

SBML Model Report

Model name: “Hornberg2005 - MAPKsignalling”



May 17, 2018

1 General Overview

This is a document in SBML Level 2 Version 4 format. This model was created by Emma Fairbanks¹ at July sixth 2017 at 10:04 a. m. and last time modified at February first 2018 at 9:50 a. m. Table 1 shows an overview of the quantities of all components of this model.

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

Element	Quantity	Element	Quantity
compartment types	0	compartments	1
species types	0	species	103
events	0	constraints	0
reactions	148	function definitions	2
global parameters	83	unit definitions	0
rules	0	initial assignments	0

Model Notes

Hornberg2005 - MAPKsignallingLarge model of the ERK signallingnetwork. Results from this model were used to generate a simplifiedversion of the network.

This model is described in the article:[Control of MAPK signalling: from complexity to what really matters](#).Hornberg JJ, Binder B, Bruggeman FJ, Schoeberl B, Heinrich R, Westerhoff HV.Oncogene 2005 Aug; 24(36): 5533-5542

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Abstract:

Oncogenesis results from changes in kinetics or in abundance of proteins in signal transduction networks. Recently, it was shown that control of signalling cannot reside in a single gene product, and might well be dispersed over many components. Which of the reactions in these complex networks are most important, and how can the existing molecular information be used to understand why particular genes are oncogenes whereas others are not? We implement a new method to help address such questions. We apply control analysis to a detailed kinetic model of the epidermal growth factor-induced mitogen-activated protein kinase network. We determine the control of each reaction with respect to three biologically relevant characteristics of the output of this network: the amplitude, duration and integrated output of the transient phosphorylation of extracellular signal-regulated kinase (ERK). We confirm that control is distributed, but far from randomly: a small proportion of reactions substantially control signalling. In particular, the activity of Raf is in control of all characteristics of the transient profile of ERK phosphorylation, which may clarify why Raf is an oncogene. Most reactions that really matter for one signalling characteristic are also important for the other characteristics. Our analysis also predicts the effects of mutations and changes in gene expression.

This model is hosted on [BioModels Database](#) and identified by: [BIOMD0000000667](#).

To cite BioModels Database, please use: [Chelliah V et al. BioModels: ten-year anniversary. Nucl. Acids Res. 2015, 43\(Database issue\):D542-8.](#)

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2 Unit Definitions

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

2.1 Unit `substance`

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

Definition `mol`

2.2 Unit `volume`

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

Definition `l`

2.3 Unit `area`

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

Definition `m2`

2.4 Unit `length`

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

Definition `m`

2.5 Unit `time`


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

Definition `s`

3 Compartment

This model contains one compartment.

Table 2: Properties of all compartments.

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

3.1 Compartment `Compartment`

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

Name `Compartment`

4 Species

This model contains 103 species. Section 8 provides further details and the derived rates of change of each species.

Table 3: Properties of each species.

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
EGF	EGF	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
EGFR	EGFR	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
EGF_EGFR	EGF_EGFR	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
_EGF_EGFR_2	(EGF_EGFR)2	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
_EGF_EGFR__2	(EGF_EGFR*)2	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
EGFRi	EGFRi	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
_EGF_EGFR__2_GAP-Grb2_Prot	(EGF_EGFR*)2_GAP_Grb2_Prot	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
_EGF_EGFRi__2	(EGF-EGFRi*)2	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
Proti	Proti	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
EGF_EGFRi	EGF_EGFRi	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
_EGF_EGFRi_2	(EGF-EGFRi)2	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
Prot	Prot	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
EGFideg	EGFideg	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
GAP	GAP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
_EGF_EGFR__2_GAP	(EGF_EGFR*)2_GAP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
EGFi	EGFi	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
_EGF_EGFRi__2_GAP	(EGF_EGFRi*)2_GAP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\square	\square
_EGF_EGFRi__2_GAP-Grb2	(EGF_EGFRi*)2_GAP_Grb2	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\square	\square

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
_EGF_EGFRi__2_GAP-Grb2_Sos	(EGF_EGFRi*)2_GAP_Grb2_Sos	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFRi__2_GAP-Grb2_Sos_Ras_GDP	(EGF_EGFRi*)2_GAP_Grb2_Sos_Ras_GDP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFRi__2_GAP-Grb2_Sos_Ras_GTP	(EGF_EGFRi*)2_GAP_Grb2_Sos_Ras_GTP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Grb2	Grb2	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFR__2_GAP-Grb2	(EGF_EGFR*)2_GAP_Grb2	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Sos	Sos	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFR__2_GAP-Grb2_Sos	(EGF_EGFR*)2_GAP_Grb2_Sos	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Ras_GDP	Ras_GDP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFR__2_GAP-Grb2_Sos_Ras_GDP	(EGF_EGFR*)2_GAP_Grb2_Sos_Ras_GDP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Ras_GTP	Ras_GTP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFR__2_GAP-Grb2_Sos_Ras_GTP	(EGF_EGFR*)2_GAP_Grb2_Sos_Ras_GTP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Grb2_Sos	Grb2_Sos	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Shc	Shc	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFR__2_GAP-SHC	(EGF_EGFR*)2_GAP_SHC	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFR__2_GAP-SHC_0	(EGF_EGFR*)2_GAP_SHC*	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFR__2_GAP-SHC__Grb2	(EGF_EGFR*)2_GAP_SHC*_Grb2	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
_EGF_EGFR__2_GAP-_SHC__Grb2_Sos	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFR__2_GAP-_SHC__Grb2_Sos-_Ras_GDP	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos-_Ras_GDP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFR__2_GAP-_SHC__Grb2_Sos-_Ras_GTP	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos-_Ras_GTP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Shc__Grb2_Sos	Shc*_Grb2_Sos	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Shc__Grb2	Shc*_Grb2	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Shc_0	Shc*	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Raf	Raf	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Raf_Ras_GTP	Raf_Ras_GTP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Ras_GTP_	Ras_GTP*	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Phosphatase1	Phosphatase1	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Raf_0	Raf*	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Raf__phosphatase1	Raf*_phosphatase1	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
MEK	MEK	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
MEK_Raf	MEK_Raf*	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
MEK_P	MEK_P	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
MEK_P_Raf	MEK_P_Raf*	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
MEK_PP	MEK_PP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
MEK_PP-_phosphatase2	MEK_PP_phosphatase2	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
phosphatse2	phosphatse2	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
MEK_P-_phosphatase2	MEK_P_phosphatase2	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
ERK	ERK	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
ERK_MEK_PP	ERK_MEK_PP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
ERK_P	ERK_P	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
ERK_P_MEKPP	ERK_P_MEKPP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
ERK_PP	ERK_PP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
phosphatase3	phosphatase3	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
ERK_PP- _phosphatase3	ERK_PP_phosphatase3	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
ERK_P- _phosphatase3	ERK_P_phosphatase3	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFRi__2_GAP- _SHC	(EGF_EGFRi*)2_GAP_SHC	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFRi__2_GAP- _SHC_0	(EGF_EGFRi*)2_GAP_SHC*	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFRi__2_GAP- _SHC__Grb2	(EGF_EGFRi*)2_GAP_SHC*_Grb2	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFRi__2_GAP- _SHC__Grb2_Sos	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFRi__2_GAP- _SHC__Grb2_Sos- _Ras_GDP	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos- _Ras_GDP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFRi__2_GAP- _SHC__Grb2_Sos- _Ras_GTP	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos- _Ras_GTP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Ras_GTPi	Ras_GTPi	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Raf_Ras_GTPi	Raf_Ras_GTPi	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Ras_GTPi_0	Ras_GTPi*	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
Rafi	Rafi*	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Rafi_- _phosphatase1	Rafi*_phosphatase1	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
MEK_Rafi	MEK_Rafi*	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
MEKi_P	MEKi_P	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
MEK_P_Rafi	MEK_P_Rafi*	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
MEKi_PP	MEKi_PP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
MEKi_PP- _phosphatase2	MEKi_PP_phosphatase2	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
MEKi_P- _phosphatase2	MEKi_P_phosphatase2	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
ERKi_P	ERKi_P	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
ERKi_P_MEKi_PP	ERKi_P_MEKi_PP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
ERKi_PP	ERKi_PP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
ERKi_PP- _phosphatase3	ERKi_PP_phosphatase3	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
ERKi_P- _phosphatase3	ERKi_P_phosphatase3	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
EGFRidag	EGFRidag	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFRi___2deg	(EGF_EGFRi*)*2deg	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFR__2_GAP- _Grb2_Sos_Prot	(EGF_EGFR*)2_GAP_Grb2_Sos_Prot	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFR__2_GAP- _Grb2_Sos_Ras_GDP- _Prot	(EGF_EGFR*)2_GAP_Grb2_Sos_Ras- _GDP_Prot	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
_EGF_EGFR__2_GAP- _Grb2_Sos_Ras_GTP- _Prot	(EGF_EGFR*)2_GAP_Grb2_Sos_Ras- _GTP_Prot	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFR__2_GAP- _Grb2_Sos_ERK_PP	(EGF_EGFR*)2_GAP_Grb2_Sos_ERK_PP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFRi__2_GAP- _Grb2_Sos_ERKi_PP	(EGF_EGFRi*)2_GAP_Grb2_Sos_ERKi- _PP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFR__2_GAP- _SHC__Grb2_Sos- _ERK_PP	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos- _ERK_PP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFRi__2_GAP- _SHC__Grb2_Sos- _ERKi_PP	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos- _ERKi_PP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFR__2_GAP- _Grb2_Sos_deg	(EGF_EGFR*)2_GAP_Grb2_Sos_deg	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFRi__2_GAP- _Grb2_Sos_deg	(EGF_EGFRi*)2_GAP_Grb2_Sos_deg	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Sos_ERK_PP	Sos_ERK_PP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Sos_ERKi_PP	Sos_ERKi_PP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Sosi	Sosi	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
ERKi_MEKi_PP_0	ERKi_MEKi_PP	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFR__2_GAP- _SHC__Grb2_Prot_0	(EGF_EGFR*)2_GAP_SHC*_Grb2_Prot	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_EGF_EGFR__2_GAP- _SHC__Grb2_Sos- _Prot_0	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos- _Prot	Compartment	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
_EGF_EGFR__2_GAP- _SHC__Grb2_Sos- _Ras_GDP_Prot_0	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos- _Ras_GDP_Prot	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_EGF_EGFR__2_GAP- _SHC__Grb2_Sos- _Ras_GTP_Prot_0	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos- _Ras_GTP_Prot	Compartment	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

5 Parameters

This model contains 83 global parameters.

Table 4: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
k1	k1		$3 \cdot 10^7$		✓
kd1	kd1		0.004		✓
k2	k2		$1.66 \cdot 10^{-5}$		✓
kd2	kd2		0.100		✓
k3	k3		1.000		✓
kd3	kd3		0.010		✓
k4	k4		$1.73 \cdot 10^{-7}$		✓
kd4	kd4		0.002		✓
kd5	kd5		0.015		✓
k6	k6		$5 \cdot 10^{-4}$		✓
kd6	kd6		0.005		✓
k8	k8		$1.66 \cdot 10^{-6}$		✓
kd8	kd8		0.200		✓
k10b	k10b		0.054		✓
kd10	kd10		0.011		✓
k13	k13		2.170		✓
k15	k15		10000.000		✓
k16	k16		$1.66 \cdot 10^{-5}$		✓
k17	k17		$1.66 \cdot 10^{-5}$		✓
kd17	kd17		0.060		✓
k18	k18		$2.5 \cdot 10^{-5}$		✓
kd18	kd18		1.300		✓
k19	k19		$1.66 \cdot 10^{-7}$		✓
kd19	kd19		0.500		✓
k20	k20		$3.5 \cdot 10^{-6}$		✓
kd20	kd20		0.400		✓
k21	k21		$3.66 \cdot 10^{-7}$		✓
kd21	kd21		0.023		✓
k22	k22		$3.5 \cdot 10^{-5}$		✓
kd22	kd22		0.100		✓
k23	k23		6.000		✓
kd23	kd23		0.060		✓
kd24	kd24		0.550		✓
k25	k25		$1.66 \cdot 10^{-5}$		✓
kd25	kd25		0.021		✓
k28	k28		$1.66 \cdot 10^{-6}$		✓

