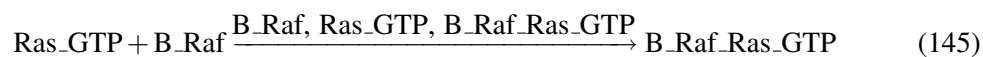
$$v_{72} = k_{f\_73} \cdot [c\_Raf] \cdot [Ras\_GTP] - k_{b\_73} \cdot [c\_Raf\_Ras\_GTP] \quad (144)$$

### 6.73 Reaction R74

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

**Name** R74

#### Reaction equation



## Reactants

Table 220: Properties of each reactant.

Id	Name	SBO
Ras_GTP	Ras_GTP	
B_Raf	B_Raf	

## Modifiers

Table 221: Properties of each modifier.

Id	Name	SBO
B_Raf	B_Raf	
Ras_GTP	Ras_GTP	
B_Raf_Ras_GTP	B_Raf_Ras_GTP	

## Product

Table 222: Properties of each product.

Id	Name	SBO
B_Raf_Ras_GTP	B_Raf_Ras_GTP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

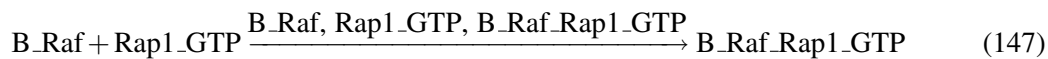
$$v_{73} = k_{f\_74} \cdot [\text{B\_Raf}] \cdot [\text{Ras\_GTP}] - k_{b\_74} \cdot [\text{B\_Raf\_Ras\_GTP}] \quad (146)$$

### 6.74 Reaction R75

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

**Name** R75

#### Reaction equation



## Reactants

Table 223: Properties of each reactant.

Id	Name	SBO
B_Raf	B_Raf	
Rap1_GTP	Rap1_GTP	

## Modifiers

Table 224: Properties of each modifier.

Id	Name	SBO
B_Raf	B_Raf	
Rap1_GTP	Rap1_GTP	
B_Raf_Rap1_GTP	B_Raf_Rap1_GTP	

## Product

Table 225: Properties of each product.

Id	Name	SBO
B_Raf_Rap1_GTP	B_Raf_Rap1_GTP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

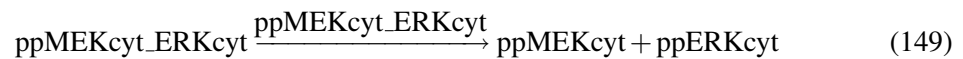
$$v_{74} = k_{f\_75} \cdot [\text{B\_Raf}] \cdot [\text{Rap1\_GTP}] - k_{b\_75} \cdot [\text{B\_Raf\_Rap1\_GTP}] \quad (148)$$

### 6.75 Reaction R76

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

**Name** R76

#### Reaction equation



## Reactant

Table 226: Properties of each reactant.

Id	Name	SBO
ppMEKcyt_ERKcyt	ppMEKcyt_ERKcyt	

## Modifier

Table 227: Properties of each modifier.

Id	Name	SBO
ppMEKcyt_ERKcyt	ppMEKcyt_ERKcyt	

## Products

Table 228: Properties of each product.

Id	Name	SBO
ppMEKcyt	ppMEKcyt	
ppERKcyt	ppERKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

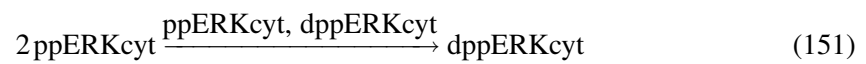
$$v_{75} = \text{kf\_76} \cdot [\text{ppMEKcyt\_ERKcyt}] \quad (150)$$

## 6.76 Reaction R77

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

**Name** R77

## Reaction equation



## Reactant

Table 229: Properties of each reactant.

Id	Name	SBO
ppERKcyt	ppERKcyt	

## Modifiers

Table 230: Properties of each modifier.

Id	Name	SBO
ppERKcyt	ppERKcyt	
dppERKcyt	dppERKcyt	

## Product

Table 231: Properties of each product.

Id	Name	SBO
dppERKcyt	dppERKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{76} = k_{f\_77} \cdot [\text{ppERKcyt}] \cdot [\text{ppERKcyt}] - k_{b\_77} \cdot [\text{dppERKcyt}] \quad (152)$$

### 6.77 Reaction R78

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

**Name** R78

#### Reaction equation



## Reactants

Table 232: Properties of each reactant.

Id	Name	SBO
MEKcyt	MEKcyt	
ERKcyt	ERKcyt	

## Modifiers

Table 233: Properties of each modifier.

Id	Name	SBO
MEKcyt	MEKcyt	
ERKcyt	ERKcyt	
MEKcyt_ERKcyt	MEKcyt_ERKcyt	

## Product

Table 234: Properties of each product.

Id	Name	SBO
MEKcyt_ERKcyt	MEKcyt_ERKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{77} = k_{f\_78} \cdot [\text{MEKcyt}] \cdot [\text{ERKcyt}] - k_{b\_78} \cdot [\text{MEKcyt\_ERKcyt}] \quad (154)$$

### 6.78 Reaction R79

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

**Name** R79

#### Reaction equation



## Reactants

Table 235: Properties of each reactant.

Id	Name	SBO
ERKcyt	ERKcyt	
pMEKcyt	pMEKcyt	

## Modifiers

Table 236: Properties of each modifier.

Id	Name	SBO
pMEKcyt	pMEKcyt	
ERKcyt	ERKcyt	
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	

## Product

Table 237: Properties of each product.

Id	Name	SBO
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{mol} \cdot \text{m}^{-3}$

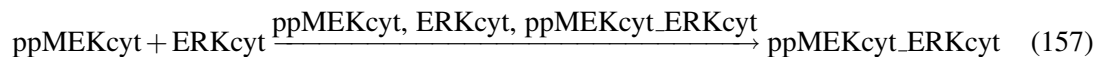
$$v_{78} = k_{f\_79} \cdot [\text{pMEKcyt}] \cdot [\text{ERKcyt}] - k_{b\_79} \cdot [\text{pMEKcyt\_ERKcyt}] \quad (156)$$

### 6.79 Reaction R80

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

**Name** R80

#### Reaction equation



## Reactants



Table 238: Properties of each reactant.

Id	Name	SBO
ppMEKcyt	ppMEKcyt	
ERKcyt	ERKcyt	

## Modifiers

Table 239: Properties of each modifier.

Id	Name	SBO
ppMEKcyt	ppMEKcyt	
ERKcyt	ERKcyt	
ppMEKcyt_ERKcyt	ppMEKcyt_ERKcyt	

## Product

Table 240: Properties of each product.

Id	Name	SBO
ppMEKcyt_ERKcyt	ppMEKcyt_ERKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

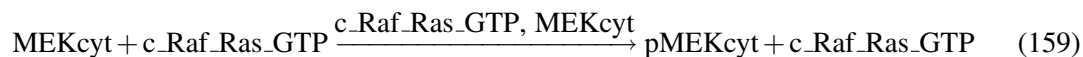
$$v_{79} = k_{f\_80} \cdot [\text{ppMEKcyt}] \cdot [\text{ERKcyt}] - k_{b\_80} \cdot [\text{ppMEKcyt\_ERKcyt}] \quad (158)$$

### 6.80 Reaction R81

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R81

#### Reaction equation



## Reactants

Table 241: Properties of each reactant.

Id	Name	SBO
MEKcyt	MEKcyt	
c_Raf_Ras_GTP	c_Raf_Ras_GTP	

## Modifiers

Table 242: Properties of each modifier.

Id	Name	SBO
c_Raf_Ras_GTP	c_Raf_Ras_GTP	
MEKcyt	MEKcyt	

## Products

Table 243: Properties of each product.

Id	Name	SBO
pMEKcyt	pMEKcyt	
c_Raf_Ras_GTP	c_Raf_Ras_GTP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

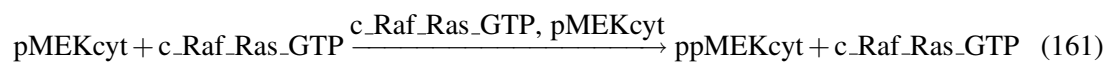
$$v_{80} = \frac{V_{\max\_81} \cdot [\text{c\_Raf\_Ras\_GTP}] \cdot [\text{MEKcyt}]}{K_{\text{m\_81}} + [\text{MEKcyt}]} \quad (160)$$

### 6.81 Reaction R82

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R82

#### Reaction equation



## Reactants

Table 244: Properties of each reactant.

Id	Name	SBO
pMEKcyt	pMEKcyt	
c_Raf_Ras_GTP	c_Raf_Ras_GTP	

## Modifiers

Table 245: Properties of each modifier.

Id	Name	SBO
c_Raf_Ras_GTP	c_Raf_Ras_GTP	
pMEKcyt	pMEKcyt	

## Products

Table 246: Properties of each product.

Id	Name	SBO
ppMEKcyt	ppMEKcyt	
c_Raf_Ras_GTP	c_Raf_Ras_GTP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

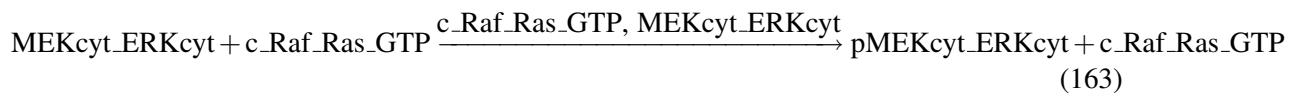
$$v_{81} = \frac{V_{\max\_82} \cdot [\text{c\_Raf\_Ras\_GTP}] \cdot [\text{pMEKcyt}]}{K_{\text{m\_82}} + [\text{pMEKcyt}]} \quad (162)$$

### 6.82 Reaction R83

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R83

#### Reaction equation



## Reactants

Table 247: Properties of each reactant.

Id	Name	SBO
MEKcyt_ERKcyt	MEKcyt_ERKcyt	
c_Raf_Ras_GTP	c_Raf_Ras_GTP	

## Modifiers

Table 248: Properties of each modifier.

Id	Name	SBO
c_Raf_Ras_GTP	c_Raf_Ras_GTP	
MEKcyt_ERKcyt	MEKcyt_ERKcyt	

## Products

Table 249: Properties of each product.

Id	Name	SBO
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	
c_Raf_Ras_GTP	c_Raf_Ras_GTP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

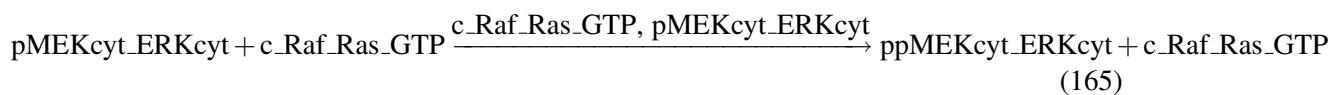
$$v_{82} = \frac{V_{\max\_83} \cdot [\text{c\_Raf\_Ras\_GTP}] \cdot [\text{MEKcyt\_ERKcyt}]}{K_{\text{m\_83}} + [\text{MEKcyt\_ERKcyt}]} \quad (164)$$

### 6.83 Reaction R84

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R84

#### Reaction equation



## Reactants

Table 250: Properties of each reactant.

Id	Name	SBO
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	
c_Raf_Ras_GTP	c_Raf_Ras_GTP	

## Modifiers

Table 251: Properties of each modifier.

Id	Name	SBO
c_Raf_Ras_GTP	c_Raf_Ras_GTP	
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	

## Products

Table 252: Properties of each product.

Id	Name	SBO
ppMEKcyt_ERKcyt	ppMEKcyt_ERKcyt	
c_Raf_Ras_GTP	c_Raf_Ras_GTP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

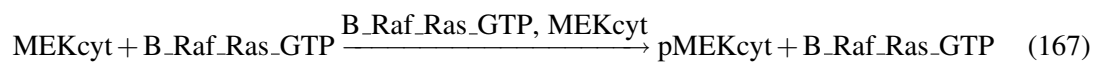
$$v_{83} = \frac{V_{\max.84} \cdot [\text{c\_Raf\_Ras\_GTP}] \cdot [\text{pMEKcyt\_ERKcyt}]}{K_{\text{m}.84} + [\text{pMEKcyt\_ERKcyt}]} \quad (166)$$

### 6.84 Reaction R85

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R85

#### Reaction equation



## Reactants

Table 253: Properties of each reactant.

Id	Name	SBO
MEKcyt	MEKcyt	
B_Raf_Ras_GTP	B_Raf_Ras_GTP	

## Modifiers

Table 254: Properties of each modifier.

Id	Name	SBO
B_Raf_Ras_GTP	B_Raf_Ras_GTP	
MEKcyt	MEKcyt	

## Products

Table 255: Properties of each product.

Id	Name	SBO
pMEKcyt	pMEKcyt	
B_Raf_Ras_GTP	B_Raf_Ras_GTP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

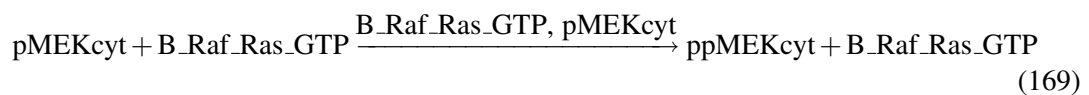
$$v_{84} = \frac{V_{\max\_85} \cdot [\text{B\_Raf\_Ras\_GTP}] \cdot [\text{MEKcyt}]}{K_{\text{m\_85}} + [\text{MEKcyt}]} \quad (168)$$

### 6.85 Reaction R86

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R86

#### Reaction equation



## Reactants

Table 256: Properties of each reactant.

Id	Name	SBO
pMEKcyt	pMEKcyt	
B_Raf_Ras_GTP	B_Raf_Ras_GTP	

## Modifiers

Table 257: Properties of each modifier.

Id	Name	SBO
B_Raf_Ras_GTP	B_Raf_Ras_GTP	
pMEKcyt	pMEKcyt	

## Products

Table 258: Properties of each product.

Id	Name	SBO
ppMEKcyt	ppMEKcyt	
B_Raf_Ras_GTP	B_Raf_Ras_GTP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

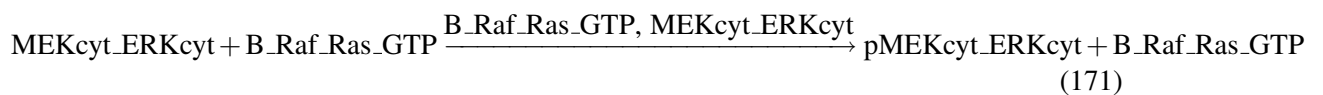
$$v_{85} = \frac{V_{\max\_86} \cdot [\text{B\_Raf\_Ras\_GTP}] \cdot [\text{pMEKcyt}]}{K_{\text{m\_86}} + [\text{pMEKcyt}]} \quad (170)$$

### 6.86 Reaction R87

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R87

#### Reaction equation



## Reactants

Table 259: Properties of each reactant.

Id	Name	SBO
MEKcyt_ERKcyt	MEKcyt_ERKcyt	
B_Raf_Ras_GTP	B_Raf_Ras_GTP	

## Modifiers

Table 260: Properties of each modifier.

Id	Name	SBO
B_Raf_Ras_GTP	B_Raf_Ras_GTP	
MEKcyt_ERKcyt	MEKcyt_ERKcyt	

## Products

Table 261: Properties of each product.