Id	Name	SBO	Value	Unit	Constant
kd28	kd28		0.005		<input checked="" type="checkbox"/>
k29	k29		$1.17 \cdot 10^{-6}$		<input checked="" type="checkbox"/>
kd29	kd29		1.000		<input checked="" type="checkbox"/>
k32	k32		$4 \cdot 10^{-7}$		<input checked="" type="checkbox"/>
kd32	kd32		0.100		<input checked="" type="checkbox"/>
k33	k33		$3.5 \cdot 10^{-5}$		<input checked="" type="checkbox"/>
kd33	kd33		0.200		<input checked="" type="checkbox"/>
k34	k34		$7.5 \cdot 10^{-6}$		<input checked="" type="checkbox"/>
kd34	kd34		0.030		<input checked="" type="checkbox"/>
k35	k35		$7.5 \cdot 10^{-6}$		<input checked="" type="checkbox"/>
kd35	kd35		0.002		<input checked="" type="checkbox"/>
k36	k36		0.005		<input checked="" type="checkbox"/>
kd36	kd36		0.000		<input checked="" type="checkbox"/>
k37	k37		$1.5 \cdot 10^{-6}$		<input checked="" type="checkbox"/>
kd37	kd37		0.300		<input checked="" type="checkbox"/>
k40	k40		$5 \cdot 10^{-5}$		<input checked="" type="checkbox"/>
kd40	kd40		0.064		<input checked="" type="checkbox"/>
k41	k41		$5 \cdot 10^{-5}$		<input checked="" type="checkbox"/>
kd41	kd41		0.043		<input checked="" type="checkbox"/>
k42	k42		$1.18 \cdot 10^{-4}$		<input checked="" type="checkbox"/>
kd42	kd42		0.200		<input checked="" type="checkbox"/>
kd43	kd43		1.000		<input checked="" type="checkbox"/>
k44	k44		$1.95 \cdot 10^{-5}$		<input checked="" type="checkbox"/>
kd44	kd44		0.018		<input checked="" type="checkbox"/>
kd45	kd45		3.500		<input checked="" type="checkbox"/>
kd47	kd47		2.900		<input checked="" type="checkbox"/>
k48	k48		$2.38 \cdot 10^{-5}$		<input checked="" type="checkbox"/>
kd48	kd48		0.800		<input checked="" type="checkbox"/>
kd49	kd49		0.057		<input checked="" type="checkbox"/>
k50	k50		$4.5 \cdot 10^{-7}$		<input checked="" type="checkbox"/>
kd50	kd50		0.500		<input checked="" type="checkbox"/>
k52	k52		$8.91 \cdot 10^{-5}$		<input checked="" type="checkbox"/>
kd52	kd52		0.033		<input checked="" type="checkbox"/>
kd53	kd53		16.000		<input checked="" type="checkbox"/>
kd55	kd55		5.700		<input checked="" type="checkbox"/>
k56	k56		$2.35 \cdot 10^{-5}$		<input checked="" type="checkbox"/>
kd56	kd56		0.600		<input checked="" type="checkbox"/>
kd57	kd57		0.246		<input checked="" type="checkbox"/>
k58	k58		$8.33 \cdot 10^{-6}$		<input checked="" type="checkbox"/>
kd58	kd58		0.500		<input checked="" type="checkbox"/>
k60	k60		0.006		<input checked="" type="checkbox"/>
k61	k61		$6.7 \cdot 10^{-4}$		<input checked="" type="checkbox"/>

Id	Name	SBO	Value	Unit	Constant
kd63	kd63		0.275		<input checked="" type="checkbox"/>
k126	k126		$1.66 \cdot 10^{-7}$		<input checked="" type="checkbox"/>
kd126	kd126		2.000		<input checked="" type="checkbox"/>
k127	k127		0.000		<input checked="" type="checkbox"/>
kd127	kd127		10^{-4}		<input checked="" type="checkbox"/>

6 Function definitions

This is an overview of two function definitions.

6.1 Function definition `Constant_flux_irreversible_0`

Name Constant flux (irreversible)

Argument v

Mathematical Expression

$$v \quad (1)$$

6.2 Function definition `function_for_v1_1`

Name function for v1_1

Arguments $[EGF]$, $[EGFR]$, $[EGF_EGFR]$, $k1$, $kd1$

Mathematical Expression

$$k1 \cdot [EGF] \cdot [EGFR] - kd1 \cdot [EGF_EGFR] \quad (2)$$

7 Reactions

This model contains 148 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	v1	v1	$\text{EGFR} \xrightleftharpoons{\text{EGF}} \text{EGF_EGFR}$	
2	v2	v2	$2 \text{EGF_EGFR} \rightleftharpoons \text{EGF_EGFR_2}$	
3	v3	v3	$\text{EGF_EGFR_2} \rightleftharpoons \text{EGF_EGFR_2}$	
4	v4	v4	$\text{EGF_EGFR_2_GAP_Grb2} \rightleftharpoons \text{Prot} \rightleftharpoons \text{EGF_EGFR_2_GAP_Grb2_Prot}$	+
5	v5	v5	$\text{EGF_EGFR_2_GAP_Grb2_Prot} \longrightarrow \text{EGF_EGFRi_2_GAP_Grb2_Proti}$	
6	v6	v6	$\text{EGFR} \rightleftharpoons \text{EGFRi}$	
7	v7	v7	$\text{EGF_EGFR_2} \rightleftharpoons \text{EGF_EGFRi_2}$	
8	v8	v8	$\text{EGF_EGFR_2} + \text{GAP} \rightleftharpoons \text{EGF_EGFR_2_GAP}$	
9	v9	v9	$\text{EGF_EGFR_2_GAP_Grb2} \longrightarrow \text{EGF_EGFRi_2_GAP_Grb2}$	
10	v10	v10	$\text{EGFRi} + \text{EGFi} \rightleftharpoons \text{EGF_EGFRi}$	
11	v11	v11	$2 \text{EGF_EGFRi} \rightleftharpoons \text{EGF_EGFRi_2}$	
12	v12	v12	$\text{EGF_EGFRi_2} \rightleftharpoons \text{EGF_EGFRi_2}$	
13	v13	v13	$\emptyset \longrightarrow \text{EGFR}$	
14	v14	v14	$\text{EGF_EGFRi_2} \rightleftharpoons \text{GAP} \rightleftharpoons \text{EGF_EGFRi_2_GAP}$	+
15	v15	v15	$\text{Proti} \longrightarrow \text{Prot}$	
16	v16	v16	$\text{Grb2} + \text{EGF_EGFR_2_GAP} \rightleftharpoons \text{EGF_EGFR_2_GAP_Grb2}$	
17	v17	v17	$\text{Sos} + \text{EGF_EGFR_2_GAP_Grb2} \rightleftharpoons \text{EGF_EGFR_2_GAP_Grb2_Sos}$	
18	v18	v18	$\text{Ras_GDP} + \text{EGF_EGFR_2_GAP_Grb2_Sos} \rightleftharpoons \text{EGF_EGFR_2_GAP_Grb2_Sos_Ra}$	
19	v19	v19	$\text{Ras_GTP} + \text{EGF_EGFR_2_GAP_Grb2_Sos} \rightleftharpoons \text{EGF_EGFR_2_GAP_Grb2_Sos_Ra}$	

Nº	Id	Name	Reaction Equation	SBO
20	v20	v20	$\text{EGF_EGFR_2_GAP_Grb2_Sos} + \text{Ras_GTP} \rightleftharpoons \text{EGF_EGFR_2_GAP_Grb2_Sos_Ras_GTP}$	
21	v21	v21	$\text{EGF_EGFR_2_GAP_Grb2_Sos} + \text{Ras_GDP} \rightleftharpoons \text{EGF_EGFR_2_GAP_Grb2_Sos_Ras_GTP}$	
22	v22	v22	$\text{Shc} + \text{EGF_EGFR_2_GAP} \rightleftharpoons \text{EGF_EGFR_2_GAP_SHC}$	
23	v23	v23	$\text{EGF_EGFR_2_GAP_SHC} \rightleftharpoons \text{EGF_EGFR_2_GAP_SHC_0}$	
24	v24	v24	$\text{Grb2} + \text{EGF_EGFR_2_GAP_SHC_0} \rightleftharpoons \text{EGF_EGFR_2_GAP_SHC_Grb2}$	
25	v25	v25	$\text{Sos} + \text{EGF_EGFR_2_GAP_SHC_Grb2} \rightleftharpoons \text{EGF_EGFR_2_GAP_SHC_Grb2_Sos}$	
26	v26	v26	$\text{Ras_GDP} + \text{EGF_EGFR_2_GAP_SHC_Grb2_Sos} \rightleftharpoons \text{EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GDP}$	
27	v27	v27	$\text{EGF_EGFR_2_GAP_SHC_Grb2_Sos} + \text{Ras_GTP} \rightleftharpoons \text{EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GDP}$	
28	v28	v28	$\text{Ras_GTP} + \text{Raf} \rightleftharpoons \text{Raf_Ras_GTP}$	
29	v29	v29	$\text{Ras_GTP} + \text{Raf_0} \rightleftharpoons \text{Raf_Ras_GTP}$	
30	v30	v30	$\text{EGF_EGFR_2_GAP_SHC_Grb2_Sos} + \text{Ras_GTP} \rightleftharpoons \text{EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GTP}$	
31	v31	v31	$\text{EGF_EGFR_2_GAP_SHC_Grb2_Sos} + \text{Ras_GDP} \rightleftharpoons \text{EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GTP}$	
32	v32	v32	$\text{Shc_Grb2_Sos} + \text{EGF_EGFR_2_GAP} \rightleftharpoons \text{EGF_EGFR_2_GAP_SHC_Grb2_Sos}$	
33	v33	v33	$\text{Shc_0} + \text{Grb2_Sos} \rightleftharpoons \text{Shc_Grb2_Sos}$	
34	v34	v34	$\text{EGF_EGFR_2_GAP} + \text{Grb2_Sos} \rightleftharpoons \text{EGF_EGFR_2_GAP_Grb2_Sos}$	
35	v35	v35	$\text{Sos} + \text{Grb2} \rightleftharpoons \text{Grb2_Sos}$	
36	v36	v36	$\text{Shc_0} \rightleftharpoons \text{Shc}$	
37	v37	v37	$\text{EGF_EGFR_2_GAP} + \text{Shc_0} \rightleftharpoons \text{EGF_EGFR_2_GAP_SHC_0}$	
38	v38	v38	$\text{Grb2} + \text{Shc_0} \rightleftharpoons \text{Shc_Grb2}$	
39	v39	v39	$\text{EGF_EGFR_2_GAP} + \text{Shc_Grb2} \rightleftharpoons \text{EGF_EGFR_2_GAP_SHC_Grb2}$	
40	v40	v40	$\text{Sos} + \text{Shc_Grb2} \rightleftharpoons \text{Shc_Grb2_Sos}$	

Nº	Id	Name	Reaction Equation	SBO
41	v41	v41	$\text{Grb2_Sos} + \text{_EGF_EGFR_2_GAP_SHC_0} \rightleftharpoons \text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos}$	
42	v42	v42	$\text{Phosphatase1} + \text{Raf_0} \rightleftharpoons \text{Raf_phosphatase1}$	
43	v43	v43	$\text{Raf_phosphatase1} \longrightarrow \text{Raf} + \text{Phosphatase1}$	
44	v44	v44	$\text{MEK} + \text{Raf_0} \rightleftharpoons \text{MEK_Raf}$	
45	v45	v45	$\text{MEK_Raf} \longrightarrow \text{MEK_P} + \text{Raf_0}$	
46	v46	v46	$\text{MEK_P} + \text{Raf_0} \rightleftharpoons \text{MEK_P_Raf}$	
47	v47	v47	$\text{MEK_P_Raf} \longrightarrow \text{MEK_PP} + \text{Raf_0}$	
48	v48	v48	$\text{MEK_PP} + \text{phosphatse2} \rightleftharpoons \text{MEK_PP_phosphatase2}$	
49	v49	v49	$\text{MEK_PP_phosphatase2} \longrightarrow \text{MEK_P} + \text{phosphatse2}$	
50	v50	v50	$\text{phosphatse2} + \text{MEK_P} \rightleftharpoons \text{MEK_P_phosphatase2}$	
51	v51	v51	$\text{MEK_P_phosphatase2} \longrightarrow \text{MEK} + \text{phosphatse2}$	
52	v52	v52	$\text{ERK} + \text{MEK_PP} \rightleftharpoons \text{ERK_MEK_PP}$	
53	v53	v53	$\text{ERK_MEK_PP} \longrightarrow \text{MEK_PP} + \text{ERK_P}$	
54	v54	v54	$\text{MEK_PP} + \text{ERK_P} \rightleftharpoons \text{ERK_P_MEKPP}$	
55	v55	v55	$\text{ERK_P_MEKPP} \longrightarrow \text{ERK_PP} + \text{MEK_PP}$	
56	v56	v56	$\text{ERK_PP} + \text{phosphatase3} \rightleftharpoons \text{ERK_PP_phosphatase3}$	
57	v57	v57	$\text{ERK_PP_phosphatase3} \longrightarrow \text{ERK_P} + \text{phosphatase3}$	
58	v58	v58	$\text{phosphatase3} + \text{ERK_P} \rightleftharpoons \text{ERK_P_phosphatase3}$	
59	v59	v59	$\text{ERK_P_phosphatase3} \longrightarrow \text{ERK} + \text{phosphatase3}$	
60	v60	v60	$\text{EGFRi} \longrightarrow \text{EGFRidag}$	
61	v61	v61	$\text{EGFi} \longrightarrow \text{EGFideg}$	
62	v62	v62	$\text{_EGF_EGFRi_2} \longrightarrow \text{_EGF_EGFRi_2deg}$	
63	v63	v63	$\text{_EGF_EGFRi_2_GAP} + \text{Grb2} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_Grb2}$	
64	v64	v64	$\text{Sos} + \text{_EGF_EGFRi_2_GAP_Grb2} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_Grb2_Sos}$	
65	v65	v65	$\text{Ras_GDP} + \text{_EGF_EGFRi_2_GAP_Grb2_Sos} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_Grb2_Sos_R}$	
66	v66	v66	$\text{Ras_GTPi} + \text{_EGF_EGFRi_2_GAP_Grb2_Sos} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_Grb2_Sos_I}$	
67	v67	v67	$\text{Ras_GTPi_0} + \text{_EGF_EGFRi_2_GAP_Grb2_Sos} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_Grb2_Sos}$	

Nº	Id	Name	Reaction Equation	SBO
68	v68	v68	$\text{_EGF_EGFRi_2_GAP_Grb2_Sos} + \text{Ras_GDP} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GTP}$	
69	v69	v69	$\text{Shc} + \text{_EGF_EGFRi_2_GAP} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_SHC}$	
70	v70	v70	$\text{_EGF_EGFRi_2_GAP_SHC} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_SHC_0}$	
71	v71	v71	$\text{Grb2} + \text{_EGF_EGFRi_2_GAP_SHC_0} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_SHC_Grb2}$	
72	v72	v72	$\text{Sos} + \text{_EGF_EGFRi_2_GAP_SHC_Grb2} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos}$	
73	v73	v73	$\text{Ras_GDP} + \text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GDP}$	
74	v74	v74	$\text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos} + \text{Ras_GTPi} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GDP}$	
75	v75	v75	$\text{Ras_GTPi} + \text{Raf} \rightleftharpoons \text{Raf_Ras_GTPi}$	
76	v76	v76	$\text{Ras_GTPi_0} + \text{Rafi} \rightleftharpoons \text{Raf_Ras_GTPi}$	
77	v77	v77	$\text{Ras_GTPi_0} + \text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GTPi_0}$	
78	v78	v78	$\text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos} + \text{Ras_GDP} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GTP}$	
79	v79	v79	$\text{_EGF_EGFRi_2_GAP} + \text{Shc_Grb2_Sos} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos}$	
80	v80	v80	$\text{_EGF_EGFRi_2_GAP} + \text{Grb2_Sos} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_Grb2_Sos}$	
81	v81	v81	$\text{_EGF_EGFRi_2_GAP} + \text{Shc_0} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_SHC_0}$	
82	v82	v82	$\text{_EGF_EGFRi_2_GAP} + \text{Shc_Grb2} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_SHC_Grb2}$	
83	v83	v83	$\text{Grb2_Sos} + \text{_EGF_EGFRi_2_GAP_SHC_0} \rightleftharpoons \text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos}$	
84	v84	v84	$\text{Phosphatase1} + \text{Rafi} \rightleftharpoons \text{Rafi_phosphatase1}$	
85	v85	v85	$\text{Rafi_phosphatase1} \longrightarrow \text{Raf} + \text{Phosphatase1}$	
86	v86	v86	$\text{MEK} + \text{Rafi} \rightleftharpoons \text{MEK_Rafi}$	
87	v87	v87	$\text{MEK_Rafi} \longrightarrow \text{MEKi_P} + \text{Rafi}$	
88	v88	v88	$\text{Rafi} + \text{MEKi_P} \rightleftharpoons \text{MEK_P_Rafi}$	
89	v89	v89	$\text{MEK_P_Rafi} \longrightarrow \text{Rafi} + \text{MEKi_PP}$	

Nº	Id	Name	Reaction Equation	SBO
90	v90	v90	MEKi_PP + phosphatse2 \rightleftharpoons MEKi_PP_phosphatase2	
91	v91	v91	MEKi_PP_phosphatase2 \rightarrow MEKi_P + phosphatse2	
92	v92	v92	phosphatse2 + MEKi_P \rightleftharpoons MEKi_P_phosphatase2	
93	v93	v93	MEKi_P_phosphatase2 \rightarrow MEK + phosphatse2	
94	v94	v94	ERK + MEKi_PP \rightleftharpoons ERKi_MEKi_PP_0	
95	v95	v95	ERKi_MEKi_PP_0 \rightarrow ERKi_P + MEKi_PP	
96	v96	v96	MEKi_PP + ERKi_P \rightleftharpoons ERKi_P_MEKi_PP	
97	v97	v97	ERKi_P_MEKi_PP \rightarrow ERKi_PP + MEKi_PP	
98	v98	v98	ERKi_PP + phosphatase3 \rightleftharpoons ERKi_PP_phosphatase3	
99	v99	v99	ERKi_PP_phosphatase3 \rightarrow ERKi_P + phosphatase3	
100	v100	v100	phosphatase3 + ERKi_P \rightleftharpoons ERKi_P_phosphatase3	
101	v101	v101	ERKi_P_phosphatase3 \rightarrow ERK + phosphatase3	
102	v102	v102	_EGF_EGFR_2_GAP \rightarrow _EGF_EGFRi_2_GAP	
103	v103	v103	_EGF_EGFR_2_GAP_SHC \rightarrow _EGF_EGFRi_2_GAP_SHC	
104	v104	v104	_EGF_EGFR_2_GAP_SHC_0 \rightarrow _EGF_EGFRi_2_GAP_SHC_0	
105	v105	v105	_EGF_EGFR_2_GAP_Grb2_Sos \rightarrow _EGF_EGFRi_2_GAP_Grb2_Sos	
106	v106	v106	_EGF_EGFR_2_GAP_Grb2_Sos + Prot \rightleftharpoons _EGF_EGFR_2_GAP_Grb2_Sos_Prot	
107	v107	v107	_EGF_EGFR_2_GAP_Grb2_Sos_Prot \rightarrow Proti + _EGF_EGFRi_2_GAP_Grb2_Sos	
108	v108	v108	_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GDP \rightarrow _EGF_EGFRi_2_GAP_Grb2_Sos_Ras	
109	v109	v109	_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GDP + Prot \rightleftharpoons _EGF_EGFR_2_GAP_Grb2_Sos_Ras_GDP_Prot	
110	v110	v110	_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GDP_Prot \rightarrow Proti + _EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GDP	
111	v111	v111	_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GTP \rightarrow _EGF_EGFRi_2_GAP_Grb2_Sos_Ras	

Nº	Id	Name	Reaction Equation	SBO
112	v112	v112	$\text{EGF_EGFR_2_GAP_Grb2_Sos_Ras_GTP} + \text{Prot} \rightleftharpoons \text{EGF_EGFR_2_GAP_Grb2_Sos_Ras_GTP_Prot}$	
113	v113	v113	$\text{EGF_EGFR_2_GAP_Grb2_Sos_Ras_GTP_Prot} \longrightarrow \text{Proti} + \text{EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GTP}$	
114	v114	v114	$\text{EGF_EGFR_2_GAP_SHC_Grb2} \longrightarrow \text{EGF_EGFRi_2_GAP_SHC_Grb2}$	
115	v115	v115	$\text{EGF_EGFR_2_GAP_SHC_Grb2} + \text{Prot} \rightleftharpoons \text{EGF_EGFR_2_GAP_SHC_Grb2_Prot_0}$	
116	v116	v116	$\text{EGF_EGFR_2_GAP_SHC_Grb2_Prot_0} \longrightarrow \text{Proti} + \text{EGF_EGFRi_2_GAP_SHC_Grb2}$	
117	v117	v117	$\text{EGF_EGFR_2_GAP_SHC_Grb2_Sos} \longrightarrow \text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos}$	
118	v118	v118	$\text{EGF_EGFR_2_GAP_SHC_Grb2_Sos} + \text{Prot} \rightleftharpoons \text{EGF_EGFR_2_GAP_SHC_Grb2_Sos_Prot_0}$	
119	v119	v119	$\text{EGF_EGFR_2_GAP_SHC_Grb2_Sos_Prot_0} \longrightarrow \text{Proti} + \text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos}$	
120	v120	v120	$\text{EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GDP} \longrightarrow \text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GDP}$	
121	v121	v121	$\text{EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GDP} + \text{Prot} \rightleftharpoons \text{EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GDP_Prot_0}$	
122	v122	v122	$\text{EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GDP_Prot_0} \longrightarrow \text{Proti} + \text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GDP}$	
123	v123	v123	$\text{EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GTP} \longrightarrow \text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GTP}$	
124	v124	v124	$\text{EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GTP} + \text{Prot} \rightleftharpoons \text{EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GTP_Prot_0}$	
125	v125	v125	$\text{EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GTP_Prot_0} \longrightarrow \text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GTP_Prot_0} + \text{Proti}$	
126	v126	v126	$\text{ERK_PP} + \text{EGF_EGFR_2_GAP_Grb2_Sos} \rightleftharpoons \text{EGF_EGFR_2_GAP_Grb2_Sos_ERK_PP}$	
127	v127	v127	$\text{ERKi_PP} + \text{EGF_EGFRi_2_GAP_Grb2_Sos} \rightleftharpoons \text{EGF_EGFRi_2_GAP_Grb2_Sos_ERKi_PP}$	
128	v128	v128	$\text{ERK_PP} + \text{EGF_EGFR_2_GAP_SHC_Grb2_Sos} \rightleftharpoons \text{EGF_EGFR_2_GAP_SHC_Grb2_Sos_ERK_PP}$	
129	v129	v129	$\text{ERKi_PP} + \text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos} \rightleftharpoons \text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos_ERKi_PP}$	
130	v130	v130	$\text{ERK_PP} + \text{Sos} \rightleftharpoons \text{Sos_ERK_PP}$	

Nº	Id	Name	Reaction Equation	SBO
131	v131	v131	$\text{ERKi_PP} + \text{Sos} \rightleftharpoons \text{Sos_ERKi_PP}$	
132	v132	v132	$\text{EGF_EGFRi_2_GAP} \longrightarrow \text{EGF_EGFRi_2deg}$	
133	v133	v133	$\text{EGF_EGFRi_2_GAP_Grb2} \longrightarrow \text{EGF_EGFRi_2deg}$	
134	v134	v134	$\text{EGF_EGFRi_2_GAP_Grb2_Sos} \longrightarrow \text{EGF_EGFRi_2deg}$	
135	v135	v135	$\text{EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GDP} \longrightarrow \text{EGF_EGFRi_2deg}$	
136	v136	v136	$\text{EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GTP} \longrightarrow \text{EGF_EGFRi_2deg}$	
137	v137	v137	$\text{EGF_EGFRi_2_GAP_SHC} \longrightarrow \text{EGF_EGFRi_2deg}$	
138	v138	v138	$\text{EGF_EGFRi_2_GAP_SHC_0} \longrightarrow \text{EGF_EGFRi_2deg}$	
139	v139	v139	$\text{EGF_EGFRi_2_GAP_SHC_Grb2} \longrightarrow \text{EGF_EGFRi_2deg}$	
140	v140	v140	$\text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos} \longrightarrow \text{EGF_EGFRi_2deg}$	
141	v141	v141	$\text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GDP} \longrightarrow \text{EGF_EGFRi_2deg}$	
142	v142	v142	$\text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GTP} \longrightarrow \text{EGF_EGFRi_2deg}$	
143	v143	v143	$\text{ERK_PP} + \text{EGF_EGFR_2_GAP_Grb2_Sos_deg} \rightleftharpoons \text{EGF_EGFR_2_GAP_Grb2_Sos}$	
144	v144	v144	$\text{ERK_PP} + \text{EGF_EGFR_2_GAP_Grb2_Sos_deg} \rightleftharpoons \text{EGF_EGFR_2_GAP_SHC_Grb2_Sos}$	
145	v145	v145	$\text{ERK_PP} + \text{Sosi} \rightleftharpoons \text{Sos_ERK_PP}$	
146	v146	v146	$\text{ERKi_PP} + \text{EGF_EGFRi_2_GAP_Grb2_Sos_deg} \rightleftharpoons \text{EGF_EGFRi_2_GAP_Grb2_Sos}$	
147	v147	v147	$\text{ERKi_PP} + \text{EGF_EGFRi_2_GAP_Grb2_Sos_deg} \rightleftharpoons \text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos}$	
148	v148	v148	$\text{ERKi_PP} + \text{Sosi} \rightleftharpoons \text{Sos_ERKi_PP}$	

7.1 Reaction v_1

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

Name v_1

Reaction equation



Reactant

Table 6: Properties of each reactant.

Id	Name	SBO
EGFR	EGFR	

Modifier

Table 7: Properties of each modifier.

Id	Name	SBO
EGF	EGF	

Product

Table 8: Properties of each product.

Id	Name	SBO
EGF_EGFR	EGF_EGFR	

Kinetic Law

Derived unit contains undeclared units

$$v_1 = \text{vol}(\text{Compartment}) \cdot \text{function_for_}v_1_1([EGF], [EGFR], [EGF_EGFR], k_1, kd_1) \quad (4)$$

$$\begin{aligned} \text{function_for_}v_1_1([EGF], [EGFR], [EGF_EGFR], k_1, kd_1) \\ = k_1 \cdot [EGF] \cdot [EGFR] - kd_1 \cdot [EGF_EGFR] \end{aligned} \quad (5)$$

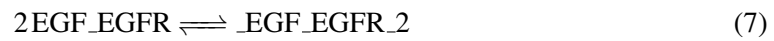
$$\begin{aligned} &\text{function_for_v1_1}([EGF], [EGFR], [EGF_EGFR], k1, kd1) \\ &= k1 \cdot [EGF] \cdot [EGFR] - kd1 \cdot [EGF_EGFR] \end{aligned} \quad (6)$$

7.2 Reaction v2

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

Name v2

Reaction equation



Reactant

Table 9: Properties of each reactant.

Id	Name	SBO
EGF_EGFR	EGF_EGFR	

Product

Table 10: Properties of each product.