Id	Name	SBO
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	
B_Raf_Ras_GTP	B_Raf_Ras_GTP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

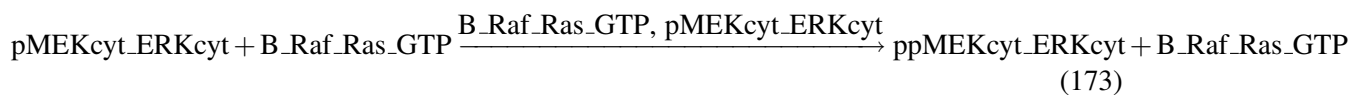
$$v_{86} = \frac{V_{\max\_87} \cdot [\text{B\_Raf\_Ras\_GTP}] \cdot [\text{MEKcyt\_ERKcyt}]}{K_{\text{m\_87}} + [\text{MEKcyt\_ERKcyt}]} \quad (172)$$

## 6.87 Reaction R88

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R88

### Reaction equation



## Reactants



Table 262: Properties of each reactant.

Id	Name	SBO
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	
B_Raf_Ras_GTP	B_Raf_Ras_GTP	

## Modifiers

Table 263: Properties of each modifier.

Id	Name	SBO
B_Raf_Ras_GTP	B_Raf_Ras_GTP	
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	

## Products

Table 264: Properties of each product.

Id	Name	SBO
ppMEKcyt_ERKcyt	ppMEKcyt_ERKcyt	
B_Raf_Ras_GTP	B_Raf_Ras_GTP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

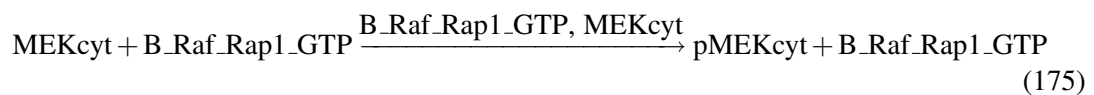
$$v_{87} = \frac{V_{\max\_88} \cdot [\text{B\_Raf\_Ras\_GTP}] \cdot [\text{pMEKcyt\_ERKcyt}]}{K_{\text{m\_88}} + [\text{pMEKcyt\_ERKcyt}]} \quad (174)$$

### 6.88 Reaction R89

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R89

#### Reaction equation



## Reactants

Table 265: Properties of each reactant.

Id	Name	SBO
MEKcyt	MEKcyt	
B_Raf_Rap1_GTP	B_Raf_Rap1_GTP	

## Modifiers

Table 266: Properties of each modifier.

Id	Name	SBO
B_Raf_Rap1_GTP	B_Raf_Rap1_GTP	
MEKcyt	MEKcyt	

## Products

Table 267: Properties of each product.

Id	Name	SBO
pMEKcyt	pMEKcyt	
B_Raf_Rap1_GTP	B_Raf_Rap1_GTP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

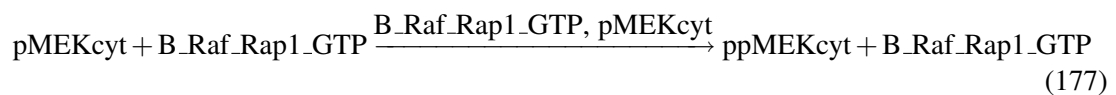
$$v_{88} = \frac{V_{\max\_89} \cdot [\text{B\_Raf\_Rap1\_GTP}] \cdot [\text{MEKcyt}]}{K_{\text{m\_89}} + [\text{MEKcyt}]} \quad (176)$$

## 6.89 Reaction R90

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R90

### Reaction equation



## Reactants

Table 268: Properties of each reactant.

Id	Name	SBO
pMEKcyt	pMEKcyt	
B_Raf_Rap1_GTP	B_Raf_Rap1_GTP	

## Modifiers

Table 269: Properties of each modifier.

Id	Name	SBO
B_Raf_Rap1_GTP	B_Raf_Rap1_GTP	
pMEKcyt	pMEKcyt	

## Products

Table 270: Properties of each product.

Id	Name	SBO
ppMEKcyt	ppMEKcyt	
B_Raf_Rap1_GTP	B_Raf_Rap1_GTP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

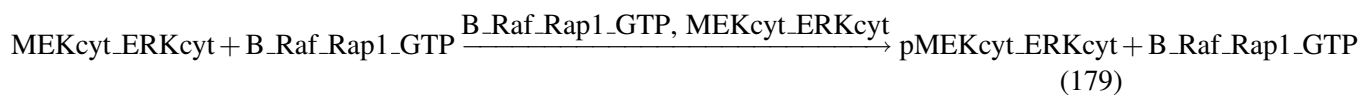
$$v_{89} = \frac{V_{\max\_90} \cdot [\text{B\_Raf\_Rap1\_GTP}] \cdot [\text{pMEKcyt}]}{K_{\text{m\_90}} + [\text{pMEKcyt}]} \quad (178)$$

## 6.90 Reaction R91

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R91

### Reaction equation



## Reactants

Table 271: Properties of each reactant.

Id	Name	SBO
MEKcyt_ERKcyt	MEKcyt_ERKcyt	
B_Raf_Rap1_GTP	B_Raf_Rap1_GTP	

## Modifiers

Table 272: Properties of each modifier.

Id	Name	SBO
B_Raf_Rap1_GTP	B_Raf_Rap1_GTP	
MEKcyt_ERKcyt	MEKcyt_ERKcyt	

## Products

Table 273: Properties of each product.

Id	Name	SBO
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	
B_Raf_Rap1_GTP	B_Raf_Rap1_GTP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

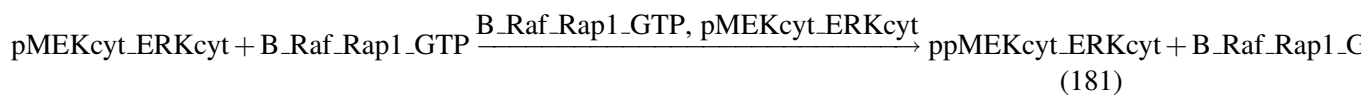
$$v_{90} = \frac{V_{\max\_91} \cdot [\text{B\_Raf\_Rap1\_GTP}] \cdot [\text{MEKcyt\_ERKcyt}]}{K_{\text{m\_91}} + [\text{MEKcyt\_ERKcyt}]} \quad (180)$$

### 6.91 Reaction R92

This is a fast irreversible reaction of two reactants forming two products influenced by two modifiers.

**Name** R92

#### Reaction equation



## Reactants

Table 274: Properties of each reactant.

Id	Name	SBO
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	
B_Raf_Rap1_GTP	B_Raf_Rap1_GTP	

## Modifiers

Table 275: Properties of each modifier.

Id	Name	SBO
B_Raf_Rap1_GTP	B_Raf_Rap1_GTP	
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	

## Products

Table 276: Properties of each product.

Id	Name	SBO
ppMEKcyt_ERKcyt	ppMEKcyt_ERKcyt	
B_Raf_Rap1_GTP	B_Raf_Rap1_GTP	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-12} \text{ mol} \cdot \text{m}^{-3}$

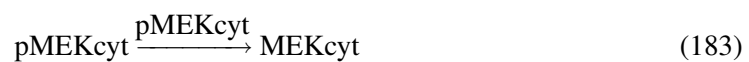
$$v_{91} = \frac{V_{\max\_92} \cdot [\text{B\_Raf\_Rap1\_GTP}] \cdot [\text{pMEKcyt\_ERKcyt}]}{K_{\text{m\_92}} + [\text{pMEKcyt\_ERKcyt}]} \quad (182)$$

## 6.92 Reaction R93

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

**Name** R93

### Reaction equation



## Reactant

Table 277: Properties of each reactant.

Id	Name	SBO
pMEKcyt	pMEKcyt	

## Modifier

Table 278: Properties of each modifier.

Id	Name	SBO
pMEKcyt	pMEKcyt	

## Product

Table 279: Properties of each product.

Id	Name	SBO
MEKcyt	MEKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot \text{m}^{-3} \cdot 10^{-6} \text{ mol}$

$$v_{92} = \frac{V_{\max\_93} \cdot \text{PP2Acyt} \cdot [\text{pMEKcyt}]}{K_{\text{m\_93}} + [\text{pMEKcyt}]} \quad (184)$$

## 6.93 Reaction R94

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

**Name** R94

## Reaction equation



## Reactant

Table 280: Properties of each reactant.

Id	Name	SBO
ppMEKcyt	ppMEKcyt	

## Modifier

Table 281: Properties of each modifier.

Id	Name	SBO
ppMEKcyt	ppMEKcyt	

## Product

Table 282: Properties of each product.

Id	Name	SBO
pMEKcyt	pMEKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot \text{m}^{-3} \cdot 10^{-6} \text{ mol}$

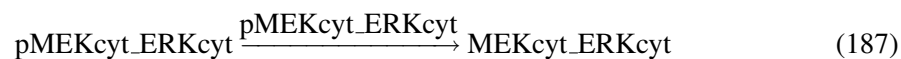
$$v_{93} = \frac{V_{\max\_94} \cdot \text{PP2Acyt} \cdot [\text{ppMEKcyt}]}{K_{\text{m\_94}} + [\text{ppMEKcyt}]} \quad (186)$$

## 6.94 Reaction R95

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

**Name** R95

## Reaction equation



## Reactant

Table 283: Properties of each reactant.

Id	Name	SBO
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	

## Modifier

Table 284: Properties of each modifier.

Id	Name	SBO
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	

## Product

Table 285: Properties of each product.

Id	Name	SBO
MEKcyt_ERKcyt	MEKcyt_ERKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot \text{m}^{-3} \cdot 10^{-6} \text{ mol}$

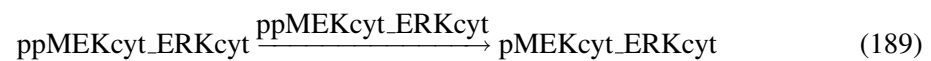
$$v_{94} = \frac{V_{\max\_95} \cdot \text{PP2Acyt} \cdot [\text{pMEKcyt\_ERKcyt}]}{K_{\text{m\_95}} + [\text{pMEKcyt\_ERKcyt}]} \quad (188)$$

## 6.95 Reaction R96

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

**Name** R96

## Reaction equation



## Reactant



Table 286: Properties of each reactant.

Id	Name	SBO
ppMEKcyt_ERKcyt	ppMEKcyt_ERKcyt	

### Modifier

Table 287: Properties of each modifier.

Id	Name	SBO
ppMEKcyt_ERKcyt	ppMEKcyt_ERKcyt	

### Product

Table 288: Properties of each product.

Id	Name	SBO
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot \text{m}^{-3} \cdot 10^{-6} \text{ mol}$

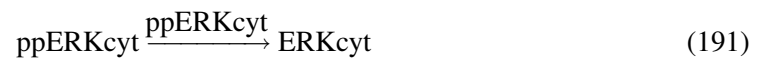
$$v_{95} = \frac{V_{\max\_96} \cdot \text{PP2Acyt} \cdot [\text{ppMEKcyt\_ERKcyt}]}{K_{\text{m\_96}} + [\text{ppMEKcyt\_ERKcyt}]} \quad (190)$$

### 6.96 Reaction R97

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

**Name** R97

### Reaction equation



### Reactant

Table 289: Properties of each reactant.

Id	Name	SBO
ppERKcyt	ppERKcyt	

## Modifier

Table 290: Properties of each modifier.

Id	Name	SBO
ppERKcyt	ppERKcyt	

## Product

Table 291: Properties of each product.

Id	Name	SBO
ERKcyt	ERKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot \text{m}^{-3} \cdot 10^{-6} \text{ mol}$

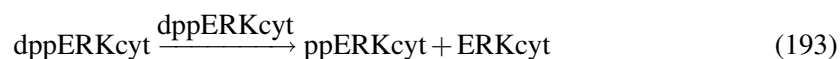
$$v_{96} = \frac{V_{\text{max\_97}} \cdot \text{MKP3cyt} \cdot [\text{ppERKcyt}]}{K_{\text{m\_97}} + [\text{ppERKcyt}]} \quad (192)$$

## 6.97 Reaction R98

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

**Name** R98

## Reaction equation



## Reactant

Table 292: Properties of each reactant.

Id	Name	SBO
dppERKcyt	dppERKcyt	

## Modifier

Table 293: Properties of each modifier.

Id	Name	SBO
dppERKcyt	dppERKcyt	

## Products

Table 294: Properties of each product.

Id	Name	SBO
ppERKcyt	ppERKcyt	
ERKcyt	ERKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot \text{m}^{-3} \cdot 10^{-6} \text{ mol}$

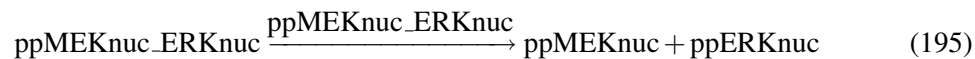
$$v_{97} = \frac{V_{\max\_98} \cdot \text{MKP3cyt} \cdot [\text{dppERKcyt}]}{K_{\text{m\_98}} + [\text{dppERKcyt}]} \quad (194)$$

## 6.98 Reaction R99

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

**Name** R99

## Reaction equation



## Reactant

Table 295: Properties of each reactant.

Id	Name	SBO
ppMEKnuc_ERKnuc	ppMEKnuc_ERKnuc	

## Modifier

Table 296: Properties of each modifier.

Id	Name	SBO
ppMEKnuc_ERKnuc	ppMEKnuc_ERKnuc	

## Products

Table 297: Properties of each product.

Id	Name	SBO
ppMEKnuc	ppMEKnuc	
ppERKnuc	ppERKnuc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

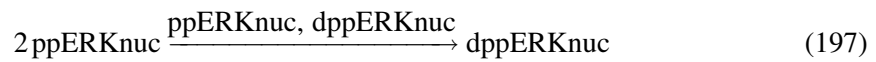
$$v_{98} = \text{kf\_99} \cdot [\text{ppMEKnuc\_ERKnuc}] \quad (196)$$

## 6.99 Reaction R100

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

**Name** R100

## Reaction equation



## Reactant

Table 298: Properties of each reactant.

Id	Name	SBO
ppERKnuc	ppERKnuc	

## Modifiers

Table 299: Properties of each modifier.

Id	Name	SBO
ppERKnuc	ppERKnuc	
dppERKnuc	dppERKnuc	

## Product

Table 300: Properties of each product.

Id	Name	SBO
dppERKnuc	dppERKnuc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{99} = k_{f\_100} \cdot [\text{ppERKnuc}] \cdot [\text{ppERKnuc}] - k_{b\_100} \cdot [\text{dppERKnuc}] \quad (198)$$

### 6.100 Reaction R101

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

**Name** R101

#### Reaction equation



## Reactants

Table 301: Properties of each reactant.

Id	Name	SBO
MEKnuc	MEKnuc	
ERKnuc	ERKnuc	

## Modifiers

Table 302: Properties of each modifier.

Id	Name	SBO
MEKnuc	MEKnuc	
ERKnuc	ERKnuc	
MEKnuc_ERKnuc	MEKnuc_ERKnuc	

## Product

Table 303: Properties of each product.

Id	Name	SBO
MEKnuc_ERKnuc	MEKnuc_ERKnuc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

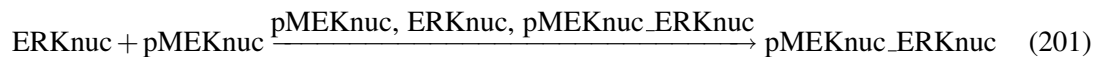
$$v_{100} = k_{f\_101} \cdot [\text{MEKnuc}] \cdot [\text{ERKnuc}] - k_{b\_101} \cdot [\text{MEKnuc\_ERKnuc}] \quad (200)$$

### 6.101 Reaction R102

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

**Name** R102

#### Reaction equation



## Reactants

Table 304: Properties of each reactant.

Id	Name	SBO
ERKnuc	ERKnuc	
pMEKnuc	pMEKnuc	

## Modifiers

Table 305: Properties of each modifier.

Id	Name	SBO
pMEKnuc	pMEKnuc	
ERKnuc	ERKnuc	
pMEKnuc_ERKnuc	pMEKnuc_ERKnuc	

## Product

Table 306: Properties of each product.