Id	Name	SBO
_EGF_EGFR_2	(EGF_EGFR)2	

Kinetic Law

Derived unit contains undeclared units

$$v_2 = \text{vol}(\text{Compartment}) \cdot (k_2 \cdot [EGF_EGFR]^2 - kd_2 \cdot [_EGF_EGFR_2]) \quad (8)$$

7.3 Reaction v3

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

Name v3

Reaction equation



Reactant

Table 11: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR_2	(EGF_EGFR)2	

Product

Table 12: Properties of each product.

Id	Name	SBO
_EGF_EGFR_2	(EGF_EGFR*)2	

Kinetic Law

Derived unit contains undeclared units

$$v_3 = \text{vol}(\text{Compartment}) \cdot (k_3 \cdot [\text{_EGF_EGFR_2}] - k_{d3} \cdot [\text{_EGF_EGFR_2}]) \quad (10)$$

7.4 Reaction v4

This is a reversible reaction of two reactants forming one product.

Name v4

Reaction equation



Reactants

Table 13: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR_2_GAP_Grb2	(EGF_EGFR*)2_GAP_Grb2	
Prot	Prot	

Product

Table 14: Properties of each product.

Id	Name	SBO
_EGF_EGFR__2_GAP_Grb2_Prot	(EGF_EGFR*)2_GAP_Grb2_Prot	

Kinetic Law

Derived unit contains undeclared units

$$v_4 = \text{vol}(\text{Compartment}) \cdot (k_4 \cdot [_\text{EGF_EGFR_2_GAP_Grb2}] \cdot [\text{Prot}] - k_{d4} \cdot [_\text{EGF_EGFR_2_GAP_Grb2_Prot}]) \quad (12)$$

7.5 Reaction v5

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

Name v5

Reaction equation



Reactant

Table 15: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR__2_GAP_Grb2_Prot	(EGF_EGFR*)2_GAP_Grb2_Prot	

Products

Table 16: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2_GAP_Grb2	(EGF_EGFRi*)2_GAP_Grb2	
Proti	Proti	

Kinetic Law

Derived unit contains undeclared units

$$v_5 = \text{vol}(\text{Compartment}) \cdot \text{kd5} \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Prot}] \quad (14)$$

7.6 Reaction v6

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

Name v6

Reaction equation



Reactant

Table 17: Properties of each reactant.

Id	Name	SBO
EGFR	EGFR	

Product

Table 18: Properties of each product.

Id	Name	SBO
EGFRi	EGFRi	

Kinetic Law

Derived unit contains undeclared units

$$v_6 = \text{vol}(\text{Compartment}) \cdot (\text{k6} \cdot [\text{EGFR}] - \text{kd6} \cdot [\text{EGFRi}]) \quad (16)$$

7.7 Reaction v7

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

Name v7

Reaction equation



Reactant

Table 19: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR_2	(EGF_EGFR*)2	

Product

Table 20: Properties of each product.

Id	Name	SBO
_EGF_EGFRi_2	(EGF-EGFRi*)2	

Kinetic Law

Derived unit contains undeclared units

$$v_7 = \text{vol}(\text{Compartment}) \cdot (k_6 \cdot [\text{_EGF_EGFR_2}] - k_{d6} \cdot [\text{_EGF_EGFRi_2}]) \quad (18)$$

7.8 Reaction v8

This is a reversible reaction of two reactants forming one product.

Name v8

Reaction equation



Reactants

Table 21: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR_2	(EGF_EGFR*)2	
GAP	GAP	

Product

Table 22: Properties of each product.

Id	Name	SBO
<code>_EGF_EGFR__2_GAP</code>	<code>(EGF_EGFR*)2_GAP</code>	

Kinetic Law

Derived unit contains undeclared units

$$v_8 = \text{vol}(\text{Compartment}) \cdot (k_8 \cdot [\text{_EGF_EGFR_2_}] \cdot [\text{GAP}] - k_{d8} \cdot [\text{_EGF_EGFR_2_GAP}]) \quad (20)$$

7.9 Reaction v9

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

Name v9

Reaction equation



Reactant

Table 23: Properties of each reactant.

Id	Name	SBO
<code>_EGF_EGFR__2_GAP_Grb2</code>	<code>(EGF_EGFR*)2_GAP_Grb2</code>	

Product

Table 24: Properties of each product.

Id	Name	SBO
<code>_EGF_EGFRi__2_GAP_Grb2</code>	<code>(EGF_EGFRi*)2_GAP_Grb2</code>	

Kinetic Law

Derived unit contains undeclared units

$$v_9 = \text{vol}(\text{Compartment}) \cdot k_6 \cdot [\text{_EGF_EGFR_2_GAP_Grb2}] \quad (22)$$

7.10 Reaction v10

This is a reversible reaction of two reactants forming one product.

Name v10

Reaction equation



Reactants

Table 25: Properties of each reactant.

Id	Name	SBO
EGFRi	EGFRi	
EGFi	EGFi	

Product

Table 26: Properties of each product.

Id	Name	SBO
EGF_EGFRi	EGF_EGFRi	

Kinetic Law

Derived unit contains undeclared units

$$v_{10} = \text{vol}(\text{Compartment}) \cdot (k_{10b} \cdot [\text{EGFRi}] \cdot [\text{EGFi}] - k_{d10} \cdot [\text{EGF_EGFRi}]) \quad (24)$$

7.11 Reaction v11

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

Name v11

Reaction equation



Reactant

Table 27: Properties of each reactant.

Id	Name	SBO
EGF_EGFRi	EGF_EGFRi	

Product

Table 28: Properties of each product.

Id	Name	SBO
_EGF_EGFRi_2	(EGF-EGFRi)2	

Kinetic Law

Derived unit contains undeclared units

$$v_{11} = \text{vol}(\text{Compartment}) \cdot (k_2 \cdot [\text{EGF_EGFRi}]^2 - k_{d2} \cdot [\text{_EGF_EGFRi_2}]) \quad (26)$$

7.12 Reaction v12

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

Name v12

Reaction equation



Reactant

Table 29: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi_2	(EGF-EGFRi)2	

Product

Table 30: Properties of each product.

Id	Name	SBO
_EGF_EGFRi_2	(EGF-EGFRi*)2	

Kinetic Law

Derived unit contains undeclared units

$$v_{12} = \text{vol}(\text{Compartment}) \cdot (k_3 \cdot [\text{_EGF_EGFRi_2}] - k_{d3} \cdot [\text{_EGF_EGFRi_2}]) \quad (28)$$

7.13 Reaction v13

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

Name v13

Reaction equation



Product

Table 31: Properties of each product.

Id	Name	SBO
EGFR	EGFR	

Kinetic Law

Derived unit contains undeclared units

$$v_{13} = \text{vol}(\text{Compartment}) \cdot \text{Constant_flux_irreversible_0}(k_{13}) \quad (30)$$

$$\text{Constant_flux_irreversible_0}(v) = v \quad (31)$$

$$\text{Constant_flux_irreversible_0}(v) = v \quad (32)$$

7.14 Reaction v14

This is a reversible reaction of two reactants forming one product.

Name v14

Reaction equation



Reactants

Table 32: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi_2	(EGF-EGFRi*)2	
GAP	GAP	

Product

Table 33: Properties of each product.

Id	Name	SBO
_EGF_EGFRi_2_GAP	(EGF_EGFRi*)2_GAP	

Kinetic Law

Derived unit contains undeclared units

$$v_{14} = \text{vol}(\text{Compartment}) \cdot (k_8 \cdot [\text{_EGF_EGFRi_2}] \cdot [\text{GAP}] - k_{d8} \cdot [\text{_EGF_EGFRi_2_GAP}]) \quad (34)$$

7.15 Reaction v15

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

Name v15

Reaction equation



Reactant

Table 34: Properties of each reactant.

Id	Name	SBO
Proti	Proti	

Product

Table 35: Properties of each product.

Id	Name	SBO
Prot	Prot	

Kinetic Law

Derived unit contains undeclared units

$$v_{15} = \text{vol}(\text{Compartment}) \cdot k_{15} \cdot [\text{Proti}] \quad (36)$$

7.16 Reaction v16

This is a reversible reaction of two reactants forming one product.

Name v16

Reaction equation



Reactants

Table 36: Properties of each reactant.

Id	Name	SBO
Grb2	Grb2	
_EGF_EGFR_2_GAP	(EGF_EGFR*)2_GAP	

Product

Table 37: Properties of each product.

Id	Name	SBO
_EGF_EGFR__2_GAP_Grb2	(EGF_EGFR*)2_GAP_Grb2	

Kinetic Law

Derived unit contains undeclared units

$$v_{16} = \text{vol}(\text{Compartment}) \cdot (k_{16} \cdot [\text{Grb2}] \cdot [\text{_EGF_EGFR_2_GAP}]] - k_{d63} \cdot [\text{_EGF_EGFR_2_GAP_Grb2}]) \quad (38)$$

7.17 Reaction v17

This is a reversible reaction of two reactants forming one product.

Name v17

Reaction equation



Reactants

Table 38: Properties of each reactant.

Id	Name	SBO
Sos	Sos	
_EGF_EGFR__2_GAP_Grb2	(EGF_EGFR*)2_GAP_Grb2	

Product

Table 39: Properties of each product.

Id	Name	SBO
_EGF_EGFR__2_GAP_Grb2_Sos	(EGF_EGFR*)2_GAP_Grb2_Sos	

Kinetic Law

Derived unit contains undeclared units

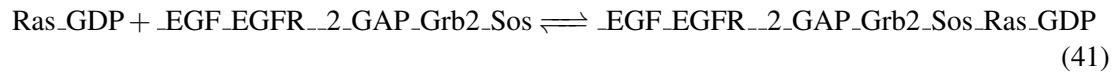
$$v_{17} = \text{vol}(\text{Compartment}) \cdot (k_{17} \cdot [\text{Sos}] \cdot [\text{_EGF_EGFR_2_GAP_Grb2}] - k_{d17} \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos}]) \quad (40)$$

7.18 Reaction v18

This is a reversible reaction of two reactants forming one product.

Name v18

Reaction equation



Reactants

Table 40: Properties of each reactant.

Id	Name	SBO
Ras_GDP	Ras_GDP	
_EGF_EGFR_2_GAP_Grb2_Sos	(EGF_EGFR*)2_GAP_Grb2_Sos	

Product

Table 41: Properties of each product.

Id	Name	SBO
_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GDP	(EGF_EGFR*)2_GAP_Grb2_Sos_Ras_GDP	

Kinetic Law

Derived unit contains undeclared units

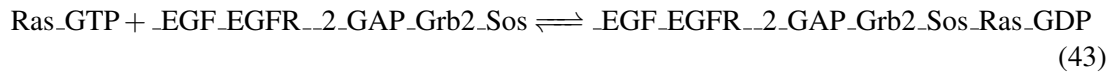
$$v_{18} = \text{vol}(\text{Compartment}) \cdot (k_{18} \cdot [\text{Ras_GDP}] \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos}] - k_{d18} \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GDP}]) \quad (42)$$

7.19 Reaction v19

This is a reversible reaction of two reactants forming one product.

Name v19

Reaction equation



Reactants

Table 42: Properties of each reactant.

Id	Name	SBO
Ras_GTP	Ras_GTP	
_EGF_EGFR_2_GAP_Grb2_Sos	(EGF_EGFR*)2_GAP_Grb2_Sos	

Product

Table 43: Properties of each product.

Id	Name	SBO
_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GDP	(EGF_EGFR*)2_GAP_Grb2_Sos_Ras_GDP	

Kinetic Law

Derived unit contains undeclared units

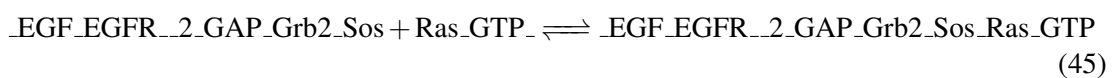
$$v_{19} = \text{vol}(\text{Compartment}) \cdot (k_{19} \cdot [\text{Ras_GTP}] \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos}] - k_{d19} \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GDP}]) \quad (44)$$

7.20 Reaction v20

This is a reversible reaction of two reactants forming one product.

Name v20

Reaction equation



Reactants

Table 44: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR__2_GAP_Grb2_Sos	(EGF_EGFR*)2_GAP_Grb2_Sos	
Ras_GTP_	Ras_GTP*	

Product

Table 45: Properties of each product.

Id	Name	SBO
_EGF_EGFR__2_GAP_Grb2_Sos_Ras_GTP	(EGF_EGFR*)2_GAP_Grb2_Sos_Ras_GTP	

Kinetic Law

Derived unit contains undeclared units

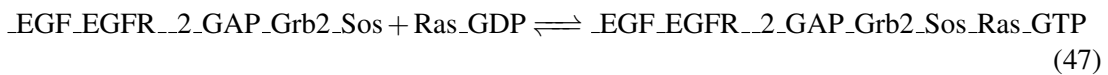
$$v_{20} = \text{vol}(\text{Compartment}) \cdot (k_{20} \cdot [_\text{EGF_EGFR_}2_ \text{GAP_Grb2_Sos}] \cdot [_\text{Ras_GTP_}] - k_{d20} \cdot [_\text{EGF_EGFR_}2_ \text{GAP_Grb2_Sos_Ras_GTP}]) \quad (46)$$

7.21 Reaction v21

This is a reversible reaction of two reactants forming one product.