Id	Name	SBO
pMEKnuc_ERKnuc	pMEKnuc_ERKnuc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

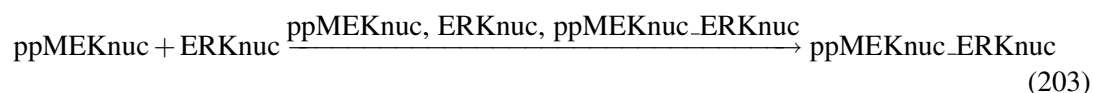
$$v_{101} = k_{f\_102} \cdot [\text{pMEKnuc}] \cdot [\text{ERKnuc}] - k_{b\_102} \cdot [\text{pMEKnuc\_ERKnuc}] \quad (202)$$

### 6.102 Reaction R103

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

**Name** R103

#### Reaction equation



## Reactants

Table 307: Properties of each reactant.

Id	Name	SBO
ppMEKnuc	ppMEKnuc	
ERKnuc	ERKnuc	

## Modifiers

Table 308: Properties of each modifier.

Id	Name	SBO
ppMEKnuc	ppMEKnuc	
ERKnuc	ERKnuc	
ppMEKnuc_ERKnuc	ppMEKnuc_ERKnuc	

## Product

Table 309: Properties of each product.

Id	Name	SBO
ppMEKnuc_ERKnuc	ppMEKnuc_ERKnuc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

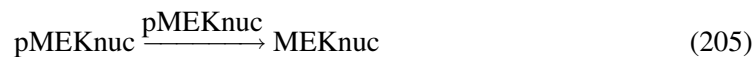
$$v_{102} = k_{f\_103} \cdot [\text{ppMEKnuc}] \cdot [\text{ERKnuc}] - k_{b\_103} \cdot [\text{ppMEKnuc\_ERKnuc}] \quad (204)$$

### 6.103 Reaction R104

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

**Name** R104

#### Reaction equation



## Reactant



Table 310: Properties of each reactant.

Id	Name	SBO
pMEKnuc	pMEKnuc	

## Modifier

Table 311: Properties of each modifier.

Id	Name	SBO
pMEKnuc	pMEKnuc	

## Product

Table 312: Properties of each product.

Id	Name	SBO
MEKnuc	MEKnuc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot \text{m}^{-3} \cdot 10^{-6} \text{ mol}$

$$v_{103} = \frac{V_{\text{max\_104}} \cdot \text{PP2Anuc} \cdot [\text{pMEKnuc}]}{K_{\text{m\_104}} + [\text{pMEKnuc}]} \quad (206)$$

### 6.104 Reaction R105

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

**Name** R105

## Reaction equation



## Reactant

Table 313: Properties of each reactant.

Id	Name	SBO
ppMEKnuc	ppMEKnuc	

## Modifier

Table 314: Properties of each modifier.

Id	Name	SBO
ppMEKnuc	ppMEKnuc	

## Product

Table 315: Properties of each product.

Id	Name	SBO
pMEKnuc	pMEKnuc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot \text{m}^{-3} \cdot 10^{-6} \text{ mol}$

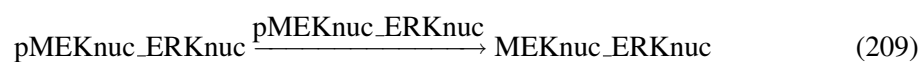
$$v_{104} = \frac{V_{\max\_105} \cdot PP2Anuc \cdot [ppMEKnuc]}{K_{m\_105} + [ppMEKnuc]} \quad (208)$$

### 6.105 Reaction R106

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

**Name** R106

### Reaction equation



## Reactant

Table 316: Properties of each reactant.

Id	Name	SBO
pMEKnuc_ERKnuc	pMEKnuc_ERKnuc	

## Modifier

Table 317: Properties of each modifier.

Id	Name	SBO
pMEKnuc_ERKnuc	pMEKnuc_ERKnuc	

## Product

Table 318: Properties of each product.

Id	Name	SBO
MEKnuc_ERKnuc	MEKnuc_ERKnuc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot \text{m}^{-3} \cdot 10^{-6} \text{ mol}$

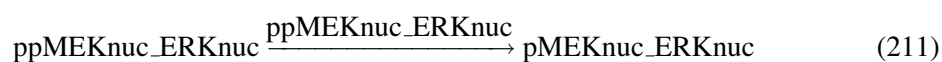
$$v_{105} = \frac{V_{\max\_106} \cdot \text{PP2Anuc} \cdot [\text{pMEKnuc\_ERKnuc}]}{K_{\text{m\_106}} + [\text{pMEKnuc\_ERKnuc}]} \quad (210)$$

### 6.106 Reaction R107

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

**Name** R107

## Reaction equation



## Reactant

Table 319: Properties of each reactant.

Id	Name	SBO
ppMEKnuc_ERKnuc	ppMEKnuc_ERKnuc	

## Modifier

Table 320: Properties of each modifier.

Id	Name	SBO
ppMEKnuc_ERKnuc	ppMEKnuc_ERKnuc	

## Product

Table 321: Properties of each product.

Id	Name	SBO
pMEKnuc_ERKnuc	pMEKnuc_ERKnuc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot \text{m}^{-3} \cdot 10^{-6} \text{ mol}$

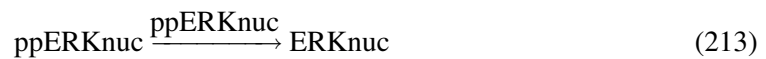
$$v_{106} = \frac{V_{\max\_107} \cdot PP2Anuc \cdot [ppMEKnuc\_ERKnuc]}{K_{m\_107} + [ppMEKnuc\_ERKnuc]} \quad (212)$$

### 6.107 Reaction R108

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

**Name** R108

## Reaction equation



## Reactant

Table 322: Properties of each reactant.

Id	Name	SBO
ppERKnuc	ppERKnuc	

## Modifier

Table 323: Properties of each modifier.

Id	Name	SBO
ppERKnuc	ppERKnuc	

## Product

Table 324: Properties of each product.

Id	Name	SBO
ERKnuc	ERKnuc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot \text{m}^{-3} \cdot 10^{-6} \text{ mol}$

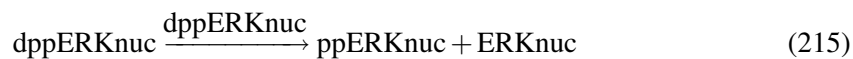
$$v_{107} = \frac{V_{\max\_108} \cdot \text{MKP3nuc} \cdot [\text{ppERKnuc}]}{K_{\text{m\_108}} + [\text{ppERKnuc}]} \quad (214)$$

## 6.108 Reaction R109

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

**Name** R109

## Reaction equation



## Reactant

Table 325: Properties of each reactant.

Id	Name	SBO
dppERKnuc	dppERKnuc	

## Modifier

Table 326: Properties of each modifier.

Id	Name	SBO
dppERKnuc	dppERKnuc	

## Products

Table 327: Properties of each product.

Id	Name	SBO
ppERKnuc	ppERKnuc	
ERKnuc	ERKnuc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot \text{m}^{-3} \cdot 10^{-6} \text{ mol}$

$$v_{108} = \frac{V_{\max\_109} \cdot \text{MKP3nuc} \cdot [\text{dppERKnuc}]}{K_{\text{m\_109}} + [\text{dppERKnuc}]} \quad (216)$$

### 6.109 Reaction R110

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

**Name** R110

## Reaction equation



## Reactant

Table 328: Properties of each reactant.

Id	Name	SBO
pMEKcyt	pMEKcyt	

## Modifier

Table 329: Properties of each modifier.

Id	Name	SBO
pMEKcyt	pMEKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

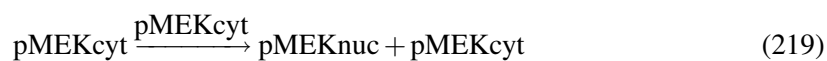
$$v_{109} = \text{kf\_110} \cdot [\text{pMEKcyt}] \quad (218)$$

## 6.110 Reaction R111

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

**Name** R111

## Reaction equation



## Reactant

Table 330: Properties of each reactant.

Id	Name	SBO
pMEKcyt	pMEKcyt	

## Modifier

Table 331: Properties of each modifier.

Id	Name	SBO
pMEKcyt	pMEKcyt	

## Products

Table 332: Properties of each product.

Id	Name	SBO
pMEKnuc	pMEKnuc	
pMEKcyt	pMEKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

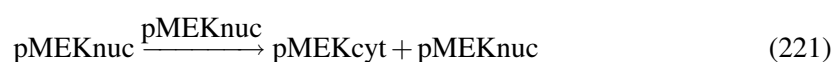
$$v_{110} = \text{kf\_111} \cdot [\text{pMEKcyt}] \quad (220)$$

### 6.111 Reaction R112

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

**Name** R112

## Reaction equation



## Reactant

Table 333: Properties of each reactant.

Id	Name	SBO
pMEKnuc	pMEKnuc	

## Modifier



Table 334: Properties of each modifier.

Id	Name	SBO
pMEKnuc	pMEKnuc	

## Products

Table 335: Properties of each product.

Id	Name	SBO
pMEKcyt	pMEKcyt	
pMEKnuc	pMEKnuc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{111} = \text{kf.112} \cdot [\text{pMEKnuc}] \quad (222)$$

### 6.112 Reaction R113

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

**Name** R113

## Reaction equation



## Reactant

Table 336: Properties of each reactant.

Id	Name	SBO
pMEKnuc	pMEKnuc	

## Modifier

Table 337: Properties of each modifier.

Id	Name	SBO
pMEKnuc	pMEKnuc	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{112} = \text{kf\_113} \cdot [\text{pMEKnuc}] \quad (224)$$

### 6.113 Reaction R114

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

**Name** R114

### Reaction equation



### Reactant

Table 338: Properties of each reactant.

Id	Name	SBO
MEKcyt_ERKcyt	MEKcyt_ERKcyt	

### Modifier

Table 339: Properties of each modifier.

Id	Name	SBO
MEKcyt_ERKcyt	MEKcyt_ERKcyt	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

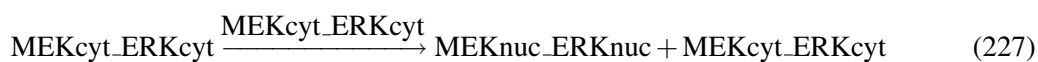
$$v_{113} = \text{kf\_114} \cdot [\text{MEKcyt\_ERKcyt}] \quad (226)$$

### 6.114 Reaction R115

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

**Name** R115

#### Reaction equation



#### Reactant

Table 340: Properties of each reactant.

Id	Name	SBO
MEKcyt_ERKcyt	MEKcyt_ERKcyt	

#### Modifier

Table 341: Properties of each modifier.

Id	Name	SBO
MEKcyt_ERKcyt	MEKcyt_ERKcyt	

#### Products

Table 342: Properties of each product.

Id	Name	SBO
MEKnuc_ERKnuc	MEKnuc_ERKnuc	
MEKcyt_ERKcyt	MEKcyt_ERKcyt	

#### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{114} = \text{kf\_115} \cdot [\text{MEKcyt\_ERKcyt}] \quad (228)$$

### 6.115 Reaction R116

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

**Name** R116

### Reaction equation



### Reactant

Table 343: Properties of each reactant.

Id	Name	SBO
MEKnuc_ERKnuc	MEKnuc_ERKnuc	

### Modifier

Table 344: Properties of each modifier.

Id	Name	SBO
MEKnuc_ERKnuc	MEKnuc_ERKnuc	

### Products

Table 345: Properties of each product.

Id	Name	SBO
MEKcyt_ERKcyt	MEKcyt_ERKcyt	
MEKnuc_ERKnuc	MEKnuc_ERKnuc	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{115} = \text{kf\_116} \cdot [\text{MEKnuc\_ERKnuc}] \quad (230)$$

### 6.116 Reaction R117

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

**Name** R117

### Reaction equation



## Reactant

Table 346: Properties of each reactant.

Id	Name	SBO
MEKnuc_ERKnuc	MEKnuc_ERKnuc	

## Modifier

Table 347: Properties of each modifier.

Id	Name	SBO
MEKnuc_ERKnuc	MEKnuc_ERKnuc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{116} = \text{kf\_117} \cdot [\text{MEKnuc\_ERKnuc}] \quad (232)$$

### 6.117 Reaction R118

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

**Name** R118

## Reaction equation



## Reactant

Table 348: Properties of each reactant.

Id	Name	SBO
ERKcyt	ERKcyt	

## Modifier

Table 349: Properties of each modifier.

Id	Name	SBO
ERKcyt	ERKcyt	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{117} = \text{kf\_118} \cdot [\text{ERKcyt}] \quad (234)$$

### 6.118 Reaction R119

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

**Name** R119

### Reaction equation



### Reactant

Table 350: Properties of each reactant.

Id	Name	SBO
ERKcyt	ERKcyt	

### Modifier

Table 351: Properties of each modifier.

Id	Name	SBO
ERKcyt	ERKcyt	

### Products

Table 352: Properties of each product.

Id	Name	SBO
ERKnuc	ERKnuc	
ERKcyt	ERKcyt	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{118} = \text{kf\_119} \cdot [\text{ERKcyt}] \quad (236)$$

### 6.119 Reaction R120

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

**Name** R120

### Reaction equation



### Reactant

Table 353: Properties of each reactant.

Id	Name	SBO
ERKnuc	ERKnuc	

### Modifier

Table 354: Properties of each modifier.

Id	Name	SBO
ERKnuc	ERKnuc	

### Products

Table 355: Properties of each product.

Id	Name	SBO
ERKcyt	ERKcyt	
ERKnuc	ERKnuc	

**Kinetic Law****Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$ 

$$v_{119} = \text{kf\_120} \cdot [\text{ERKnuc}] \quad (238)$$

**6.120 Reaction R121**

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

**Name** R121**Reaction equation****Reactant**

Table 356: Properties of each reactant.

Id	Name	SBO
ERKnuc	ERKnuc	

**Modifier**

Table 357: Properties of each modifier.

Id	Name	SBO
ERKnuc	ERKnuc	

**Kinetic Law****Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$ 

$$v_{120} = \text{kf\_121} \cdot [\text{ERKnuc}] \quad (240)$$



### 6.121 Reaction R122

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

**Name** R122

#### Reaction equation



#### Reactant

Table 358: Properties of each reactant.

Id	Name	SBO
MEKcyt	MEKcyt	

#### Modifier

Table 359: Properties of each modifier.

Id	Name	SBO
MEKcyt	MEKcyt	

#### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{121} = \text{kf\_122} \cdot [\text{MEKcyt}] \quad (242)$$

### 6.122 Reaction R123

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

**Name** R123

#### Reaction equation



#### Reactant

Table 360: Properties of each reactant.

Id	Name	SBO
MEKcyt	MEKcyt	

## Modifier

Table 361: Properties of each modifier.

Id	Name	SBO
MEKcyt	MEKcyt	

## Products

Table 362: Properties of each product.

Id	Name	SBO
MEKnuc	MEKnuc	
MEKcyt	MEKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{122} = \text{kf\_123} \cdot [\text{MEKcyt}] \quad (244)$$

### 6.123 Reaction R124

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

**Name** R124

## Reaction equation



## Reactant

Table 363: Properties of each reactant.

Id	Name	SBO
MEKnuc	MEKnuc	

## Modifier

Table 364: Properties of each modifier.

Id	Name	SBO
MEKnuc	MEKnuc	

## Products

Table 365: Properties of each product.

Id	Name	SBO
MEKcyt	MEKcyt	
MEKnuc	MEKnuc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{123} = k_{f\_124} \cdot [\text{MEKnuc}] \quad (246)$$

### 6.124 Reaction R125

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

**Name** R125

## Reaction equation



## Reactant

Table 366: Properties of each reactant.

Id	Name	SBO
MEKnuc	MEKnuc	

### Modifier

Table 367: Properties of each modifier.