Name v21

Reaction equation



Reactants

Table 46: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR__2_GAP_Grb2_Sos	(EGF_EGFR*)2_GAP_Grb2_Sos	
Ras_GDP	Ras_GDP	

Product

Table 47: Properties of each product.

Id	Name	SBO
<code>_EGF_EGFR__2_GAP_Grb2_Sos_Ras_GTP</code>	<code>(EGF_EGFR*)2_GAP_Grb2_Sos_Ras_GTP</code>	

Kinetic Law

Derived unit contains undeclared units

$$v_{21} = \text{vol}(\text{Compartment}) \cdot (k_{21} \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos}] \cdot [\text{Ras_GDP}] - k_{d21} \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GTP}]) \quad (48)$$

7.22 Reaction v22

This is a reversible reaction of two reactants forming one product.

Name v22

Reaction equation



Reactants

Table 48: Properties of each reactant.

Id	Name	SBO
<code>Shc</code>	<code>Shc</code>	
<code>_EGF_EGFR__2_GAP</code>	<code>(EGF_EGFR*)2_GAP</code>	

Product

Table 49: Properties of each product.

Id	Name	SBO
<code>_EGF_EGFR__2_GAP_SHC</code>	<code>(EGF_EGFR*)2_GAP_SHC</code>	

Kinetic Law

Derived unit contains undeclared units

$$v_{22} = \text{vol}(\text{Compartment}) \cdot (k_{22} \cdot [\text{Shc}] \cdot [\text{_EGF_EGFR_2_GAP}] - k_{d22} \cdot [\text{_EGF_EGFR_2_GAP_SHC}]) \quad (50)$$

7.23 Reaction v23

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

Name v23

Reaction equation



Reactant

Table 50: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR_2_GAP_SHC	(EGF_EGFR*)2_GAP_SHC	

Product

Table 51: Properties of each product.

Id	Name	SBO
_EGF_EGFR_2_GAP_SHC_0	(EGF_EGFR*)2_GAP_SHC*	

Kinetic Law

Derived unit contains undeclared units

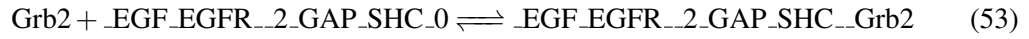
$$v_{23} = \text{vol}(\text{Compartment}) \cdot (k_{23} \cdot [\text{_EGF_EGFR_2_GAP_SHC}] - k_{d23} \cdot [\text{_EGF_EGFR_2_GAP_SHC_0}]) \quad (52)$$

7.24 Reaction v24

This is a reversible reaction of two reactants forming one product.

Name v24

Reaction equation



Reactants

Table 52: Properties of each reactant.

Id	Name	SBO
Grb2	Grb2	
_EGF_EGFR_2_GAP_SHC_0	(EGF_EGFR*)2_GAP_SHC*	

Product

Table 53: Properties of each product.

Id	Name	SBO
_EGF_EGFR_2_GAP_SHC_Grb2	(EGF_EGFR*)2_GAP_SHC*_Grb2	

Kinetic Law

Derived unit contains undeclared units

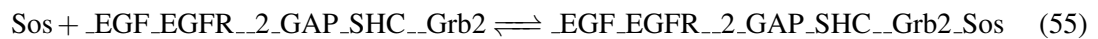
$$v_{24} = \text{vol}(\text{Compartment}) \cdot (k_{16} \cdot [\text{Grb2}] \cdot [\text{_EGF_EGFR_2_GAP_SHC_0}] - k_{d24} \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2}]) \quad (54)$$

7.25 Reaction v25

This is a reversible reaction of two reactants forming one product.

Name v25

Reaction equation



Reactants

Table 54: Properties of each reactant.

Id	Name	SBO
Sos	Sos	
_EGF_EGFR__2_GAP_SHC__Grb2	(EGF_EGFR*)2_GAP_SHC*_Grb2	

Product

Table 55: Properties of each product.

Id	Name	SBO
_EGF_EGFR__2_GAP_SHC__Grb2_Sos	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos	

Kinetic Law

Derived unit contains undeclared units

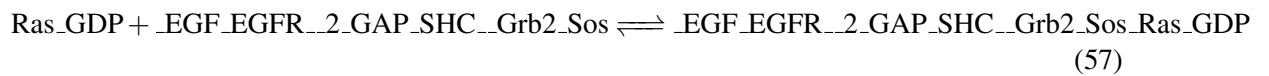
$$v_{25} = \text{vol}(\text{Compartment}) \cdot (k_{25} \cdot [\text{Sos}] \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2}] - k_{d25} \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos}]) \quad (56)$$

7.26 Reaction v26

This is a reversible reaction of two reactants forming one product.

Name v26

Reaction equation



Reactants

Table 56: Properties of each reactant.

Id	Name	SBO
Ras_GDP	Ras_GDP	
_EGF_EGFR__2_GAP_SHC__Grb2_Sos	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos	

Product

Table 57: Properties of each product.

Id	Name	SBO
_EGF_EGFR__2_GAP_SHC__Grb2_Sos_Ras_GDP	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos_Ras_GDP	

Kinetic Law

Derived unit contains undeclared units

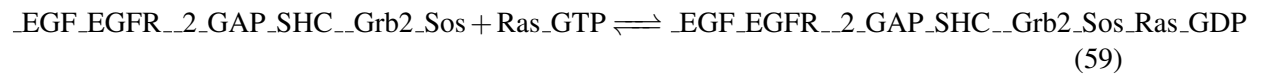
$$v_{26} = \text{vol}(\text{Compartment}) \cdot (k_{18} \cdot [\text{Ras_GDP}] \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos}] - k_{d18} \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GDP}]) \quad (58)$$

7.27 Reaction v27

This is a reversible reaction of two reactants forming one product.

Name v27

Reaction equation



Reactants

Table 58: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR__2_GAP_SHC__Grb2_Sos	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos	
Ras_GTP	Ras_GTP	

Product

Table 59: Properties of each product.

Id	Name	SBO
_EGF_EGFR__2_GAP_SHC__Grb2_Sos_Ras_GDP	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos_Ras_GDP	

Kinetic Law

Derived unit contains undeclared units

$$v_{27} = \text{vol}(\text{Compartment}) \cdot (k_{19} \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos}] \cdot [\text{Ras_GTP}] - k_{d19} \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GDP}]) \quad (60)$$

7.28 Reaction v28

This is a reversible reaction of two reactants forming one product.

Name v28

Reaction equation



Reactants

Table 60: Properties of each reactant.

Id	Name	SBO
Ras_GTP	Ras_GTP	
Raf	Raf	

Product

Table 61: Properties of each product.

Id	Name	SBO
Raf_Ras_GTP	Raf_Ras_GTP	

Kinetic Law

Derived unit contains undeclared units

$$v_{28} = \text{vol}(\text{Compartment}) \cdot (k_{28} \cdot [\text{Ras_GTP}] \cdot [\text{Raf}] - k_{d28} \cdot [\text{Raf_Ras_GTP}]) \quad (62)$$

7.29 Reaction v29

This is a reversible reaction of two reactants forming one product.

Name v29

Reaction equation



Reactants

Table 62: Properties of each reactant.

Id	Name	SBO
Ras_GTP_	Ras_GTP*	
Raf_0	Raf*	

Product

Table 63: Properties of each product.

Id	Name	SBO
Raf_Ras_GTP	Raf_Ras_GTP	

Kinetic Law

Derived unit contains undeclared units

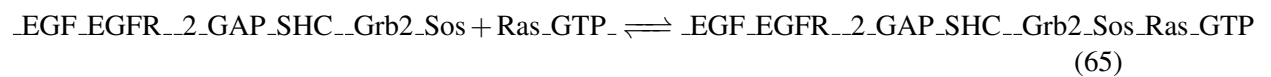
$$v_{29} = \text{vol}(\text{Compartment}) \cdot (k_{29} \cdot [\text{Ras_GTP_}] \cdot [\text{Raf_0}] - k_{d29} \cdot [\text{Raf_Ras_GTP}]) \quad (64)$$

7.30 Reaction v30

This is a reversible reaction of two reactants forming one product.

Name v30

Reaction equation



Reactants

Table 64: Properties of each reactant.

Id	Name	SBO
<code>_EGF_EGFR__2_GAP_SHC__Grb2_Sos</code>	<code>(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos</code>	
<code>Ras_GTP_</code>	<code>Ras_GTP*</code>	

Product

Table 65: Properties of each product.

Id	Name	SBO
<code>_EGF_EGFR__2_GAP_SHC__Grb2_Sos_Ras_GTP</code>	<code>(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos_Ras_GTP</code>	

Kinetic Law

Derived unit contains undeclared units

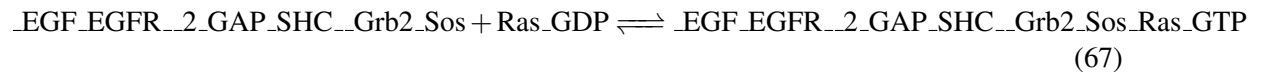
$$v_{30} = \text{vol}(\text{Compartment}) \cdot (k_{20} \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos}] \cdot [\text{Ras_GTP_}] - k_{d20} \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GTP}]) \quad (66)$$

7.31 Reaction v31

This is a reversible reaction of two reactants forming one product.

Name v31

Reaction equation



Reactants

Table 66: Properties of each reactant.

Id	Name	SBO
<code>_EGF_EGFR__2_GAP_SHC__Grb2_Sos</code>	<code>(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos</code>	
<code>Ras_GDP</code>	<code>Ras_GDP</code>	

Product

Table 67: Properties of each product.

Id	Name	SBO
<code>_EGF_EGFR__2_GAP_SHC__Grb2_Sos_Ras_GTP</code>	<code>(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos_Ras_GTP</code>	

Kinetic Law

Derived unit contains undeclared units

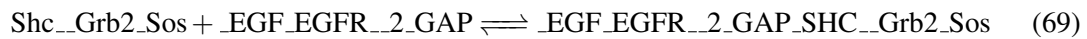
$$v_{31} = \text{vol}(\text{Compartment}) \cdot (k_{21} \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos}] \cdot [\text{Ras_GDP}] - k_{d21} \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GTP}]) \quad (68)$$

7.32 Reaction v32

This is a reversible reaction of two reactants forming one product.

Name v32

Reaction equation



Reactants

Table 68: Properties of each reactant.

Id	Name	SBO
<code>Shc__Grb2_Sos</code>	<code>Shc*_Grb2_Sos</code>	
<code>_EGF_EGFR__2_GAP</code>	<code>(EGF_EGFR*)2_GAP</code>	

Product

Table 69: Properties of each product.

Id	Name	SBO
<code>_EGF_EGFR__2_GAP_SHC__Grb2_Sos</code>	<code>(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos</code>	

Kinetic Law

Derived unit contains undeclared units

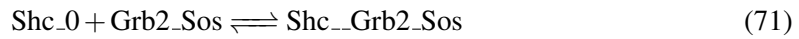
$$v_{32} = \text{vol}(\text{Compartment}) \cdot (k_{32} \cdot [\text{Shc_Grb2_Sos}] \cdot [\text{_EGF_EGFR_2_GAP}] - k_{d32} \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos}]) \quad (70)$$

7.33 Reaction v33

This is a reversible reaction of two reactants forming one product.

Name v33

Reaction equation



Reactants

Table 70: Properties of each reactant.

Id	Name	SBO
Shc_0	Shc*	
Grb2_Sos	Grb2_Sos	

Product

Table 71: Properties of each product.

Id	Name	SBO
Shc_Grb2_Sos	Shc*_Grb2_Sos	

Kinetic Law

Derived unit contains undeclared units

$$v_{33} = \text{vol}(\text{Compartment}) \cdot (k_{33} \cdot [\text{Shc_0}] \cdot [\text{Grb2_Sos}] - k_{d33} \cdot [\text{Shc_Grb2_Sos}]) \quad (72)$$

7.34 Reaction v34

This is a reversible reaction of two reactants forming one product.

Name v34

Reaction equation



Reactants

Table 72: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR_2_GAP	(EGF_EGFR*)2_GAP	
Grb2_Sos	Grb2_Sos	

Product

Table 73: Properties of each product.

Id	Name	SBO
_EGF_EGFR_2_GAP_Grb2_Sos	(EGF_EGFR*)2_GAP_Grb2_Sos	

Kinetic Law

Derived unit contains undeclared units

$$v_{34} = \text{vol}(\text{Compartment}) \cdot (k_{34} \cdot [\text{_EGF_EGFR_2_GAP}] \cdot [\text{Grb2_Sos}] - k_{d34} \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos}]) \quad (74)$$

7.35 Reaction v35

This is a reversible reaction of two reactants forming one product.

Name v35

Reaction equation



Reactants

Table 74: Properties of each reactant.

Id	Name	SBO
Sos	Sos	
Grb2	Grb2	

Product

Table 75: Properties of each product.

Id	Name	SBO
Grb2_Sos	Grb2_Sos	

Kinetic Law

Derived unit contains undeclared units

$$v_{35} = \text{vol}(\text{Compartment}) \cdot (k_{35} \cdot [\text{Sos}] \cdot [\text{Grb2}] - k_{d35} \cdot [\text{Grb2_Sos}]) \quad (76)$$

7.36 Reaction v36

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

Name v36

Reaction equation



Reactant

Table 76: Properties of each reactant.