Id	Name	SBO
MEKnuc	MEKnuc	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

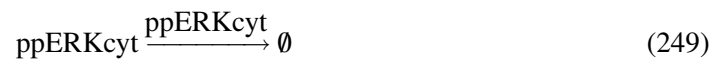
$$v_{124} = k_{f\_125} \cdot [\text{MEKnuc}] \quad (248)$$

### 6.125 Reaction R126

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

**Name** R126

### Reaction equation



### Reactant

Table 368: Properties of each reactant.

Id	Name	SBO
ppERKcyt	ppERKcyt	

### Modifier

Table 369: Properties of each modifier.

Id	Name	SBO
ppERKcyt	ppERKcyt	

**Kinetic Law**

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{125} = \text{kf\_126} \cdot [\text{ppERKcyt}]$$

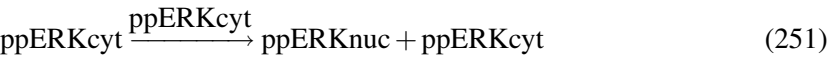
(250)

**6.126 Reaction R127**

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

**Name** R127

**Reaction equation**



**Reactant**

Table 370: Properties of each reactant.

Id	Name	SBO
ppERKcyt	ppERKcyt	

**Modifier**

Table 371: Properties of each modifier.

Id	Name	SBO
ppERKcyt	ppERKcyt	

**Products**

Table 372: Properties of each product.

Id	Name	SBO
ppERKnuc	ppERKnuc	
ppERKcyt	ppERKcyt	

**Kinetic Law**

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

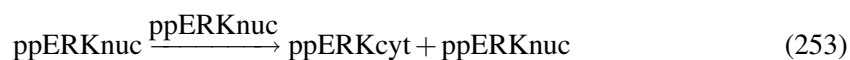
$$v_{126} = k_{f\_127} \cdot [\text{ppERKcyt}] \quad (252)$$

## 6.127 Reaction R128

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

**Name** R128

### Reaction equation



### Reactant

Table 373: Properties of each reactant.

Id	Name	SBO
ppERKnuc	ppERKnuc	

### Modifier

Table 374: Properties of each modifier.

Id	Name	SBO
ppERKnuc	ppERKnuc	

### Products

Table 375: Properties of each product.

Id	Name	SBO
ppERKcyt	ppERKcyt	
ppERKnuc	ppERKnuc	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{127} = k_{f\_128} \cdot [\text{ppERKnuc}] \quad (254)$$

6.128 Reaction R129

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

Name R129

Reaction equation



Reactant

Table 376: Properties of each reactant.

Id	Name	SBO
ppERKnuc	ppERKnuc	

Modifier

Table 377: Properties of each modifier.

Id	Name	SBO
ppERKnuc	ppERKnuc	

Kinetic Law

Derived unit  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{128} = \text{kf\_129} \cdot [\text{ppERKnuc}]$$

(256)

6.129 Reaction R130

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

Name R130

Reaction equation



Reactant

Table 378: Properties of each reactant.

Id	Name	SBO
ppMEKcyt	ppMEKcyt	

### Modifier

Table 379: Properties of each modifier.

Id	Name	SBO
ppMEKcyt	ppMEKcyt	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

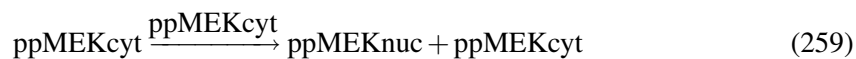
$$v_{129} = \text{kf\_130} \cdot [\text{ppMEKcyt}] \quad (258)$$

### 6.130 Reaction R131

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

**Name** R131

### Reaction equation



### Reactant

Table 380: Properties of each reactant.

Id	Name	SBO
ppMEKcyt	ppMEKcyt	

### Modifier



Table 381: Properties of each modifier.

Id	Name	SBO
ppMEKcyt	ppMEKcyt	

## Products

Table 382: Properties of each product.

Id	Name	SBO
ppMEKnuc	ppMEKnuc	
ppMEKcyt	ppMEKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

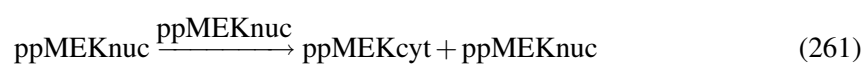
$$v_{130} = \text{kf\_131} \cdot [\text{ppMEKcyt}] \quad (260)$$

### 6.131 Reaction R132

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

**Name** R132

## Reaction equation



## Reactant

Table 383: Properties of each reactant.

Id	Name	SBO
ppMEKnuc	ppMEKnuc	

## Modifier

Table 384: Properties of each modifier.

Id	Name	SBO
ppMEKnuc	ppMEKnuc	

## Products

Table 385: Properties of each product.

Id	Name	SBO
ppMEKcyt	ppMEKcyt	
ppMEKnuc	ppMEKnuc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{131} = \text{kf\_132} \cdot [\text{ppMEKnuc}] \quad (262)$$

### 6.132 Reaction R133

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

**Name** R133

## Reaction equation



## Reactant

Table 386: Properties of each reactant.

Id	Name	SBO
ppMEKnuc	ppMEKnuc	

## Modifier

Table 387: Properties of each modifier.

Id	Name	SBO
ppMEKnuc	ppMEKnuc	

#### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{132} = \text{kf\_133} \cdot [\text{ppMEKnuc}] \quad (264)$$

#### 6.133 Reaction R134

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

**Name** R134

#### Reaction equation



#### Reactant

Table 388: Properties of each reactant.

Id	Name	SBO
ppMEKcyt_ERKcyt	ppMEKcyt_ERKcyt	

#### Modifier

Table 389: Properties of each modifier.

Id	Name	SBO
ppMEKcyt_ERKcyt	ppMEKcyt_ERKcyt	

#### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{133} = \text{kf\_134} \cdot [\text{ppMEKcyt\_ERKcyt}] \quad (266)$$

### 6.134 Reaction R135

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

**Name** R135

#### Reaction equation



#### Reactant

Table 390: Properties of each reactant.

Id	Name	SBO
ppMEKcyt_ERKcyt	ppMEKcyt_ERKcyt	

#### Modifier

Table 391: Properties of each modifier.

Id	Name	SBO
ppMEKcyt_ERKcyt	ppMEKcyt_ERKcyt	

#### Products

Table 392: Properties of each product.

Id	Name	SBO
ppMEKnuc_ERKnuc	ppMEKnuc_ERKnuc	
ppMEKcyt_ERKcyt	ppMEKcyt_ERKcyt	

#### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{134} = \text{kf\_135} \cdot [\text{ppMEKcyt\_ERKcyt}] \quad (268)$$

### 6.135 Reaction R136

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

**Name** R136

### Reaction equation



### Reactant

Table 393: Properties of each reactant.

Id	Name	SBO
ppMEKnuc_ERKnuc	ppMEKnuc_ERKnuc	

### Modifier

Table 394: Properties of each modifier.

Id	Name	SBO
ppMEKnuc_ERKnuc	ppMEKnuc_ERKnuc	

### Products

Table 395: Properties of each product.

Id	Name	SBO
ppMEKcyt_ERKcyt	ppMEKcyt_ERKcyt	
ppMEKnuc_ERKnuc	ppMEKnuc_ERKnuc	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{135} = \text{kf\_136} \cdot [\text{ppMEKnuc\_ERKnuc}] \quad (270)$$

### 6.136 Reaction R137

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

**Name** R137

### Reaction equation



### Reactant

Table 396: Properties of each reactant.

Id	Name	SBO
ppMEKnuc_ERKnuc	ppMEKnuc_ERKnuc	

### Modifier

Table 397: Properties of each modifier.

Id	Name	SBO
ppMEKnuc_ERKnuc	ppMEKnuc_ERKnuc	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

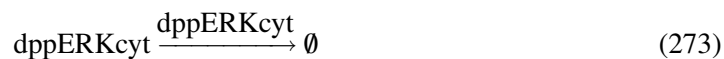
$$v_{136} = \text{kf\_137} \cdot [\text{ppMEKnuc\_ERKnuc}] \quad (272)$$

## 6.137 Reaction R138

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

**Name** R138

### Reaction equation



### Reactant

Table 398: Properties of each reactant.

Id	Name	SBO
dppERKcyt	dppERKcyt	

## Modifier

Table 399: Properties of each modifier.

Id	Name	SBO
dppERKcyt	dppERKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{mol} \cdot \text{m}^{-3}$

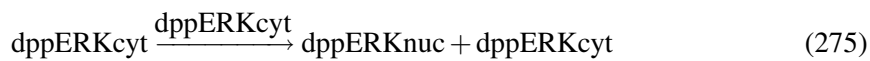
$$v_{137} = \text{kf\_138} \cdot [\text{dppERKcyt}] \quad (274)$$

## 6.138 Reaction R139

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

**Name** R139

## Reaction equation



## Reactant

Table 400: Properties of each reactant.

Id	Name	SBO
dppERKcyt	dppERKcyt	

## Modifier

Table 401: Properties of each modifier.

Id	Name	SBO
dppERKcyt	dppERKcyt	

## Products

Table 402: Properties of each product.

Id	Name	SBO
dppERKnuc	dppERKnuc	
dppERKcyt	dppERKcyt	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{mol} \cdot \text{m}^{-3}$

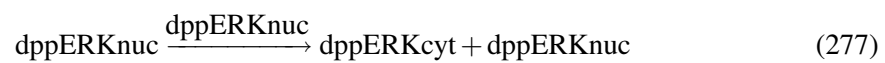
$$v_{138} = \text{kf\_139} \cdot [\text{dppERKcyt}] \quad (276)$$

### 6.139 Reaction R140

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

**Name** R140

### Reaction equation



### Reactant

Table 403: Properties of each reactant.

Id	Name	SBO
dppERKnuc	dppERKnuc	

### Modifier

Table 404: Properties of each modifier.

Id	Name	SBO
dppERKnuc	dppERKnuc	

### Products



Table 405: Properties of each product.

Id	Name	SBO
dppERKcyt	dppERKcyt	
dppERKnuc	dppERKnuc	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{139} = \text{kf\_140} \cdot [\text{dppERKnuc}] \quad (278)$$

### 6.140 Reaction R141

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

**Name** R141

### Reaction equation



### Reactant

Table 406: Properties of each reactant.

Id	Name	SBO
dppERKnuc	dppERKnuc	

### Modifier

Table 407: Properties of each modifier.

Id	Name	SBO
dppERKnuc	dppERKnuc	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{140} = \text{kf\_141} \cdot [\text{dppERKnuc}] \quad (280)$$

### 6.141 Reaction R142

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

**Name** R142

#### Reaction equation



#### Reactant

Table 408: Properties of each reactant.

Id	Name	SBO
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	

#### Modifier

Table 409: Properties of each modifier.

Id	Name	SBO
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	

#### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{141} = \text{kf\_142} \cdot [\text{pMEKcyt\_ERKcyt}] \quad (282)$$

### 6.142 Reaction R143

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

**Name** R143

#### Reaction equation



#### Reactant

Table 410: Properties of each reactant.

Id	Name	SBO
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	

## Modifier

Table 411: Properties of each modifier.

Id	Name	SBO
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	

## Products

Table 412: Properties of each product.

Id	Name	SBO
pMEKnuc_ERKnuc	pMEKnuc_ERKnuc	
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{142} = \text{kf\_143} \cdot [\text{pMEKcyt\_ERKcyt}] \quad (284)$$

### 6.143 Reaction R144

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

**Name** R144

## Reaction equation



## Reactant

Table 413: Properties of each reactant.

Id	Name	SBO
pMEKnuc_ERKnuc	pMEKnuc_ERKnuc	

## Modifier

Table 414: Properties of each modifier.

Id	Name	SBO
pMEKnuc_ERKnuc	pMEKnuc_ERKnuc	

## Products

Table 415: Properties of each product.

Id	Name	SBO
pMEKcyt_ERKcyt	pMEKcyt_ERKcyt	
pMEKnuc_ERKnuc	pMEKnuc_ERKnuc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{143} = \text{kf\_144} \cdot [\text{pMEKnuc\_ERKnuc}] \quad (286)$$

### 6.144 Reaction R145

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

**Name** R145

## Reaction equation



## Reactant

Table 416: Properties of each reactant.

Id	Name	SBO
pMEKnuc_ERKnuc	pMEKnuc_ERKnuc	

## Modifier

Table 417: Properties of each modifier.

Id	Name	SBO
pMEKnuc_ERKnuc	pMEKnuc_ERKnuc	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

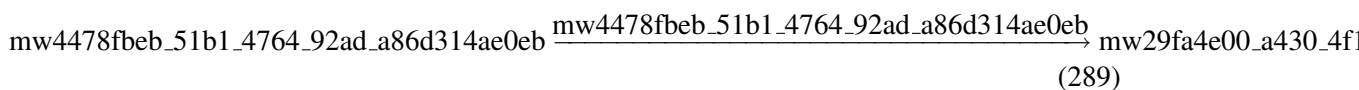
$$v_{144} = \text{kf\_145} \cdot [\text{pMEKnuc\_ERKnuc}] \quad (288)$$

### 6.145 Reaction [mwe8ee00ff\\_3d59\\_44d5\\_8d7f\\_a2074823f29d](#)

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

**Name** reaction\_1

## Reaction equation



## Reactant

Table 418: Properties of each reactant.

Id	Name	SBO
mw4478fbeb_51b1_4764_92ad_a86d314ae0eb	source	

## Modifier

Table 419: Properties of each modifier.

Id	Name	SBO
mw4478fbeb_51b1_4764_92ad_a86d314ae0eb	source	

## Product

Table 420: Properties of each product.

Id	Name	SBO
mw29fa4e00_a430_4f11_b62e_1bcbc0a767a0	NGF	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{145} = \text{mw7d6fb5c7\_061a\_49ff\_99a2\_d76de2f025f7} \cdot [\text{mw4478fbeb\_51b1\_4764\_92ad\_a86d314ae0eb}] \quad (290)$$

Table 421: Properties of each parameter.

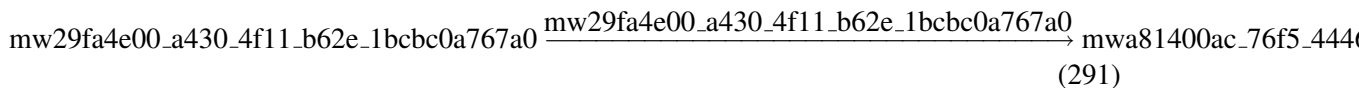
Id	Name	SBO	Value	Unit	Constant
mw7d6fb5c7-_061a-_49ff_99a2-_d76de2f025f7	ksynthngf		$3.849 \cdot 10^{-8}$	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
				0.0166666666666667	dimensionless

## 6.146 Reaction mw711542fd\_b235\_40f7\_9782\_f78eb654d773

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

**Name** reaction\_2

### Reaction equation



## Reactant

Table 422: Properties of each reactant.

Id	Name	SBO
mw29fa4e00_a430_4f11_b62e_1bcbc0a767a0	NGF	

## Modifier

Table 423: Properties of each modifier.

Id	Name	SBO
mw29fa4e00_a430_4f11_b62e_1bcbc0a767a0	NGF	

## Product

Table 424: Properties of each product.

Id	Name	SBO
mwa81400ac_76f5_4446_8a4d_6446ab4b11c9	NGFdeg	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{146} = \text{mw65c9272f\_da7a\_4626\_86c0\_f834524601e6} \cdot [\text{mw29fa4e00\_a430\_4f11\_b62e\_1bcbc0a767a0}] \quad (292)$$

Table 425: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
mw65c9272f\_da7a\_4626\_86c0\_f834524601e6	kdegng		0.001	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
				0.0166666666666667	dimensionless

### 6.147 Reaction [mw65c9272f\\\_da7a\\\_4626\\\_86c0\\\_f834524601e6](#)

This is a reversible reaction of two reactants forming one product influenced by three modifiers.