Id	Name	SBO
Shc_0	Shc*	

Product

Table 77: Properties of each product.

Id	Name	SBO
Shc	Shc	

Kinetic Law**Derived unit** contains undeclared units

$$v_{36} = \text{vol}(\text{Compartment}) \cdot (k_{36} \cdot [\text{Shc}_0] - k_{d36} \cdot [\text{Shc}]) \quad (78)$$

7.37 Reaction v37

This is a reversible reaction of two reactants forming one product.

Name v37**Reaction equation****Reactants**

Table 78: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR_2_GAP	(EGF_EGFR*)2_GAP	
Shc_0	Shc*	

Product

Table 79: Properties of each product.

Id	Name	SBO
_EGF_EGFR_2_GAP_SHC_0	(EGF_EGFR*)2_GAP_SHC*	

Kinetic Law**Derived unit** contains undeclared units

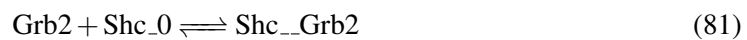
$$v_{37} = \text{vol}(\text{Compartment}) \cdot (k_{37} \cdot [\text{_EGF_EGFR_2_GAP}] \cdot [\text{Shc_0}] - k_{d37} \cdot [\text{_EGF_EGFR_2_GAP_SHC_0}]) \quad (80)$$

7.38 Reaction v38

This is a reversible reaction of two reactants forming one product.

Name v38

Reaction equation



Reactants

Table 80: Properties of each reactant.

Id	Name	SBO
Grb2	Grb2	
Shc_0	Shc*	

Product

Table 81: Properties of each product.

Id	Name	SBO
Shc_Grb2	Shc*_Grb2	

Kinetic Law

Derived unit contains undeclared units

$$v_{38} = \text{vol}(\text{Compartment}) \cdot (k_{16} \cdot [\text{Grb2}] \cdot [\text{Shc_0}] - k_{d24} \cdot [\text{Shc_Grb2}]) \quad (82)$$

7.39 Reaction v39

This is a reversible reaction of two reactants forming one product.

Name v39

Reaction equation



Reactants

Table 82: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR_2_GAP	(EGF_EGFR*)2_GAP	
Shc_Grb2	Shc*_Grb2	

Product

Table 83: Properties of each product.

Id	Name	SBO
_EGF_EGFR_2_GAP_SHC_Grb2	(EGF_EGFR*)2_GAP_SHC*_Grb2	

Kinetic Law

Derived unit contains undeclared units

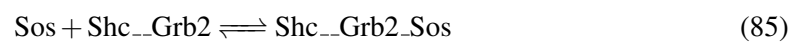
$$v_{39} = \text{vol}(\text{Compartment}) \cdot (k_{37} \cdot [\text{_EGF_EGFR_2_GAP}] \cdot [\text{Shc_Grb2}] - k_{d37} \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2}]) \quad (84)$$

7.40 Reaction v40

This is a reversible reaction of two reactants forming one product.

Name v40

Reaction equation



Reactants

Table 84: Properties of each reactant.

Id	Name	SBO
Sos	Sos	
Shc__Grb2	Shc*_Grb2	

Product

Table 85: Properties of each product.

Id	Name	SBO
Shc__Grb2_Sos	Shc*_Grb2_Sos	

Kinetic Law

Derived unit contains undeclared units

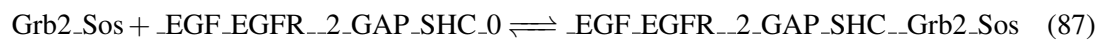
$$v_{40} = \text{vol}(\text{Compartment}) \cdot (k_{40} \cdot [\text{Sos}] \cdot [\text{Shc_Grb2}] - k_{d40} \cdot [\text{Shc_Grb2_Sos}]) \quad (86)$$

7.41 Reaction v41

This is a reversible reaction of two reactants forming one product.

Name v41

Reaction equation



Reactants

Table 86: Properties of each reactant.

Id	Name	SBO
Grb2_Sos	Grb2_Sos	
_EGF_EGFR_2_GAP_SHC_0	(EGF_EGFR*)2_GAP_SHC*	

Product

Table 87: Properties of each product.

Id	Name	SBO
_EGF_EGFR__2_GAP_SHC__Grb2_Sos	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos	

Kinetic Law

Derived unit contains undeclared units

$$v_{41} = \text{vol}(\text{Compartment}) \cdot (k_{41} \cdot [\text{Grb2_Sos}] \cdot [\text{_EGF_EGFR_2_GAP_SHC_0}] - k_{d41} \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos}]) \quad (88)$$

7.42 Reaction v42

This is a reversible reaction of two reactants forming one product.

Name v42

Reaction equation



Reactants

Table 88: Properties of each reactant.

Id	Name	SBO
Phosphatase1	Phosphatase1	
Raf_0	Raf*	

Product

Table 89: Properties of each product.

Id	Name	SBO
Raf__phosphatase1	Raf*_phosphatase1	

Kinetic Law

Derived unit contains undeclared units

$$v_{42} = \text{vol}(\text{Compartment}) \cdot (k_{42} \cdot [\text{Phosphatase1}] \cdot [\text{Raf}_0] - k_{d42} \cdot [\text{Raf_phosphatase1}]) \quad (90)$$

7.43 Reaction v43

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

Name v43

Reaction equation



Reactant

Table 90: Properties of each reactant.

Id	Name	SBO
Raf__phosphatase1	Raf*_phosphatase1	

Products

Table 91: Properties of each product.

Id	Name	SBO
Raf	Raf	
Phosphatase1	Phosphatase1	

Kinetic Law

Derived unit contains undeclared units

$$v_{43} = \text{vol}(\text{Compartment}) \cdot k_{d43} \cdot [\text{Raf_phosphatase1}] \quad (92)$$

7.44 Reaction v44

This is a reversible reaction of two reactants forming one product.

Name v44

Reaction equation



Reactants

Table 92: Properties of each reactant.

Id	Name	SBO
MEK	MEK	
Raf_0	Raf*	

Product

Table 93: Properties of each product.

Id	Name	SBO
MEK_Raf	MEK_Raf*	

Kinetic Law

Derived unit contains undeclared units

$$v_{44} = \text{vol}(\text{Compartment}) \cdot (k_{44} \cdot [\text{MEK}] \cdot [\text{Raf}_0] - k_{d52} \cdot [\text{MEK_Raf}])$$

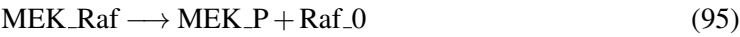
(94)

7.45 Reaction v45

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

Name v45

Reaction equation



Reactant

Table 94: Properties of each reactant.

Id	Name	SBO
MEK_Raf	MEK_Raf*	

Products

Table 95: Properties of each product.

Id	Name	SBO
MEK_P	MEK_P	
Raf_0	Raf*	

Kinetic Law

Derived unit contains undeclared units

$$v_{45} = \text{vol}(\text{Compartment}) \cdot kd_{45} \cdot [\text{MEK_Raf}] \quad (96)$$

7.46 Reaction v46

This is a reversible reaction of two reactants forming one product.

Name v46

Reaction equation



Reactants

Table 96: Properties of each reactant.

Id	Name	SBO
MEK_P	MEK_P	
Raf_0	Raf*	

Product

Table 97: Properties of each product.

Id	Name	SBO
MEK_P_Raf	MEK_P_Raf*	

Kinetic Law

Derived unit contains undeclared units

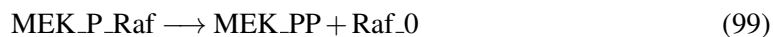
$$v_{46} = \text{vol}(\text{Compartment}) \cdot (k_{44} \cdot [\text{MEK_P}] \cdot [\text{Raf_0}] - k_{d52} \cdot [\text{MEK_P_Raf}]) \quad (98)$$

7.47 Reaction v47

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

Name v47

Reaction equation



Reactant

Table 98: Properties of each reactant.

Id	Name	SBO
MEK_P_Raf	MEK_P_Raf*	

Products

Table 99: Properties of each product.

Id	Name	SBO
MEK_PP	MEK_PP	
Raf_0	Raf*	

Kinetic Law

Derived unit contains undeclared units

$$v_{47} = \text{vol}(\text{Compartment}) \cdot k_{d47} \cdot [\text{MEK_P_Raf}] \quad (100)$$

7.48 Reaction v48

This is a reversible reaction of two reactants forming one product.

Name v48

Reaction equation



Reactants

Table 100: Properties of each reactant.

Id	Name	SBO
MEK_PP phosphatse2	MEK_PP phosphatse2	

Product

Table 101: Properties of each product.

Id	Name	SBO
MEK_PP_phosphatase2	MEK_PP_phosphatase2	

Kinetic Law

Derived unit contains undeclared units

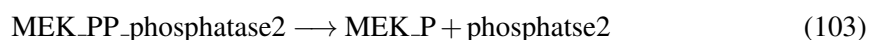
$$v_{48} = \text{vol}(\text{Compartment}) \cdot (k_{48} \cdot [\text{MEK_PP}] \cdot [\text{phosphatse2}] - k_{d48} \cdot [\text{MEK_PP_phosphatase2}]) \quad (102)$$

7.49 Reaction v49

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

Name v49

Reaction equation



Reactant

Table 102: Properties of each reactant.

Id	Name	SBO
MEK_PP_phosphatase2	MEK_PP_phosphatase2	

Products

Table 103: Properties of each product.

Id	Name	SBO
MEK_P phosphatse2	MEK_P phosphatse2	

Kinetic Law

Derived unit contains undeclared units

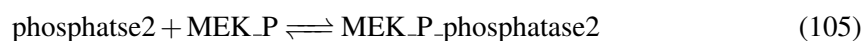
$$v_{49} = \text{vol}(\text{Compartment}) \cdot \text{kd}_{49} \cdot [\text{MEK_PP_phosphatase2}] \quad (104)$$

7.50 Reaction v50

This is a reversible reaction of two reactants forming one product.

Name v50

Reaction equation



Reactants

Table 104: Properties of each reactant.

Id	Name	SBO
phosphatse2	phosphatse2	
MEK_P	MEK_P	

Product

Table 105: Properties of each product.

Id	Name	SBO
MEK_P_phosphatase2	MEK_P_phosphatase2	

Kinetic Law

Derived unit contains undeclared units

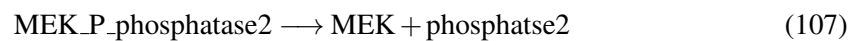
$$v_{50} = \text{vol}(\text{Compartment}) \cdot (k_{50} \cdot [\text{phosphatse2}] \cdot [\text{MEK_P}] - k_{d50} \cdot [\text{MEK_P_phosphatase2}]) \quad (106)$$

7.51 Reaction v51

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

Name v51

Reaction equation



Reactant

Table 106: Properties of each reactant.

Id	Name	SBO
MEK_P_phosphatase2	MEK_P_phosphatase2	

Products

Table 107: Properties of each product.

Id	Name	SBO
MEK	MEK	
phosphatse2	phosphatse2	

Kinetic Law

Derived unit contains undeclared units

$$v_{51} = \text{vol}(\text{Compartment}) \cdot \text{kd49} \cdot [\text{MEK_P_phosphatase2}] \quad (108)$$

7.52 Reaction v52

This is a reversible reaction of two reactants forming one product.

Name v52

Reaction equation



Reactants

Table 108: Properties of each reactant.

Id	Name	SBO
ERK	ERK	
MEK_PP	MEK_PP	

Product

Table 109: Properties of each product.

Id	Name	SBO
ERK_MEK_PP	ERK_MEK_PP	

Kinetic Law

Derived unit contains undeclared units

$$v_{52} = \text{vol}(\text{Compartment}) \cdot (\text{k52} \cdot [\text{ERK}] \cdot [\text{MEK_PP}] - \text{kd44} \cdot [\text{ERK_MEK_PP}]) \quad (110)$$

7.53 Reaction v53

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

Name v53

Reaction equation



Reactant

Table 110: Properties of each reactant.

Id	Name	SBO
ERK_MEK_PP	ERK_MEK_PP	

Products

Table 111: Properties of each product.

Id	Name	SBO
MEK_PP	MEK_PP	
ERK_P	ERK_P	

Kinetic Law

Derived unit contains undeclared units

$$v_{53} = \text{vol}(\text{Compartment}) \cdot \text{kd53} \cdot [\text{ERK_MEK_PP}] \quad (112)$$

7.54 Reaction v_{54}

This is a reversible reaction of two reactants forming one product.

Name v_{54}

Reaction equation



Reactants

Table 112: Properties of each reactant.

Id	Name	SBO
MEK_PP	MEK_PP	
ERK_P	ERK_P	

Product

Table 113: Properties of each product.

Id	Name	SBO
ERK_P_MEKPP	ERK_P_MEKPP	

Kinetic Law

Derived unit contains undeclared units

$$v_{54} = \text{vol}(\text{Compartment}) \cdot (k_{52} \cdot [\text{MEK_PP}] \cdot [\text{ERK_P}] - k_{d44} \cdot [\text{ERK_P_MEKPP}]) \quad (114)$$

7.55 Reaction v55

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

Name v55

Reaction equation



Reactant

Table 114: Properties of each reactant.

Id	Name	SBO
ERK_P_MEKPP	ERK_P_MEKPP	

Products

Table 115: Properties of each product.