**Name** reaction\_3

Reaction equation

$$\text{mwe979ec8f\_a55c\_470c\_a554\_9fa8013eab74} + \text{mw29fa4e00\_a430\_4f11\_b62e\_1bcbc0a767a0}$$

(293)

mwe979ec8f\_a55c\_470c\_a554\_9fa8013eab74

mw29fa4e00\_a430\_4f11\_b62e\_1bcbc0a767a0

Reactants

Table 426: Properties of each reactant.

Id	Name	SBO
mwe979ec8f_a55c_470c_a554_9fa8013eab74	NGFR_interstitial_fluid	
mw29fa4e00_a430_4f11_b62e_1bcbc0a767a0	NGF	

Modifiers

Table 427: Properties of each modifier.

Id	Name	SBO
mwe979ec8f_a55c_470c_a554_9fa8013eab74	NGFR_interstitial_fluid	
mw29fa4e00_a430_4f11_b62e_1bcbc0a767a0	NGF	
mw6782adfa_29ee_41a8_acbb_4c86c6c81596	NGFR_L_interstitial_fluid	

Product

Table 428: Properties of each product.

Id	Name	SBO
mw6782adfa_29ee_41a8_acbb_4c86c6c81596	NGFR_L_interstitial_fluid	

Kinetic Law

Derived unit  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$\begin{aligned} v_{147} = & \text{mw4b2ef456\_cb6c\_46b8\_919b\_734f320058c1} \\ & \cdot [\text{mwe979ec8f\_a55c\_470c\_a554\_9fa8013eab74}] \\ & \cdot [\text{mw29fa4e00\_a430\_4f11\_b62e\_1bcbc0a767a0}] \\ & - \text{mw3d826840\_83ab\_4394\_ae58\_99f8d7180f29} \\ & \cdot [\text{mw6782adfa\_29ee\_41a8\_acbb\_4c86c6c81596}] \end{aligned}$$

(294)



Table 429: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
mw4b2ef456- _cb6c- _46b8_919b- _734f320058c1	konngf		372.000	$\text{m}^3 \cdot \text{mol}^{-1} \cdot \text{s}^{-1}$	<input checked="" type="checkbox"/> dimensionless
mw3d826840- _83ab- _4394_ae58- _99f8d7180f29	koffngf		0.004	$\text{s}^{-1}$	<input checked="" type="checkbox"/> dimensionless

### 6.148 Reaction mw02775189\_5c04\_4c2f\_a5f4\_2f15723e1ece

This is a reversible reaction of two reactants forming one product influenced by three modifiers.

**Name** reaction\_4

#### Reaction equation

mw29fa4e00\_a430\_4f11\_b62e\_1bcbc0a767a0 + mwe599c4c1\_2d8e\_446c\_bf3f\_4c97baced8a9  $\xrightleftharpoons[(295)]{\text{mw29fa4e00_a430_4f11_b62e_1bcbc0a767a0}}$

#### Reactants

Table 430: Properties of each reactant.

Id	Name	SBO
mw29fa4e00_a430_4f11_b62e_1bcbc0a767a0	NGF	
mwe599c4c1_2d8e_446c_bf3f_4c97baced8a9	tanezumab	

#### Modifiers

Table 431: Properties of each modifier.

Id	Name	SBO
mw29fa4e00_a430_4f11_b62e_1bcbc0a767a0	NGF	
mwe599c4c1_2d8e_446c_bf3f_4c97baced8a9	tanezumab	
mw46e8693e_348e_4f1d_8c49_c13485fae7ba	NGF_tanezumab	

#### Product

Table 432: Properties of each product.

Id	Name	SBO
mw46e8693e_348e_4f1d_8c49_c13485fae7ba	NGF_tanezumab	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{mol} \cdot \text{m}^{-3}$

$$\begin{aligned}
 v_{148} = & \text{mw748e0940\_792f\_4420\_8ece\_0de52ecaa556} \\
 & \cdot [\text{mw29fa4e00\_a430\_4f11\_b62e\_1bcbc0a767a0}] \\
 & \cdot [\text{mwe599c4c1\_2d8e\_446c\_bf3f\_4c97baced8a9}] \\
 & - \text{mw87c66aa4\_69ab\_4cad\_aa55\_4b28455f804a} \\
 & \cdot [\text{mw46e8693e\_348e\_4f1d\_8c49\_c13485fae7ba}]
 \end{aligned} \tag{296}$$

Table 433: Properties of each parameter.

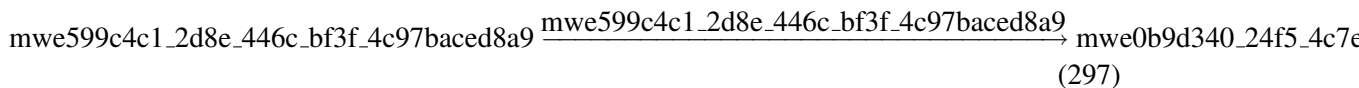
Id	Name	SBO	Value	Unit	Constant
mw748e0940- _792f- _4420_8ece- _0de52ecaa556	kontz		16.200	$\text{m}^3 \cdot \text{mol}^{-1} \cdot \text{s}^{-1}$	<input checked="" type="checkbox"/> 16.66666666666667 dimensionless
mw87c66aa4- _69ab- _4cad_aa55- _4b28455f804a	kofftz		$1.8 \cdot 10^{-4}$	$\text{s}^{-1}$	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless

### 6.149 Reaction mwfb02ea2a\_1f06\_4f8f\_80a0\_721149f213ff

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

**Name** reaction\_5

### Reaction equation



### Reactant

Table 434: Properties of each reactant.

Id	Name	SBO
mwe599c4c1_2d8e_446c_bf3f_4c97baced8a9	tanezumab	

**Modifier**

Table 435: Properties of each modifier.

Id	Name	SBO
mwe599c4c1_2d8e_446c_bf3f_4c97baced8a9	tanezumab	

**Product**

Table 436: Properties of each product.

Id	Name	SBO
mwe0b9d340_24f5_4c7e_a80f_4faadae6c0fc	tz_deg	

**Kinetic Law****Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$ 

$$v_{149} = \text{mw27805dbc\_be23\_402e\_95ec\_fab51829ca51} \cdot [\text{mwe599c4c1\_2d8e\_446c\_bf3f\_4c97baced8a9}] \quad (298)$$

Table 437: Properties of each parameter.

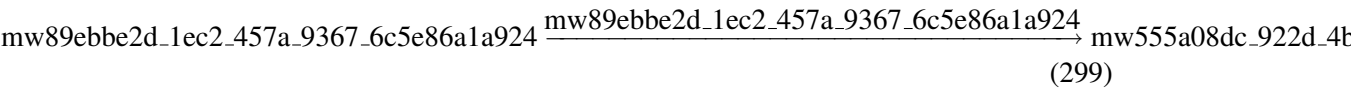
Id	Name	SBO	Value	Unit	Constant
mw27805dbc-_be23-_402e_95ec-_fab51829ca51	kdegtz		$2.3 \cdot 10^{-5}$	$\text{s}^{-1}$	<input checked="" type="checkbox"/> 0.0166666666666667 dimensionless

**6.150 Reaction** mw12b652db\_d0da\_4723\_b160\_001fa36f9190

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

**Name** reaction\_6

Reaction equation



Reactant

Table 438: Properties of each reactant.

Id	Name	SBO
mw89ebbe2d_1ec2_457a_9367_6c5e86a1a924	trkaI	

Modifier

Table 439: Properties of each modifier.

Id	Name	SBO
mw89ebbe2d_1ec2_457a_9367_6c5e86a1a924	trkaI	

Product

Table 440: Properties of each product.

Id	Name	SBO
mw555a08dc_922d_4b35_8f69_5c6e8a4ad614	trkaI_deg	

Kinetic Law

Derived unit  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{150} = \text{mw2bbef0c4\_48a5\_4757\_8f66\_81da5c6894bd} \cdot [\text{mw89ebbe2d\_1ec2\_457a\_9367\_6c5e86a1a924}]$$

(300)

Table 441: Properties of each parameter.

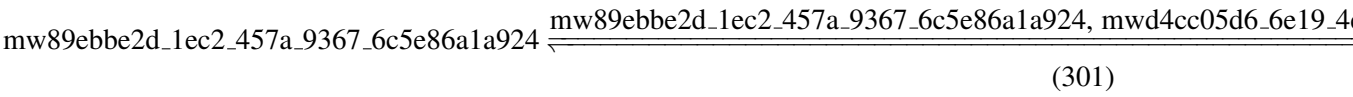
Id	Name	SBO	Value	Unit	Constant
mw2bbef0c4-_48a5-_4757_8f66-_81da5c6894bd	kdegtrkaI		0.002	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
				0.0166666666666667	dimensionless

6.151 Reaction mwffc6fab3\_9f90\_4da4\_bf71\_214b9b723899

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

Name reaction\_7

Reaction equation



Reactant

Table 442: Properties of each reactant.

Id	Name	SBO
mw89ebbe2d_1ec2_457a_9367_6c5e86a1a924	trkaI	

Modifiers

Table 443: Properties of each modifier.

Id	Name	SBO
mw89ebbe2d_1ec2_457a_9367_6c5e86a1a924	trkaI	
mwd4cc05d6_6e19_4e2e_b540_45954f2df4f0	trkaI_int	

Product

Table 444: Properties of each product.

Id	Name	SBO
mwd4cc05d6_6e19_4e2e_b540_45954f2df4f0	trkaI_int	

Kinetic Law

Derived unit  $\text{s}^{-1} \cdot 10^{-6} \text{ mol}$

$$\begin{aligned}
 v_{151} = & \text{mw307c003f\_3906\_4fa9\_a1a8\_bafaa3d0d901} \\
 & \cdot [\text{mw89ebbe2d\_1ec2\_457a\_9367\_6c5e86a1a924}] \\
 & \cdot \text{vol}(\text{mwc2fe3668\_8fb0\_4cfb\_b795\_99057e61e290}) \\
 & - \text{mw6208f472\_c677\_43ef\_a590\_554bc0d88d2c} \\
 & \cdot [\text{mwd4cc05d6\_6e19\_4e2e\_b540\_45954f2df4f0}] \\
 & \cdot \text{vol}(\text{mw3bc142df\_1951\_4fa9\_b0a7\_011c95012bbf})
 \end{aligned}
 \tag{302}$$

Table 445: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
mw307c003f- _3906- _4fa9_a1a8- _bafaa3d0d901	ktrkaiin		83.33	s <sup>-1</sup>	<input checked="" type="checkbox"/>
mw6208f472- _c677- _43ef_a590- _554bc0d88d2c	ktrkaiout		1000000.00	s <sup>-1</sup>	<input checked="" type="checkbox"/>
				0.0166666666666667	dimensionless

## 6.152 Reaction [mwf371eb20\\_7bda\\_4140\\_9a43\\_dfad70900057](#)

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

**Name** reaction\_8

### Reaction equation

$$\text{mw6782adfa\_29ee\_41a8\_acbb\_4c86c6c81596} \xrightleftharpoons[\text{L\_NGFR}]{\text{mw6782adfa\_29ee\_41a8\_acbb\_4c86c6c81596, L\_NGFR}} \text{L\_NGFR}
 \tag{303}$$

### Reactant

Table 446: Properties of each reactant.

Id	Name	SBO
mw6782adfa_29ee_41a8_acbb_4c86c6c81596	NGFR_L_interstitial_fluid	

### Modifiers

Table 447: Properties of each modifier.

Id	Name	SBO
mw6782adfa_29ee_41a8_acbb_4c86c6c81596 L_NGFR	NGFR_L_interstitial_fluid L_NGFR	

## Product

Table 448: Properties of each product.

Id	Name	SBO
L_NGFR	L_NGFR	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol}$

$$\begin{aligned}
 v_{152} = & \text{mw5d69c45e\_20e6\_4a18\_b22a\_b79692b9c57d} \\
 & \cdot [\text{mw6782adfa\_29ee\_41a8\_acbb\_4c86c6c81596}] \\
 & \cdot \text{vol}(\text{mwc2fe3668\_8fb0\_4cfb\_b795\_99057e61e290}) \\
 & - \text{mw88063cbd\_d06b\_40bd\_bbed\_3f8a4a9ee082} \cdot [\text{L\_NGFR}] \\
 & \cdot \text{vol}(\text{mw3bc142df\_1951\_4fa9\_b0a7\_011c95012bbf})
 \end{aligned} \tag{304}$$

Table 449: Properties of each parameter.

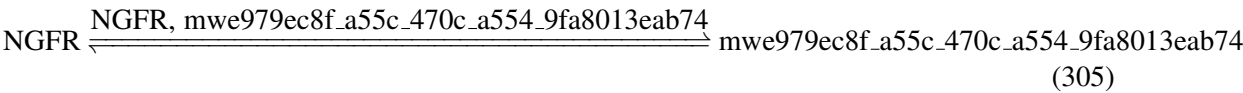
Id	Name	SBO	Value	Unit	Constant
mw5d69c45e- _20e6- _4a18_b22a- _b79692b9c57d	ktranstngfrlout		2000.0	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
mw88063cbd- _d06b- _40bd_bbed- _3f8a4a9ee082	ktransngfrlin		2000.0	$\text{s}^{-1}$	<input checked="" type="checkbox"/>

### 6.153 Reaction [mw8105f0dc\\_19ad\\_4f7a\\_80df\\_3f84de216c42](#)

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

**Name** Intercomp mass transfer

Reaction equation



Reactant

Table 450: Properties of each reactant.

Id	Name	SBO
NGFR	NGFR	

Modifiers

Table 451: Properties of each modifier.

Id	Name	SBO
NGFR	NGFR	
mwe979ec8f\_a55c\_470c\_a554\_9fa8013eab74	NGFR_interstitial_fluid	

Product

Table 452: Properties of each product.

Id	Name	SBO
mwe979ec8f\_a55c\_470c\_a554\_9fa8013eab74	NGFR_interstitial_fluid	

Kinetic Law

Derived unit  $\text{s}^{-1} \cdot 10^{-6} \text{ mol}$

$$\begin{aligned} v_{153} = & \text{mwc3897a3e\_bec3\_478d\_9450\_afc4751c2775} \cdot [\text{NGFR}] \\ & \cdot \text{vol}(\text{mw3bc142df\_1951\_4fa9\_b0a7\_011c95012bbf}) \\ & - \text{mwda0271e2\_458c\_4419\_9c7d\_8fb1bf692c13} \\ & \cdot [\text{mwe979ec8f\_a55c\_470c\_a554\_9fa8013eab74}] \\ & \cdot \text{vol}(\text{mwc2fe3668\_8fb0\_4cfb\_b795\_99057e61e290}) \end{aligned} \tag{306}$$



Table 453: Properties of each parameter.

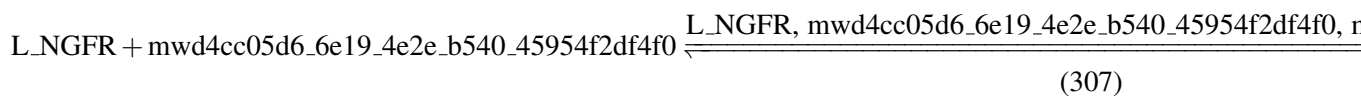
Id	Name	SBO	Value	Unit	Constant
mwc3897a3e-_bec3-_478d_9450-_afc4751c2775	ktransinneuron		2000.0	s <sup>-1</sup>	<input checked="" type="checkbox"/>
mwda0271e2-_458c-_4419_9c7d-_8fb1bf692c13	ktransoutneuron		2000.0	s <sup>-1</sup>	<input checked="" type="checkbox"/>
				0.0166666666666667	dimensionless

### 6.154 Reaction [mw9da48a51\\_bbd0\\_4395\\_9883\\_8441d8153b00](#)

This is a reversible reaction of two reactants forming one product influenced by three modifiers.

**Name** reaction\_9

#### Reaction equation



#### Reactants

Table 454: Properties of each reactant.

Id	Name	SBO
L_NGFR	L_NGFR	
mwd4cc05d6_6e19_4e2e_b540_45954f2df4f0	trkaI_int	

#### Modifiers

Table 455: Properties of each modifier.

Id	Name	SBO
L_NGFR	L_NGFR	
mwd4cc05d6_6e19_4e2e_b540_45954f2df4f0	trkaI_int	
mwe009ad7f_90fd_4186_8855_77780724ddb8	L_NGFR_I	

#### Product

Table 456: Properties of each product.

Id	Name	SBO
mwe009ad7f_90fd_4186_8855_77780724ddb8	L_NGFR.I	

### Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{mol} \cdot \text{m}^{-3}$

$$\begin{aligned}
 v_{154} = & \text{mwfc8fe87e\_6841\_4214\_9c2f\_5d821794f38d} \cdot [\text{L\_NGFR}] \\
 & \cdot [\text{mwd4cc05d6\_6e19\_4e2e\_b540\_45954f2df4f0}] \\
 & - \text{mw3716109a\_c83e\_4fd4\_911e\_ccc67b036bb7} \\
 & \cdot [\text{mwe009ad7f\_90fd\_4186\_8855\_77780724ddb8}]
 \end{aligned}
 \tag{308}$$

Table 457: Properties of each parameter.

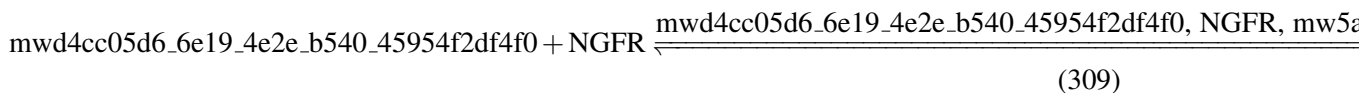
Id	Name	SBO	Value	Unit	Constant
mwfc8fe87e- _6841- _4214_9c2f- _5d821794f38d	kontrkaI		$10^7$	$\text{m}^3 \cdot \text{mol}^{-1} \cdot \text{s}^{-1} \cdot$ 0.0010 dimensionless	<input checked="" type="checkbox"/>
mw3716109a- _c83e- _4fd4_911e- _ccc67b036bb7	kofftrkaI		0.001	$\text{s}^{-1} \cdot \text{dimensionless}$	<input checked="" type="checkbox"/>

### 6.155 Reaction [mwc467edb6\\_a255\\_45d6\\_8014\\_33bd0209b36f](#)

This is a reversible reaction of two reactants forming one product influenced by three modifiers.

**Name** reaction\_10

### Reaction equation



### Reactants

Table 458: Properties of each reactant.

Id	Name	SBO
mwd4cc05d6_6e19_4e2e_b540_45954f2df4f0	trkaI_int	
NGFR	NGFR	

## Modifiers

Table 459: Properties of each modifier.

Id	Name	SBO
mwd4cc05d6_6e19_4e2e_b540_45954f2df4f0	trkaI_int	
NGFR	NGFR	
mw5afa8250_0cf0_40a2_a97a_f7cf20a9cfbd	NGFR_I	

## Product

Table 460: Properties of each product.

Id	Name	SBO
mw5afa8250_0cf0_40a2_a97a_f7cf20a9cfbd	NGFR_I	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$\begin{aligned}
 v_{155} = & \text{mwd74ca4a6\_566f\_4161\_859e\_2b05bf2851fc} \\
 & \cdot [\text{mwd4cc05d6\_6e19\_4e2e\_b540\_45954f2df4f0}] \\
 & \cdot [\text{NGFR}] - \text{mw924e0439\_7ac5\_4812\_b1c2\_11e46b4737b8} \\
 & \cdot [\text{mw5afa8250\_0cf0\_40a2\_a97a\_f7cf20a9cfbd}]
 \end{aligned} \tag{310}$$

Table 461: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
mwd74ca4a6- _566f- _4161_859e- _2b05bf2851fc	kontrkaI		$10^7$	$\text{m}^3 \cdot \text{mol}^{-1} \cdot \text{s}^{-1} \cdot$ 0.0010 dimensionless	<input checked="" type="checkbox"/>

Id	Name	SBO	Value	Unit	Constant
mw924e0439- _7ac5- _4812_b1c2- _11e46b4737b8	kofftrkaI		0.001	s <sup>-1</sup> · dimensionless	<input checked="" type="checkbox"/>

### 6.156 Reaction [mwe4f77287\\_e0fe\\_47f7\\_a74e\\_312151e578a4](#)

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

**Name** reaction\_14

#### Reaction equation

mw5afa8250\_0cf0\_40a2\_a97a\_f7cf20a9cfbd  $\xrightarrow{\text{mw5afa8250_0cf0_40a2_a97a_f7cf20a9cfbd}}$  mwb4295eb0\_bd92\_4221\_1  
(311)

#### Reactant

Table 462: Properties of each reactant.

Id	Name	SBO
mw5afa8250_0cf0_40a2_a97a_f7cf20a9cfbd	NGFR_I	

#### Modifier

Table 463: Properties of each modifier.

Id	Name	SBO
mw5afa8250_0cf0_40a2_a97a_f7cf20a9cfbd	NGFR_I	

#### Product

Table 464: Properties of each product.

Id	Name	SBO
mwb4295eb0_bd92_4221_b49d_bbbd48ca25bc	NGFR_I_deg	

#### Kinetic Law

**Derived unit** s<sup>-1</sup> · 10<sup>-6</sup> mol · m<sup>-3</sup>

$$v_{156} = \text{mw}ee585562\_2580\_4943\_bd3e\_731f12217004 \cdot [\text{mw}5afa8250\_0cf0\_40a2\_a97a\_f7cf20a9cfbd] \quad (312)$$

Table 465: Properties of each parameter.

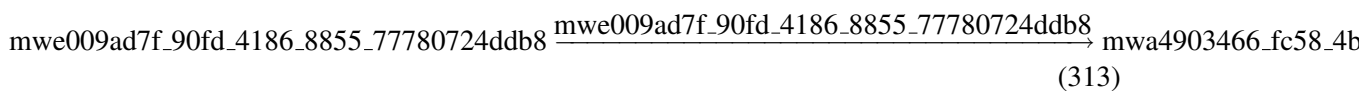
Id	Name	SBO	Value	Unit	Constant
<a href="#">mw</a> ee585562- _2580- _4943_bd3e- _731f12217004	kdegEI		0.017	s <sup>-1</sup>	<input checked="" type="checkbox"/>
				0.01666666666666667	dimensionless

### 6.157 Reaction [mw](#)4f0ee780\_12f5\_436d\_a227\_c5e7cd420259

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

**Name** reaction\_15

#### Reaction equation



#### Reactant

Table 466: Properties of each reactant.

Id	Name	SBO
<a href="#">mwe</a> 009ad7f_90fd_4186_8855_77780724ddb8	L_NGFR_I	

#### Modifier

Table 467: Properties of each modifier.

Id	Name	SBO
<a href="#">mwe</a> 009ad7f_90fd_4186_8855_77780724ddb8	L_NGFR_I	

#### Product

Table 468: Properties of each product.

Id	Name	SBO
mwa4903466_fc58_4bfe_b3ec_76a90f9d20e2	L_NGFR.I_deg	

## Kinetic Law

**Derived unit**  $\text{s}^{-1} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3}$

$$v_{157} = \text{mwfbbeb575a\_0864\_4d0d\_b862\_240f7f6506c1} \cdot [\text{mwe009ad7f\_90fd\_4186\_8855\_77780724ddb8}] \quad (314)$$

Table 469: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
mwfbbeb575a- _0864- _4d0d_b862- _240f7f6506c1	kdegEI		0.017	$\text{s}^{-1}$	<input checked="" type="checkbox"/>
			0.01666666666666667	dimensionless	

## 7 Derived Rate Equations

When interpreted as an ordinary differential equation framework, this model implies the following set of equations for the rates of change of each species.

Identifiers for kinetic laws highlighted in gray cannot be verified to evaluate to units of SBML substance per time. As a result, some SBML interpreters may not be able to verify the consistency of the units on quantities in the model. Please check if

- parameters without an unit definition are involved or
- volume correction is necessary because the `hasOnlySubstanceUnits` flag may be set to `false` and `spacialDimensions`  $> 0$  for certain species.

### 7.1 Species NGFR

**Name** NGFR

**Initial concentration**  $0.06189368 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in six reactions (as a reactant in [mw8105f0dc\\_19ad\\_4f7a\\_80df\\_3f84de216c42](#), [mwc467edb6\\_a255\\_45d6\\_8014\\_33bd0209b36f](#) and as a product in [R1](#) and as a modifier in [R1](#), [mw8105f0dc\\_19ad\\_4f7a\\_80df\\_3f84de216c42](#), [mwc467edb6\\_a255\\_45d6\\_8014\\_33bd0209b36f](#)).

$$\frac{d}{dt}\text{NGFR} = v_1 - v_{153} - v_{155} \quad (315)$$

## 7.2 Species L\_NGFR

**Name** L\_NGFR

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in six reactions (as a reactant in [R3](#), [mw9da48a51\\_bbd0\\_4395\\_9883-\\_8441d8153b00](#) and as a product in [mwf371eb20\\_7bda\\_4140\\_9a43\\_dfad70900057](#) and as a modifier in [R3](#), [mwf371eb20\\_7bda\\_4140\\_9a43\\_dfad70900057](#), [mw9da48a51\\_bbd0\\_4395-\\_9883\\_8441d8153b00](#)).

$$\frac{d}{dt}\text{L\_NGFR} = v_{152} - v_2 - v_{154} \quad (316)$$

## 7.3 Species pTrkA

**Name** pTrkA

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in 18 reactions (as a reactant in [R4](#), [R18](#), [R19](#), [R20](#), [R24](#), [R25](#), [R32](#), [R39](#) and as a product in [R3](#), [R39](#) and as a modifier in [R4](#), [R18](#), [R19](#), [R20](#), [R24](#), [R25](#), [R32](#), [R39](#)).

$$\frac{d}{dt}\text{pTrkA} = v_2 + v_{38} - v_3 - v_{17} - v_{18} - v_{19} - v_{23} - v_{24} - v_{31} - v_{38} \quad (317)$$

## 7.4 Species pTrkA\_endo

**Name** pTrkA\_endo

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in 13 reactions (as a reactant in [R11](#), [R21](#), [R22](#), [R23](#), [R26](#), [R27](#) and as a product in [R4](#) and as a modifier in [R11](#), [R21](#), [R22](#), [R23](#), [R26](#), [R27](#)).

$$\frac{d}{dt}\text{pTrkA\_endo} = v_3 - v_{10} - v_{20} - v_{21} - v_{22} - v_{25} - v_{26} \quad (318)$$

## 7.5 Species Shc\_pTrkA

**Name** Shc\_pTrkA

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in eleven reactions (as a reactant in [R5](#), [R28](#), [R33](#), [R40](#) and as a product in [R18](#), [R40](#) and as a modifier in [R5](#), [R18](#), [R28](#), [R33](#), [R40](#)).

$$\frac{d}{dt}\text{Shc\_pTrkA} = v_{17} + v_{39} - v_4 - v_{27} - v_{32} - v_{39} \quad (319)$$

## 7.6 Species Shc\_pTrkA\_endo

**Name** Shc\_pTrkA\_endo

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in seven reactions (as a reactant in [R12](#), [R29](#) and as a product in [R5](#), [R21](#) and as a modifier in [R12](#), [R21](#), [R29](#)).

$$\frac{d}{dt} \text{Shc\_pTrkA\_endo} = v_4 + v_{20} - v_{11} - v_{28} \quad (320)$$

## 7.7 Species pShc\_pTrkA

**Name** pShc\_pTrkA

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in twelve reactions (as a reactant in [R6](#), [R34](#), [R41](#), [R49](#) and as a product in [R19](#), [R28](#), [R41](#) and as a modifier in [R6](#), [R19](#), [R34](#), [R41](#), [R49](#)).

$$\frac{d}{dt} \text{pShc\_pTrkA} = v_{18} + v_{27} + v_{40} - v_5 - v_{33} - v_{40} - v_{48} \quad (321)$$

## 7.8 Species pShc\_pTrkA\_endo

**Name** pShc\_pTrkA\_endo

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in eight reactions (as a reactant in [R13](#), [R50](#) and as a product in [R6](#), [R22](#), [R29](#) and as a modifier in [R13](#), [R22](#), [R50](#)).

$$\frac{d}{dt} \text{pShc\_pTrkA\_endo} = v_5 + v_{21} + v_{28} - v_{12} - v_{49} \quad (322)$$

## 7.9 Species Grb2\_SOS\_pShc\_pTrkA

**Name** Grb2\_SOS\_pShc\_pTrkA

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in 14 reactions (as a reactant in [R7](#), [R35](#), [R42](#), [R58](#) and as a product in [R20](#), [R42](#), [R49](#), [R58](#) and as a modifier in [R7](#), [R20](#), [R35](#), [R42](#), [R49](#), [R58](#)).

$$\frac{d}{dt} \text{Grb2\_SOS\_pShc\_pTrkA} = v_{19} + v_{41} + v_{48} + v_{57} - v_6 - v_{34} - v_{41} - v_{57} \quad (323)$$



## 7.10 Species Grb2\_SOS\_pShc\_pTrkA\_endo

**Name** Grb2\_SOS\_pShc\_pTrkA\_endo

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in seven reactions (as a reactant in [R14](#) and as a product in [R7](#), [R23](#), [R50](#) and as a modifier in [R14](#), [R23](#), [R50](#)).

$$\frac{d}{dt} \text{Grb2\_SOS\_pShc\_pTrkA\_endo} = v_6 + v_{22} + v_{49} - v_{13} \quad (324)$$

## 7.11 Species FRS2\_pTrkA

**Name** FRS2\_pTrkA

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in eleven reactions (as a reactant in [R8](#), [R30](#), [R36](#), [R43](#) and as a product in [R24](#), [R43](#) and as a modifier in [R8](#), [R24](#), [R30](#), [R36](#), [R43](#)).

$$\frac{d}{dt} \text{FRS2\_pTrkA} = v_{23} + v_{42} - v_7 - v_{29} - v_{35} - v_{42} \quad (325)$$

## 7.12 Species FRS2\_pTrkA\_endo

**Name** FRS2\_pTrkA\_endo

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in seven reactions (as a reactant in [R15](#), [R31](#) and as a product in [R8](#), [R26](#) and as a modifier in [R15](#), [R26](#), [R31](#)).

$$\frac{d}{dt} \text{FRS2\_pTrkA\_endo} = v_7 + v_{25} - v_{14} - v_{30} \quad (326)$$

## 7.13 Species pFRS2\_pTrkA

**Name** pFRS2\_pTrkA

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in twelve reactions (as a reactant in [R9](#), [R37](#), [R44](#), [R66](#) and as a product in [R25](#), [R30](#), [R44](#) and as a modifier in [R9](#), [R25](#), [R37](#), [R44](#), [R66](#)).

$$\frac{d}{dt} \text{pFRS2\_pTrkA} = v_{24} + v_{29} + v_{43} - v_8 - v_{36} - v_{43} - v_{65} \quad (327)$$

#### 7.14 Species pFRS2\_pTrkA\_endo

**Name** pFRS2\_pTrkA\_endo

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in eight reactions (as a reactant in [R16](#), [R67](#) and as a product in [R9](#), [R27](#), [R31](#) and as a modifier in [R16](#), [R27](#), [R67](#)).

$$\frac{d}{dt} \text{pFRS2\_pTrkA\_endo} = v_8 + v_{26} + v_{30} - v_{15} - v_{66} \quad (328)$$