Id	Name	SBO
ERK_PP	ERK_PP	
MEK_PP	MEK_PP	

Kinetic Law

Derived unit contains undeclared units

$$v_{55} = \text{vol}(\text{Compartment}) \cdot \text{kd55} \cdot [\text{ERK_P_MEKPP}] \quad (116)$$

7.56 Reaction v56

This is a reversible reaction of two reactants forming one product.

Name v56

Reaction equation



Reactants

Table 116: Properties of each reactant.

Id	Name	SBO
ERK_PP	ERK_PP	
phosphatase3	phosphatase3	

Product

Table 117: Properties of each product.

Id	Name	SBO
ERK_PP_phosphatase3	ERK_PP_phosphatase3	

Kinetic Law

Derived unit contains undeclared units

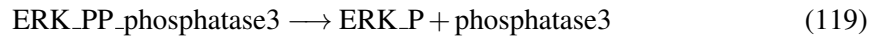
$$v_{56} = \text{vol}(\text{Compartment}) \cdot (\text{k56} \cdot [\text{ERK_PP}] \cdot [\text{phosphatase3}] - \text{kd56} \cdot [\text{ERK_PP_phosphatase3}]) \quad (118)$$

7.57 Reaction v57

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

Name v57

Reaction equation



Reactant

Table 118: Properties of each reactant.

Id	Name	SBO
ERK_PP_phosphatase3	ERK_PP_phosphatase3	

Products

Table 119: Properties of each product.

Id	Name	SBO
ERK_P phosphatase3	ERK_P phosphatase3	

Kinetic Law

Derived unit contains undeclared units

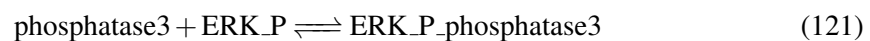
$$v_{57} = \text{vol}(\text{Compartment}) \cdot \text{kd57} \cdot [\text{ERK_PP_phosphatase3}] \quad (120)$$

7.58 Reaction v58

This is a reversible reaction of two reactants forming one product.

Name v58

Reaction equation



Reactants

Table 120: Properties of each reactant.

Id	Name	SBO
phosphatase3	phosphatase3	
ERK_P	ERK_P	

Product

Table 121: Properties of each product.

Id	Name	SBO
ERK_P_phosphatase3	ERK_P_phosphatase3	

Kinetic Law

Derived unit contains undeclared units

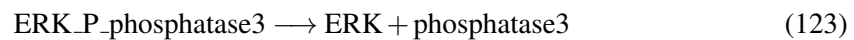
$$v_{58} = \text{vol}(\text{Compartment}) \cdot (k_{58} \cdot [\text{phosphatase3}] \cdot [\text{ERK_P}] - k_{d58} \cdot [\text{ERK_P_phosphatase3}]) \quad (122)$$

7.59 Reaction v59

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

Name v59

Reaction equation



Reactant

Table 122: Properties of each reactant.

Id	Name	SBO
ERK_P_phosphatase3	ERK_P_phosphatase3	

Products

Table 123: Properties of each product.

Id	Name	SBO
ERK	ERK	
phosphatase3	phosphatase3	

Kinetic Law

Derived unit contains undeclared units

$$v_{59} = \text{vol}(\text{Compartment}) \cdot \text{kd57} \cdot [\text{ERK_P_phosphatase3}] \quad (124)$$

7.60 Reaction v60

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

Name v60

Reaction equation



Reactant

Table 124: Properties of each reactant.

Id	Name	SBO
EGFRi	EGFRi	

Product

Table 125: Properties of each product.

Id	Name	SBO
EGFRidag	EGFRidag	

Kinetic Law

Derived unit contains undeclared units

$$v_{60} = \text{vol}(\text{Compartment}) \cdot \text{k60} \cdot [\text{EGFRi}] \quad (126)$$

7.61 Reaction v61

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

Name v61

Reaction equation



Reactant

Table 126: Properties of each reactant.

Id	Name	SBO
EGFi	EGFi	

Product

Table 127: Properties of each product.

Id	Name	SBO
EGFi _{deg}	EGFi _{deg}	

Kinetic Law

Derived unit contains undeclared units

$$v_{61} = \text{vol}(\text{Compartment}) \cdot k_{61} \cdot [\text{EGFi}]$$

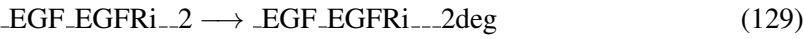
(128)

7.62 Reaction v62

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

Name v62

Reaction equation



Reactant

Table 128: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi__2	(EGF-EGFRi*)2	

Product

Table 129: Properties of each product.

Id	Name	SBO
_EGF_EGFRi___2deg	(EGF_EGFRi*)*2deg	

Kinetic Law

Derived unit contains undeclared units

$$v_{62} = \text{vol}(\text{Compartment}) \cdot k_{60} \cdot [_\text{EGF_EGFRi_2}] \quad (130)$$

7.63 Reaction v63

This is a reversible reaction of two reactants forming one product.

Name v63

Reaction equation



Reactants

Table 130: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi__2_GAP	(EGF_EGFRi*)2_GAP	
Grb2	Grb2	

Product

Table 131: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2_GAP_Grb2	(EGF_EGFRi*)2_GAP_Grb2	

Kinetic Law

Derived unit contains undeclared units

$$v_{63} = \text{vol}(\text{Compartment}) \cdot (k_{16} \cdot [_\text{EGF_EGFRi_}2_ \text{GAP}] \cdot [\text{Grb2}] - k_{d63} \cdot [_\text{EGF_EGFRi_}2_ \text{GAP_Grb2}]) \quad (132)$$

7.64 Reaction v64

This is a reversible reaction of two reactants forming one product.

Name v64

Reaction equation



Reactants

Table 132: Properties of each reactant.

Id	Name	SBO
Sos	Sos	
_EGF_EGFRi__2_GAP_Grb2	(EGF_EGFRi*)2_GAP_Grb2	

Product

Table 133: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2_GAP_Grb2_Sos	(EGF_EGFRi*)2_GAP_Grb2_Sos	

Kinetic Law

Derived unit contains undeclared units

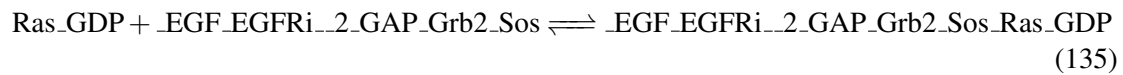
$$v_{64} = \text{vol}(\text{Compartment}) \cdot (k17 \cdot [\text{Sos}] \cdot [\text{_EGF_EGFRi_2_GAP_Grb2}] - kd17 \cdot [\text{_EGF_EGFRi_2_GAP_Grb2_Sos}]) \quad (134)$$

7.65 Reaction v65

This is a reversible reaction of two reactants forming one product.

Name v65

Reaction equation



Reactants

Table 134: Properties of each reactant.

Id	Name	SBO
Ras_GDP	Ras_GDP	
_EGF_EGFRi_2_GAP_Grb2_Sos	(EGF_EGFRi*)2_GAP_Grb2_Sos	

Product

Table 135: Properties of each product.

Id	Name	SBO
_EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GDP	(EGF_EGFRi*)2_GAP_Grb2_Sos_Ras_GDP	

Kinetic Law

Derived unit contains undeclared units

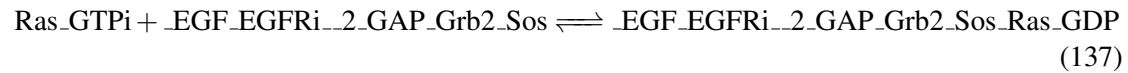
$$v_{65} = \text{vol}(\text{Compartment}) \cdot (k18 \cdot [\text{Ras_GDP}] \cdot [\text{_EGF_EGFRi_2_GAP_Grb2_Sos}] - kd18 \cdot [\text{_EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GDP}]) \quad (136)$$

7.66 Reaction v66

This is a reversible reaction of two reactants forming one product.

Name v66

Reaction equation



Reactants

Table 136: Properties of each reactant.

Id	Name	SBO
Ras_GTPi	Ras_GTPi	
_EGF_EGFRi_2_GAP_Grb2_Sos	(EGF_EGFRi*)2_GAP_Grb2_Sos	

Product

Table 137: Properties of each product.

Id	Name	SBO
_EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GDP	(EGF_EGFRi*)2_GAP_Grb2_Sos_Ras_GDP	

Kinetic Law

Derived unit contains undeclared units

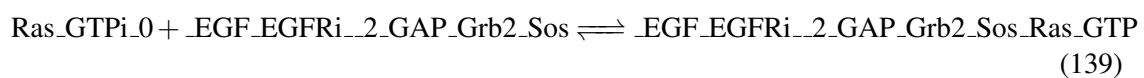
$$v_{66} = \text{vol}(\text{Compartment}) \cdot (k_{19} \cdot [\text{Ras_GTPi}] \cdot [\text{_EGF_EGFRi_2_GAP_Grb2_Sos}] - k_{d19} \cdot [\text{_EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GDP}]) \quad (138)$$

7.67 Reaction v67

This is a reversible reaction of two reactants forming one product.

Name v67

Reaction equation



Reactants

Table 138: Properties of each reactant.

Id	Name	SBO
Ras_GTPi_0	Ras_GTPi*	
_EGF_EGFRi__2_GAP_Grb2_Sos	(EGF_EGFRi*)2_GAP_Grb2_Sos	

Product

Table 139: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2_GAP_Grb2_Sos_Ras_GTP	(EGF_EGFRi*)2_GAP_Grb2_Sos_Ras_GTP	

Kinetic Law

Derived unit contains undeclared units

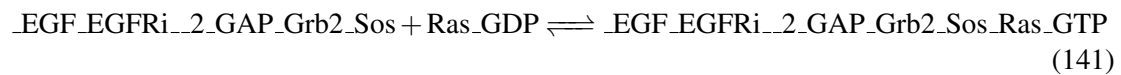
$$v_{67} = \text{vol}(\text{Compartment}) \cdot (k_{20} \cdot [\text{Ras_GTPi_0}] \cdot [\text{_EGF_EGFRi_2_GAP_Grb2_Sos}] - k_{d20} \cdot [\text{_EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GTP}]) \quad (140)$$

7.68 Reaction v68

This is a reversible reaction of two reactants forming one product.

Name v68

Reaction equation



Reactants

Table 140: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi__2_GAP_Grb2_Sos	(EGF_EGFRi*)2_GAP_Grb2_Sos	
Ras_GDP	Ras_GDP	

Product

Table 141: Properties of each product.

Id	Name	SBO
<code>_EGF_EGFRi__2_GAP_Grb2_Sos_Ras_GTP</code>	<code>(EGF_EGFRi*)2_GAP_Grb2_Sos_Ras_GTP</code>	

Kinetic Law

Derived unit contains undeclared units

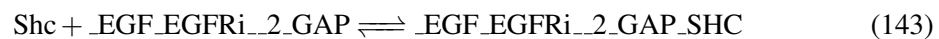
$$v_{68} = \text{vol}(\text{Compartment}) \cdot (k_{21} \cdot [\text{_EGF_EGFRi_2_GAP_Grb2_Sos}] \cdot [\text{Ras_GDP}] - k_{d21} \cdot [\text{_EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GTP}]) \quad (142)$$

7.69 Reaction v69

This is a reversible reaction of two reactants forming one product.

Name v69

Reaction equation



Reactants

Table 142: Properties of each reactant.

Id	Name	SBO
<code>Shc</code>	<code>Shc</code>	
<code>_EGF_EGFRi__2_GAP</code>	<code>(EGF_EGFRi*)2_GAP</code>	

Product

Table 143: Properties of each product.

Id	Name	SBO
<code>_EGF_EGFRi__2_GAP_SHC</code>	<code>(EGF_EGFRi*)2_GAP_SHC</code>	

Kinetic Law

Derived unit contains undeclared units

$$v_{69} = \text{vol}(\text{Compartment}) \cdot (k_{22} \cdot [\text{Shc}] \cdot [\text{_EGF_EGFRi_2_GAP}] - k_{d22} \cdot [\text{_EGF_EGFRi_2_GAP_SHC}]) \quad (144)$$

7.70 Reaction v70

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

Name v70

Reaction equation



Reactant

Table 144: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi_2_GAP_SHC	(EGF_EGFRi*)2_GAP_SHC	

Product

Table 145: Properties of each product.

Id	Name	SBO
_EGF_EGFRi_2_GAP_SHC_0	(EGF_EGFRi*)2_GAP_SHC*	

Kinetic Law

Derived unit contains undeclared units

$$v_{70} = \text{vol}(\text{Compartment}) \cdot (k_{23} \cdot [\text{_EGF_EGFRi_2_GAP_SHC}] - k_{d23} \cdot [\text{_EGF_EGFRi_2_GAP_SHC_0}]) \quad (146)$$

7.71 Reaction v71

This is a reversible reaction of two reactants forming one product.

Name v71

Reaction equation



Reactants

Table 146: Properties of each reactant.

Id	Name	SBO
Grb2	Grb2	
_EGF_EGFRi_2_GAP_SHC_0	(EGF_EGFRi*)2_GAP_SHC*	

Product

Table 147: Properties of each product.