#### 7.15 Species Crk\_C3G\_pFRS2\_pTrkA

**Name** Crk\_C3G\_pFRS2\_pTrkA

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in nine reactions (as a reactant in [R10](#), [R38](#), [R45](#) and as a product in [R45](#), [R66](#) and as a modifier in [R10](#), [R38](#), [R45](#), [R66](#)).

$$\frac{d}{dt} \text{Crk\_C3G\_pFRS2\_pTrkA} = v_{44} + v_{65} - v_9 - v_{37} - v_{44} \quad (329)$$

#### 7.16 Species Crk\_C3G\_pFRS2\_pTrkA\_endo

**Name** Crk\_C3G\_pFRS2\_pTrkA\_endo

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in eight reactions (as a reactant in [R17](#), [R70](#) and as a product in [R10](#), [R67](#), [R70](#) and as a modifier in [R17](#), [R67](#), [R70](#)).

$$\frac{d}{dt} \text{Crk\_C3G\_pFRS2\_pTrkA\_endo} = v_9 + v_{66} + v_{69} - v_{16} - v_{69} \quad (330)$$

#### 7.17 Species Shc

**Name** Shc

**Initial concentration**  $1 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in eight reactions (as a reactant in [R18](#), [R21](#) and as a product in [R12](#), [R33](#), [R51](#), [R52](#) and as a modifier in [R18](#), [R21](#)).

$$\frac{d}{dt} \text{Shc} = v_{11} + v_{32} + v_{50} + v_{51} - v_{17} - v_{20} \quad (331)$$

### 7.18 Species Grb2\_SOS\_pShc

**Name** Grb2\_SOS\_pShc

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in twelve reactions (as a reactant in R20, R23, R52, R60 and as a product in R14, R35, R48 and as a modifier in R20, R23, R48, R52, R60).

$$\frac{d}{dt}\text{Grb2\_SOS\_pShc} = v_{13} + v_{34} + v_{47} - v_{19} - v_{22} - v_{51} - v_{59} \quad (332)$$

### 7.19 Species FRS2

**Name** FRS2

**Initial concentration**  $1 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in seven reactions (as a reactant in R24, R26 and as a product in R15, R36, R68 and as a modifier in R24, R26).

$$\frac{d}{dt}\text{FRS2} = v_{14} + v_{35} + v_{67} - v_{23} - v_{25} \quad (333)$$

### 7.20 Species Crk\_C3G

**Name** Crk\_C3G

**Initial concentration**  $0.4980158 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in eight reactions (as a reactant in R66, R67 and as a product in R17, R38, R65 and as a modifier in R65, R66, R67).

$$\frac{d}{dt}\text{Crk\_C3G} = v_{16} + v_{37} + v_{64} - v_{65} - v_{66} \quad (334)$$

### 7.21 Species Dok

**Name** Dok

**Initial concentration**  $0.2993032 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in 16 reactions (as a reactant in R39, R40, R41, R42, R43, R44, R45 and as a product in R56 and as a modifier in R39, R40, R41, R42, R43, R44, R45, R56).

$$\frac{d}{dt}\text{Dok} = v_{55} - v_{38} - v_{39} - v_{40} - v_{41} - v_{42} - v_{43} - v_{44} \quad (335)$$

## 7.22 Species pDok

**Name** pDok

**Initial concentration**  $6.12296 \cdot 10^{-4} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in eleven reactions (as a reactant in [R55](#), [R56](#) and as a product in [R39](#), [R40](#), [R41](#), [R42](#), [R43](#), [R44](#), [R45](#) and as a modifier in [R55](#), [R56](#)).

$$\frac{d}{dt} \text{pDok} = v_{38} + v_{39} + v_{40} + v_{41} + v_{42} + v_{43} + v_{44} - v_{54} - v_{55} \quad (336)$$

## 7.23 Species Grb2

**Name** Grb2

**Initial concentration**  $0.9373994 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in four reactions (as a reactant in [R46](#), [R47](#) and as a modifier in [R46](#), [R47](#)).

$$\frac{d}{dt} \text{Grb2} = -v_{45} - v_{46} \quad (337)$$

## 7.24 Species SOS

**Name** SOS

**Initial concentration**  $0.03739938 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in five reactions (as a reactant in [R46](#), [R59](#) and as a product in [R53](#) and as a modifier in [R46](#), [R59](#)).

$$\frac{d}{dt} \text{SOS} = v_{52} - v_{45} - v_{58} \quad (338)$$

## 7.25 Species Grb2\_SOS

**Name** Grb2\_SOS

**Initial concentration**  $0.06260062 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in twelve reactions (as a reactant in [R48](#), [R49](#), [R50](#), [R61](#) and as a product in [R46](#), [R52](#), [R54](#) and as a modifier in [R46](#), [R48](#), [R49](#), [R50](#), [R61](#)).

$$\frac{d}{dt} \text{Grb2\_SOS} = v_{45} + v_{51} + v_{53} - v_{47} - v_{48} - v_{49} - v_{60} \quad (339)$$

## 7.26 Species Ras\_GTP

**Name** Ras\_GTP

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in nine reactions (as a reactant in [R57](#), [R62](#), [R73](#), [R74](#) and as a product in [R58](#) and as a modifier in [R57](#), [R62](#), [R73](#), [R74](#)).

$$\frac{d}{dt}\text{Ras\_GTP} = v_{57} - v_{56} - v_{61} - v_{72} - v_{73} \quad (340)$$

## 7.27 Species Ras\_GDP

**Name** Ras\_GDP

**Initial concentration**  $0.1 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in six reactions (as a reactant in [R58](#) and as a product in [R57](#), [R62](#), [R63](#), [R64](#) and as a modifier in [R58](#)).

$$\frac{d}{dt}\text{Ras\_GDP} = v_{56} + v_{61} + v_{62} + v_{63} - v_{57} \quad (341)$$

## 7.28 Species B\_Raf\_Ras\_GTP

**Name** B\_Raf\_Ras\_GTP

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in 16 reactions (as a reactant in [R63](#), [R85](#), [R86](#), [R87](#), [R88](#) and as a product in [R74](#), [R85](#), [R86](#), [R87](#), [R88](#) and as a modifier in [R63](#), [R74](#), [R85](#), [R86](#), [R87](#), [R88](#)).

$$\frac{d}{dt}\text{B\_Raf\_Ras\_GTP} = v_{73} + v_{84} + v_{85} + v_{86} + v_{87} - v_{62} - v_{84} - v_{85} - v_{86} - v_{87} \quad (342)$$

## 7.29 Species B\_Raf

**Name** B\_Raf

**Initial concentration**  $0.2 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in six reactions (as a reactant in [R74](#), [R75](#) and as a product in [R63](#), [R72](#) and as a modifier in [R74](#), [R75](#)).

$$\frac{d}{dt}\text{B\_Raf} = v_{62} + v_{71} - v_{73} - v_{74} \quad (343)$$

### 7.30 Species `c_Raf`

**Name** `c_Raf`

**Initial concentration**  $0.5 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in three reactions (as a reactant in [R73](#) and as a product in [R64](#) and as a modifier in [R73](#)).

$$\frac{d}{dt}c\_Raf = v_{63} - v_{72} \quad (344)$$

### 7.31 Species `Rap1_GTP`

**Name** `Rap1_GTP`

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in seven reactions (as a reactant in [R69](#), [R71](#), [R75](#) and as a product in [R70](#) and as a modifier in [R69](#), [R71](#), [R75](#)).

$$\frac{d}{dt}Rap1\_GTP = v_{69} - v_{68} - v_{70} - v_{74} \quad (345)$$

### 7.32 Species `ppMEKcyt_ERKcyt`

**Name** `ppMEKcyt_ERKcyt`

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in 15 reactions (as a reactant in [R76](#), [R96](#), [R134](#), [R135](#) and as a product in [R80](#), [R84](#), [R88](#), [R92](#), [R135](#), [R136](#) and as a modifier in [R76](#), [R80](#), [R96](#), [R134](#), [R135](#)).

$$\begin{aligned} \frac{d}{dt}ppMEKcyt\_ERKcyt = & v_{79} + v_{83} + v_{87} + v_{91} + v_{134} \\ & + v_{135} - v_{75} - v_{95} - v_{133} - v_{134} \end{aligned} \quad (346)$$

### 7.33 Species `ppMEKcyt`

**Name** `ppMEKcyt`

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in 14 reactions (as a reactant in [R80](#), [R94](#), [R130](#), [R131](#) and as a product in [R76](#), [R82](#), [R86](#), [R90](#), [R131](#), [R132](#) and as a modifier in [R80](#), [R94](#), [R130](#), [R131](#)).

$$\frac{d}{dt}ppMEKcyt = v_{75} + v_{81} + v_{85} + v_{89} + v_{130} + v_{131} - v_{79} - v_{93} - v_{129} - v_{130} \quad (347)$$

### 7.34 Species ppERKcyt

**Name** ppERKcyt

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in twelve reactions (as a reactant in R77, R97, R126, R127 and as a product in R76, R98, R127, R128 and as a modifier in R77, R97, R126, R127).

$$\frac{d}{dt} \text{ppERKcyt} = v_{75} + v_{97} + v_{126} + v_{127} - 2 v_{76} - v_{96} - v_{125} - v_{126} \quad (348)$$

### 7.35 Species dppERKcyt

**Name** dppERKcyt

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in 19 reactions (as a reactant in R59, R60, R61, R98, R138, R139 and as a product in R59, R60, R61, R77, R139, R140 and as a modifier in R59, R60, R61, R77, R98, R138, R139).

$$\begin{aligned} \frac{d}{dt} \text{dppERKcyt} = & v_{58} + v_{59} + v_{60} + v_{76} + v_{138} + v_{139} \\ & - v_{58} - v_{59} - v_{60} - v_{97} - v_{137} - v_{138} \end{aligned} \quad (349)$$

### 7.36 Species MEKcyt

**Name** MEKcyt

**Initial concentration**  $0.1469897 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in 15 reactions (as a reactant in R78, R81, R85, R89, R122, R123 and as a product in R93, R123, R124 and as a modifier in R78, R81, R85, R89, R122, R123).

$$\frac{d}{dt} \text{MEKcyt} = v_{92} + v_{122} + v_{123} - v_{77} - v_{80} - v_{84} - v_{88} - v_{121} - v_{122} \quad (350)$$

### 7.37 Species ERKcyt

**Name** ERKcyt

**Initial concentration**  $0.02803697 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in 14 reactions (as a reactant in R78, R79, R80, R118, R119 and as a product in R97, R98, R119, R120 and as a modifier in R78, R79, R80, R118, R119).

$$\frac{d}{dt} \text{ERKcyt} = v_{96} + v_{97} + v_{118} + v_{119} - v_{77} - v_{78} - v_{79} - v_{117} - v_{118} \quad (351)$$

### 7.38 Species MEKcyt\_ERKcyt

**Name** MEKcyt\_ERKcyt

**Initial concentration**  $0.1121076 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in 15 reactions (as a reactant in R83, R87, R91, R114, R115 and as a product in R78, R95, R115, R116 and as a modifier in R78, R83, R87, R91, R114, R115).

$$\frac{d}{dt} \text{MEKcyt\_ERKcyt} = v_{77} + v_{94} + v_{114} + v_{115} - v_{82} - v_{86} - v_{90} - v_{113} - v_{114} \quad (352)$$

### 7.39 Species pMEKcyt

**Name** pMEKcyt

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in 20 reactions (as a reactant in R79, R82, R86, R90, R93, R110, R111 and as a product in R81, R85, R89, R94, R111, R112 and as a modifier in R79, R82, R86, R90, R93, R110, R111).

$$\begin{aligned} \frac{d}{dt} \text{pMEKcyt} = & v_{80} + v_{84} + v_{88} + v_{93} + v_{110} + v_{111} - v_{78} \\ & - v_{81} - v_{85} - v_{89} - v_{92} - v_{109} - v_{110} \end{aligned} \quad (353)$$

### 7.40 Species pMEKcyt\_ERKcyt

**Name** pMEKcyt\_ERKcyt

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in 20 reactions (as a reactant in R84, R88, R92, R95, R142, R143 and as a product in R79, R83, R87, R91, R96, R143, R144 and as a modifier in R79, R84, R88, R92, R95, R142, R143).

$$\begin{aligned} \frac{d}{dt} \text{pMEKcyt\_ERKcyt} = & v_{78} + v_{82} + v_{86} + v_{90} + v_{95} + v_{142} + v_{143} \\ & - v_{83} - v_{87} - v_{91} - v_{94} - v_{141} - v_{142} \end{aligned} \quad (354)$$

### 7.41 Species ppMEKnuc\_ERKnuc

**Name** ppMEKnuc\_ERKnuc

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in twelve reactions (as a reactant in R99, R107, R136, R137 and as a product in R103, R135, R136 and as a modifier in R99, R103, R107, R136, R137).

$$\frac{d}{dt} \text{ppMEKnuc\_ERKnuc} = v_{102} + v_{134} + v_{135} - v_{98} - v_{106} - v_{135} - v_{136} \quad (355)$$



#### 7.42 Species ppMEKnuc

**Name** ppMEKnuc

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in eleven reactions (as a reactant in R103, R105, R132, R133 and as a product in R99, R131, R132 and as a modifier in R103, R105, R132, R133).

$$\frac{d}{dt}\text{ppMEKnuc} = v_{98} + v_{130} + v_{131} - v_{102} - v_{104} - v_{131} - v_{132} \quad (356)$$

#### 7.43 Species ppERKnuc

**Name** ppERKnuc

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in twelve reactions (as a reactant in R100, R108, R128, R129 and as a product in R99, R109, R127, R128 and as a modifier in R100, R108, R128, R129).

$$\frac{d}{dt}\text{ppERKnuc} = v_{98} + v_{108} + v_{126} + v_{127} - 2 v_{99} - v_{107} - v_{127} - v_{128} \quad (357)$$

#### 7.44 Species dppERKnuc

**Name** dppERKnuc

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in ten reactions (as a reactant in R109, R140, R141 and as a product in R100, R139, R140 and as a modifier in R100, R109, R140, R141).

$$\frac{d}{dt}\text{dppERKnuc} = v_{99} + v_{138} + v_{139} - v_{108} - v_{139} - v_{140} \quad (358)$$

#### 7.45 Species MEKnuc

**Name** MEKnuc

**Initial concentration**  $1.941234 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in nine reactions (as a reactant in R101, R124, R125 and as a product in R104, R123, R124 and as a modifier in R101, R124, R125).

$$\frac{d}{dt}\text{MEKnuc} = v_{103} + v_{122} + v_{123} - v_{100} - v_{123} - v_{124} \quad (359)$$

## 7.46 Species ERKnuc

**Name** ERKnuc

**Initial concentration**  $0.01599799 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in 14 reactions (as a reactant in R101, R102, R103, R120, R121 and as a product in R108, R109, R119, R120 and as a modifier in R101, R102, R103, R120, R121).

$$\frac{d}{dt}\text{ERKnuc} = v_{107} + v_{108} + v_{118} + v_{119} - v_{100} - v_{101} - v_{102} - v_{119} - v_{120} \quad (360)$$

## 7.47 Species MEKnuc\_ERKnuc

**Name** MEKnuc\_ERKnuc

**Initial concentration**  $0.8432791 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in nine reactions (as a reactant in R116, R117 and as a product in R101, R106, R115, R116 and as a modifier in R101, R116, R117).

$$\frac{d}{dt}\text{MEKnuc\_ERKnuc} = v_{100} + v_{105} + v_{114} + v_{115} - v_{115} - v_{116} \quad (361)$$

## 7.48 Species pMEKnuc

**Name** pMEKnuc

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in eleven reactions (as a reactant in R102, R104, R112, R113 and as a product in R105, R111, R112 and as a modifier in R102, R104, R112, R113).

$$\frac{d}{dt}\text{pMEKnuc} = v_{104} + v_{110} + v_{111} - v_{101} - v_{103} - v_{111} - v_{112} \quad (362)$$

## 7.49 Species pMEKnuc\_ERKnuc

**Name** pMEKnuc\_ERKnuc

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in eleven reactions (as a reactant in R106, R144, R145 and as a product in R102, R107, R143, R144 and as a modifier in R102, R106, R144, R145).

$$\frac{d}{dt}\text{pMEKnuc\_ERKnuc} = v_{101} + v_{106} + v_{142} + v_{143} - v_{105} - v_{143} - v_{144} \quad (363)$$

### 7.50 Species c\_Raf\_Ras\_GTP

**Name** c\_Raf\_Ras\_GTP

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in 16 reactions (as a reactant in [R64](#), [R81](#), [R82](#), [R83](#), [R84](#) and as a product in [R73](#), [R81](#), [R82](#), [R83](#), [R84](#) and as a modifier in [R64](#), [R73](#), [R81](#), [R82](#), [R83](#), [R84](#)).

$$\frac{d}{dt} \text{c\_Raf\_Ras\_GTP} = v_{72} + v_{80} + v_{81} + v_{82} + v_{83} - v_{63} - v_{80} - v_{81} - v_{82} - v_{83} \quad (364)$$

### 7.51 Species B\_Raf\_Rap1\_GTP

**Name** B\_Raf\_Rap1\_GTP

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in 16 reactions (as a reactant in [R72](#), [R89](#), [R90](#), [R91](#), [R92](#) and as a product in [R75](#), [R89](#), [R90](#), [R91](#), [R92](#) and as a modifier in [R72](#), [R75](#), [R89](#), [R90](#), [R91](#), [R92](#)).

$$\frac{d}{dt} \text{B\_Raf\_Rap1\_GTP} = v_{74} + v_{88} + v_{89} + v_{90} + v_{91} - v_{71} - v_{88} - v_{89} - v_{90} - v_{91} \quad (365)$$

### 7.52 Species Rap1\_GDP

**Name** Rap1\_GDP

**Initial concentration**  $0.2 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in five reactions (as a reactant in [R70](#) and as a product in [R69](#), [R71](#), [R72](#) and as a modifier in [R70](#)).

$$\frac{d}{dt} \text{Rap1\_GDP} = v_{68} + v_{70} + v_{71} - v_{69} \quad (366)$$

### 7.53 Species Crk

**Name** Crk

**Initial concentration**  $0.5019842 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in two reactions (as a reactant in [R65](#) and as a modifier in [R65](#)).

$$\frac{d}{dt} \text{Crk} = -v_{64} \quad (367)$$

### 7.54 Species C3G

**Name** C3G

**Initial concentration**  $0.001984189 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in two reactions (as a reactant in [R65](#) and as a modifier in [R65](#)).

$$\frac{d}{dt} \text{C3G} = -v_{64} \quad (368)$$

### 7.55 Species pDok\_RasGAP

**Name** pDok\_RasGAP

**Initial concentration**  $8.45291 \cdot 10^{-5} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in eleven reactions (as a reactant in [R62](#), [R63](#), [R64](#) and as a product in [R55](#), [R62](#), [R63](#), [R64](#) and as a modifier in [R55](#), [R62](#), [R63](#), [R64](#)).

$$\frac{d}{dt} \text{pDok\_RasGAP} = v_{54} + v_{61} + v_{62} + v_{63} - v_{61} - v_{62} - v_{63} \quad (369)$$

### 7.56 Species RasGAP

**Name** RasGAP

**Initial concentration**  $0.09991547 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in two reactions (as a reactant in [R55](#) and as a modifier in [R55](#)).

$$\frac{d}{dt} \text{RasGAP} = -v_{54} \quad (370)$$

### 7.57 Species Grb2\_pSOS

**Name** Grb2\_pSOS

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in six reactions (as a reactant in [R54](#) and as a product in [R47](#), [R60](#), [R61](#) and as a modifier in [R47](#), [R54](#)).

$$\frac{d}{dt} \text{Grb2\_pSOS} = v_{46} + v_{59} + v_{60} - v_{53} \quad (371)$$

## 7.58 Species pShc

**Name** pShc

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in eleven reactions (as a reactant in [R19](#), [R22](#), [R48](#), [R51](#) and as a product in [R13](#), [R34](#), [R60](#) and as a modifier in [R19](#), [R22](#), [R48](#), [R51](#)).

$$\frac{d}{dt}pShc = v_{12} + v_{33} + v_{59} - v_{18} - v_{21} - v_{47} - v_{50} \quad (372)$$

## 7.59 Species pSOS

**Name** pSOS

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in five reactions (as a reactant in [R47](#), [R53](#) and as a product in [R59](#) and as a modifier in [R47](#), [R53](#)).

$$\frac{d}{dt}pSOS = v_{58} - v_{46} - v_{52} \quad (373)$$

## 7.60 Species pFRS2

**Name** pFRS2

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in ten reactions (as a reactant in [R25](#), [R27](#), [R68](#) and as a product in [R16](#), [R17](#), [R37](#), [R38](#) and as a modifier in [R25](#), [R27](#), [R68](#)).

$$\frac{d}{dt}pFRS2 = v_{15} + v_{16} + v_{36} + v_{37} - v_{24} - v_{26} - v_{67} \quad (374)$$

## 7.61 Species mw9da48a51\_bbd0\_4395\_9883\_8441d8153b00,

**Name** trkaI\_int

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in six reactions (as a reactant in [mw9da48a51\\_bbd0\\_4395\\_9883\\_8441d8153b00](#), [mwc467edb6\\_a255\\_45d6\\_8014\\_33bd0209b36f](#) and as a product in [mwffc6fab3\\_9f90\\_4da4-bf71\\_214b9b723899](#) and as a modifier in [mwffc6fab3\\_9f90\\_4da4-bf71\\_214b9b723899](#), [mw9da48a51\\_bbd0\\_4395\\_9883\\_8441d8153b00](#), [mwc467edb6\\_a255\\_45d6\\_8014\\_33bd0209b36f](#)).

$$\frac{d}{dt}mw9da48a51\_bbd0\_4395\_9883\_8441d8153b00 = v_{151} - v_{154} - v_{155} \quad (375)$$

## 7.62 Species [mwf82ad06a\\_b8aa\\_40fa\\_a532\\_a1da44e3425f](#)

**Name** pro\_TrkA

**Initial concentration**  $0.020631 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in three reactions (as a reactant in [R1](#) and as a product in [R1](#) and as a modifier in [R1](#)), which do not influence its rate of change because this constant species is on the boundary of the reaction system:

$$\frac{d}{dt} \text{mwf82ad06a_b8aa_40fa_a532_a1da44e3425f} = 0 \quad (376)$$

## 7.63 Species [mwe009ad7f\\_90fd\\_4186\\_8855\\_77780724ddb8](#)

**Name** L\_NGFR\_I

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in four reactions (as a reactant in [mw4f0ee780\\_12f5\\_436d\\_a227\\_c5e7cd420259](#) and as a product in [mw9da48a51\\_bbd0\\_4395\\_9883\\_8441d8153b00](#) and as a modifier in [mw9da48a51\\_bbd0\\_4395\\_9883\\_8441d8153b00](#), [mw4f0ee780\\_12f5\\_436d\\_a227\\_c5e7cd420259](#)).

$$\frac{d}{dt} \text{mwe009ad7f_90fd_4186_8855_77780724ddb8} = v_{154} - v_{157} \quad (377)$$

## 7.64 Species [mw5afa8250\\_0cf0\\_40a2\\_a97a\\_f7cf20a9cfbd](#)

**Name** NGFR\_I

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in four reactions (as a reactant in [mwe4f77287\\_e0fe\\_47f7\\_a74e\\_312151e578a4](#) and as a product in [mwc467edb6\\_a255\\_45d6\\_8014\\_33bd0209b36f](#) and as a modifier in [mwc467edb6\\_a255\\_45d6\\_8014\\_33bd0209b36f](#), [mwe4f77287\\_e0fe\\_47f7\\_a74e\\_312151e578a4](#)).

$$\frac{d}{dt} \text{mw5afa8250_0cf0_40a2_a97a_f7cf20a9cfbd} = v_{155} - v_{156} \quad (378)$$

## 7.65 Species [mw4295eb0\\_bd92\\_4221\\_b49d\\_bbbd48ca25bc](#)

**Name** NGFR\_I.deg

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in one reaction (as a product in [mwe4f77287\\_e0fe\\_47f7\\_a74e\\_312151e578a4](#)).

$$\frac{d}{dt} \text{mw4295eb0_bd92_4221_b49d_bbbd48ca25bc} = v_{156} \quad (379)$$

### 7.66 Species [mwa4903466\\_fc58\\_4bfe\\_b3ec\\_76a90f9d20e2](#)

**Name** L\_NGFR\_I\_deg

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in one reaction (as a product in [mw4f0ee780\\_12f5\\_436d\\_a227\\_c5e7cd420259](#)).

$$\frac{d}{dt} \text{mwa4903466\_fc58\_4bfe\_b3ec\_76a90f9d20e2} = v_{157} \quad (380)$$

### 7.67 Species [mwe979ec8f\\_a55c\\_470c\\_a554\\_9fa8013eab74](#)

**Name** NGFR\_interstitial\_fluid

**Initial concentration**  $5 \cdot 10^{-6} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in four reactions (as a reactant in [mwc7ff2b7b\\_e2c9\\_4420\\_87bc\\_f285d98de30b](#) and as a product in [mw8105f0dc\\_19ad\\_4f7a\\_80df\\_3f84de216c42](#) and as a modifier in [mwc7ff2b7b\\_e2c9\\_4420\\_87bc\\_f285d98de30b](#), [mw8105f0dc\\_19ad\\_4f7a\\_80df\\_3f84de216c42](#)).

$$\frac{d}{dt} \text{mwe979ec8f\_a55c\_470c\_a554\_9fa8013eab74} = v_{153} - v_{147} \quad (381)$$

### 7.68 Species [mw4478fbeb\\_51b1\\_4764\\_92ad\\_a86d314ae0eb](#)

**Name** source

**Initial concentration**  $1 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in two reactions (as a reactant in [mwe8ee00ff\\_3d59\\_44d5\\_8d7f\\_a2074823f29d](#) and as a modifier in [mwe8ee00ff\\_3d59\\_44d5\\_8d7f\\_a2074823f29d](#)), which do not influence its rate of change because this species is on the boundary of the reaction system:

$$\frac{d}{dt} \text{mw4478fbeb\_51b1\_4764\_92ad\_a86d314ae0eb} = 0 \quad (382)$$

### 7.69 Species [mw29fa4e00\\_a430\\_4f11\\_b62e\\_1bcbc0a767a0](#)

**Name** NGF

**Initial concentration**  $3 \cdot 10^{-5} \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in seven reactions (as a reactant in [mw711542fd\\_b235\\_40f7\\_9782\\_f78eb654d773](#), [mwc7ff2b7b\\_e2c9\\_4420\\_87bc\\_f285d98de30b](#), [mw02775189\\_5c04\\_4c2f\\_a5f4\\_2f15723e1ece](#) and as a product in [mwe8ee00ff\\_3d59\\_44d5\\_8d7f\\_a2074823f29d](#) and as a modifier in [mw711542fd\\_b235\\_40f7\\_9782\\_f78eb654d773](#), [mwc7ff2b7b\\_e2c9\\_4420\\_87bc\\_f285d98de30b](#), [mw02775189\\_5c04\\_4c2f\\_a5f4\\_2f15723e1ece](#)).

$$\frac{d}{dt} \text{mw29fa4e00\_a430\_4f11\_b62e\_1bcbc0a767a0} = v_{145} - v_{146} - v_{147} - v_{148} \quad (383)$$

### 7.70 Species [mwa81400ac\\_76f5\\_4446\\_8a4d\\_6446ab4b11c9](#)

**Name** NGFdeg

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in one reaction (as a product in [mw711542fd\\_b235\\_40f7\\_9782\\_f78eb654d773](#)).

$$\frac{d}{dt} \text{mwa81400ac\_76f5\_4446\_8a4d\_6446ab4b11c9} = v_{146} \quad (384)$$

### 7.71 Species [mw6782adfa\\_29ee\\_41a8\\_acbb\\_4c86c6c81596](#)

**Name** NGFR\_L\_interstitial\_fluid

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in four reactions (as a reactant in [mwf371eb20\\_7bda\\_4140\\_9a43\\_dfad70900057](#) and as a product in [mwc7ff2b7b\\_e2c9\\_4420\\_87bc\\_f285d98de30b](#) and as a modifier in [mwc7ff2b7b\\_e2c9\\_4420\\_87bc\\_f285d98de30b](#), [mwf371eb20\\_7bda\\_4140\\_9a43\\_dfad70900057](#)).

$$\frac{d}{dt} \text{mw6782adfa\_29ee\_41a8\_acbb\_4c86c6c81596} = v_{147} - v_{152} \quad (385)$$

### 7.72 Species [mwe599c4c1\\_2d8e\\_446c\\_bf3f\\_4c97baced8a9](#)

**Name** tanezumab

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in four reactions (as a reactant in [mw02775189\\_5c04\\_4c2f\\_a5f4\\_2f15723e1ece](#), [mwfb02ea2a\\_1f06\\_4f8f\\_80a0\\_721149f213ff](#) and as a modifier in [mw02775189\\_5c04\\_4c2f\\_a5f4\\_2f15723e1ece](#), [mwfb02ea2a\\_1f06\\_4f8f\\_80a0\\_721149f213ff](#)).

$$\frac{d}{dt} \text{mwe599c4c1\_2d8e\_446c\_bf3f\_4c97baced8a9} = -v_{148} - v_{149} \quad (386)$$

### 7.73 Species [mw46e8693e\\_348e\\_4f1d\\_8c49\\_c13485fae7ba](#)

**Name** NGF\_tanezumab

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in two reactions (as a product in [mw02775189\\_5c04\\_4c2f\\_a5f4\\_2f15723e1ece](#) and as a modifier in [mw02775189\\_5c04\\_4c2f\\_a5f4\\_2f15723e1ece](#)).

$$\frac{d}{dt} \text{mw46e8693e\_348e\_4f1d\_8c49\_c13485fae7ba} = v_{148} \quad (387)$$



#### 7.74 Species mwe0b9d340\_24f5\_4c7e\_a80f\_4faadae6c0fc

**Name** tz\_deg

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in one reaction (as a product in mwfb02ea2a\_1f06\_4f8f\_80a0\_721149f213ff).

$$\frac{d}{dt} \text{mwe0b9d340\_24f5\_4c7e\_a80f\_4faadae6c0fc} = v_{149} \quad (388)$$

#### 7.75 Species mw89ebbe2d\_1ec2\_457a\_9367\_6c5e86a1a924

**Name** trkaI

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in four reactions (as a reactant in mw12b652db\_d0da\_4723\_b160\_001fa36f9190, mwffc6fab3\_9f90\_4da4\_bf71\_214b9b723899 and as a modifier in mw12b652db\_d0da\_4723\_b160\_001fa36f9190, mwffc6fab3\_9f90\_4da4\_bf71\_214b9b723899).

$$\frac{d}{dt} \text{mw89ebbe2d\_1ec2\_457a\_9367\_6c5e86a1a924} = -v_{150} - v_{151} \quad (389)$$

#### 7.76 Species mw555a08dc\_922d\_4b35\_8f69\_5c6e8a4ad614

**Name** trkaI\_deg

**Initial concentration**  $0 \cdot 10^{-6} \text{ mol} \cdot \text{m}^{-3} \cdot (0.0010 \text{ dimensionless})^{-1}$

This species takes part in one reaction (as a product in mw12b652db\_d0da\_4723\_b160\_001fa36f9190).

$$\frac{d}{dt} \text{mw555a08dc\_922d\_4b35\_8f69\_5c6e8a4ad614} = v_{150} \quad (390)$$

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

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