Id	Name	SBO
_EGF_EGFRi_2_GAP_SHC_Grb2	(EGF_EGFRi*)2_GAP_SHC*_Grb2	

Kinetic Law

Derived unit contains undeclared units

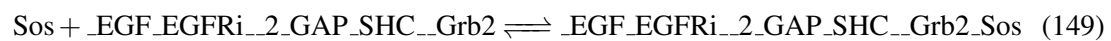
$$v_{71} = \text{vol}(\text{Compartment}) \cdot (k_{16} \cdot [\text{Grb2}] \cdot [\text{_EGF_EGFRi_2_GAP_SHC_0}] - k_{d24} \cdot [\text{_EGF_EGFRi_2_GAP_SHC_Grb2}]) \quad (148)$$

7.72 Reaction v72

This is a reversible reaction of two reactants forming one product.

Name v72

Reaction equation



Reactants

Table 148: Properties of each reactant.

Id	Name	SBO
Sos	Sos	
_EGF_EGFRi__2_GAP_SHC__Grb2	(EGF_EGFRi*)2_GAP_SHC*_Grb2	

Product

Table 149: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2_GAP_SHC__Grb2_Sos	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos	

Kinetic Law

Derived unit contains undeclared units

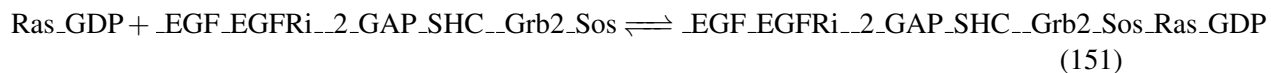
$$v_{72} = \text{vol}(\text{Compartment}) \cdot (k_{25} \cdot [\text{Sos}] \cdot [\text{_EGF_EGFRi_2_GAP_SHC_Grb2}] - k_{d25} \cdot [\text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos}]) \quad (150)$$

7.73 Reaction v73

This is a reversible reaction of two reactants forming one product.

Name v73

Reaction equation



Reactants

Table 150: Properties of each reactant.

Id	Name	SBO
Ras_GDP	Ras_GDP	
_EGF_EGFRi__2_GAP_SHC__Grb2_Sos	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos	

Product

Table 151: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2_GAP_SHC__Grb2_Sos_Ras_GDP	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos_Ras_GDP	

Kinetic Law

Derived unit contains undeclared units

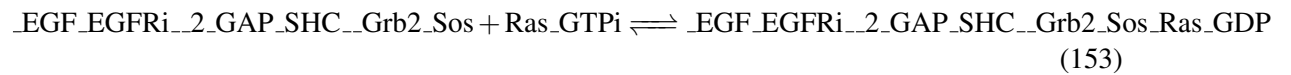
$$v_{73} = \text{vol}(\text{Compartment}) \cdot (k_{18} \cdot [\text{Ras_GDP}] \cdot [\text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos}] - k_{d18} \cdot [\text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GDP}]) \quad (152)$$

7.74 Reaction v74

This is a reversible reaction of two reactants forming one product.

Name v74

Reaction equation



Reactants

Table 152: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi__2_GAP_SHC__Grb2_Sos	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos	
Ras_GTPi	Ras_GTPi	

Product

Table 153: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2_GAP_SHC__Grb2_Sos_Ras_GDP	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos_Ras_GDP	

Kinetic Law

Derived unit contains undeclared units

$$v_{74} = \text{vol}(\text{Compartment}) \cdot (k_{19} \cdot [\text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos}] \cdot [\text{Ras_GTPi}] - k_{d19} \cdot [\text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GDP}]) \quad (154)$$

7.75 Reaction v75

This is a reversible reaction of two reactants forming one product.

Name v75

Reaction equation



Reactants

Table 154: Properties of each reactant.

Id	Name	SBO
Ras_GTPi	Ras_GTPi	
Raf	Raf	

Product

Table 155: Properties of each product.

Id	Name	SBO
Raf_Ras_GTPi	Raf_Ras_GTPi	

Kinetic Law

Derived unit contains undeclared units

$$v_{75} = \text{vol}(\text{Compartment}) \cdot (k_{28} \cdot [\text{Ras_GTPi}] \cdot [\text{Raf}] - k_{d28} \cdot [\text{Raf_Ras_GTPi}]) \quad (156)$$

7.76 Reaction v76

This is a reversible reaction of two reactants forming one product.

Name v76

Reaction equation



Reactants

Table 156: Properties of each reactant.

Id	Name	SBO
Ras_GTPi_0	Ras_GTPi*	
Rafi	Rafi*	

Product

Table 157: Properties of each product.

Id	Name	SBO
Raf_Ras_GTPi	Raf_Ras_GTPi	

Kinetic Law

Derived unit contains undeclared units

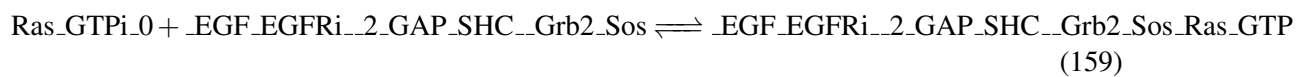
$$v_{76} = \text{vol}(\text{Compartment}) \cdot (k_{29} \cdot [\text{Ras_GTPi_0}] \cdot [\text{Rafi}] - k_{d29} \cdot [\text{Raf_Ras_GTPi}]) \quad (158)$$

7.77 Reaction v77

This is a reversible reaction of two reactants forming one product.

Name v77

Reaction equation



Reactants

Table 158: Properties of each reactant.

Id	Name	SBO
Ras_GTPi_0	Ras_GTPi*	
_EGF_EGFRi__2_GAP_SHC__Grb2_Sos	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos	

Product

Table 159: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2_GAP_SHC__Grb2_Sos_Ras_GTP	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos_Ras_GTP	

Kinetic Law

Derived unit contains undeclared units

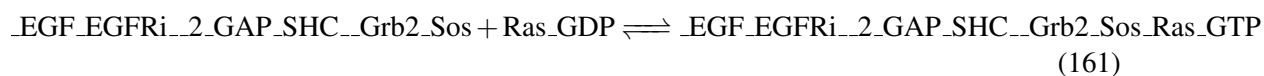
$$v_{77} = \text{vol}(\text{Compartment}) \cdot (k_{20} \cdot [\text{Ras_GTPi_0}] \cdot [\text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos}] - k_{d20} \cdot [\text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GTP}]) \quad (160)$$

7.78 Reaction v78

This is a reversible reaction of two reactants forming one product.

Name v78

Reaction equation



Reactants

Table 160: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi__2_GAP_SHC__Grb2_Sos	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos	
Ras_GDP	Ras_GDP	

Product

Table 161: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2_GAP_SHC__Grb2_Sos_Ras_GTP	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos_Ras_GTP	

Kinetic Law

Derived unit contains undeclared units

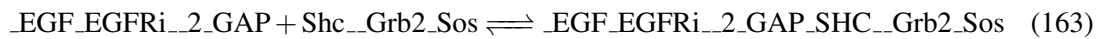
$$v_{78} = \text{vol}(\text{Compartment}) \cdot (k_{21} \cdot [_\text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos}] \cdot [\text{Ras_GDP}] - k_{d21} \cdot [_\text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GTP}]) \quad (162)$$

7.79 Reaction v79

This is a reversible reaction of two reactants forming one product.

Name v79

Reaction equation



Reactants

Table 162: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi__2_GAP	(EGF_EGFRi*)2_GAP	
Shc__Grb2_Sos	Shc*_Grb2_Sos	

Product

Table 163: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2_GAP_SHC__Grb2_Sos	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos	

Kinetic Law

Derived unit contains undeclared units

$$v_{79} = \text{vol}(\text{Compartment}) \cdot (k_{32} \cdot [_\text{EGF_EGFRi_2_GAP}] \cdot [\text{Shc_Grb2_Sos}] - k_{d32} \cdot [_\text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos}]) \quad (164)$$

7.80 Reaction v80

This is a reversible reaction of two reactants forming one product.

Name v80

Reaction equation



Reactants

Table 164: Properties of each reactant.

Id	Name	SBO
_\text{EGF_EGFRi_2_GAP}	(EGF_EGFRi*)2_GAP	
Grb2_Sos	Grb2_Sos	

Product

Table 165: Properties of each product.

Id	Name	SBO
_\text{EGF_EGFRi_2_GAP_Grb2_Sos}	(EGF_EGFRi*)2_GAP_Grb2_Sos	

Kinetic Law

Derived unit contains undeclared units

$$v_{80} = \text{vol}(\text{Compartment}) \cdot (k_{34} \cdot [_\text{EGF_EGFRi_2_GAP}] \cdot [\text{Grb2_Sos}] - k_{d34} \cdot [_\text{EGF_EGFRi_2_GAP_Grb2_Sos}]) \quad (166)$$

7.81 Reaction v81

This is a reversible reaction of two reactants forming one product.

Name v81

Reaction equation



Reactants

Table 166: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi_2_GAP	(EGF_EGFRi*)2_GAP	
Shc_0	Shc*	

Product

Table 167: Properties of each product.

Id	Name	SBO
_EGF_EGFRi_2_GAP_SHC_0	(EGF_EGFRi*)2_GAP_SHC*	

Kinetic Law

Derived unit contains undeclared units

$$v_{81} = \text{vol}(\text{Compartment}) \cdot (k_{37} \cdot [_EGF_EGFRi_2_GAP] \cdot [Shc_0] - kd_{37} \cdot [_EGF_EGFRi_2_GAP_SHC_0])$$

(168)

7.82 Reaction v82

This is a reversible reaction of two reactants forming one product.

Name v82

Reaction equation



Reactants

Table 168: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi__2_GAP	(EGF_EGFRi*)2_GAP	
Shc__Grb2	Shc*_Grb2	

Product

Table 169: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2_GAP_SHC__Grb2	(EGF_EGFRi*)2_GAP_SHC*_Grb2	

Kinetic Law

Derived unit contains undeclared units

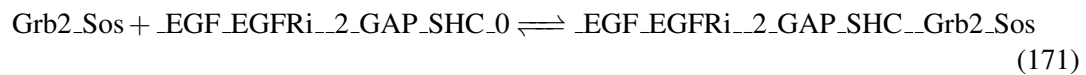
$$v_{82} = \text{vol}(\text{Compartment}) \cdot (k_{37} \cdot [_\text{EGF_EGFRi_}2_GAP] \cdot [_\text{Shc_}Grb2] - k_{d37} \cdot [_\text{EGF_EGFRi_}2_GAP_SHC_Grb2]) \quad (170)$$

7.83 Reaction v83

This is a reversible reaction of two reactants forming one product.

Name v83

Reaction equation



Reactants

Table 170: Properties of each reactant.

Id	Name	SBO
Grb2_Sos	Grb2_Sos	
_EGF_EGFRi__2_GAP_SHC_0	(EGF_EGFRi*)2_GAP_SHC*	

Product

Table 171: Properties of each product.

Id	Name	SBO
<code>_EGF_EGFRi__2_GAP_SHC__Grb2_Sos</code>	<code>(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos</code>	

Kinetic Law

Derived unit contains undeclared units

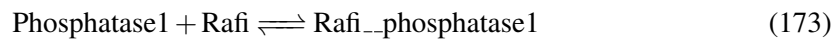
$$v_{83} = \text{vol}(\text{Compartment}) \cdot (k_{41} \cdot [\text{Grb2_Sos}] \cdot [\text{_EGF_EGFRi_2_GAP_SHC_0}] - k_{d41} \cdot [\text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos}]) \quad (172)$$

7.84 Reaction v84

This is a reversible reaction of two reactants forming one product.

Name v84

Reaction equation



Reactants

Table 172: Properties of each reactant.

Id	Name	SBO
<code>Phosphatase1</code>	<code>Phosphatase1</code>	
<code>Rafi</code>	<code>Rafi*</code>	

Product

Table 173: Properties of each product.

Id	Name	SBO
<code>Rafi_phosphatase1</code>	<code>Rafi*_phosphatase1</code>	

Kinetic Law

Derived unit contains undeclared units

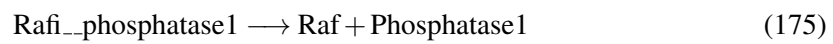
$$v_{84} = \text{vol}(\text{Compartment}) \cdot (k_{42} \cdot [\text{Phosphatase1}] \cdot [\text{Rafi}] - k_{d42} \cdot [\text{Rafi_phosphatase1}]) \quad (174)$$

7.85 Reaction v85

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

Name v85

Reaction equation



Reactant

Table 174: Properties of each reactant.

Id	Name	SBO
Rafi_phosphatase1	Rafi*_phosphatase1	

Products

Table 175: Properties of each product.

Id	Name	SBO
Raf	Raf	
Phosphatase1	Phosphatase1	

Kinetic Law

Derived unit contains undeclared units

$$v_{85} = \text{vol}(\text{Compartment}) \cdot k_{d43} \cdot [\text{Rafi_phosphatase1}] \quad (176)$$

7.86 Reaction v86

This is a reversible reaction of two reactants forming one product.

Name v86

Reaction equation



Reactants

Table 176: Properties of each reactant.

Id	Name	SBO
MEK	MEK	
Raf i	Rafi*	

Product

Table 177: Properties of each product.

Id	Name	SBO
MEK_Raf i	MEK_Rafi*	

Kinetic Law

Derived unit contains undeclared units

$$v_{86} = \text{vol}(\text{Compartment}) \cdot (k44 \cdot [\text{MEK}] \cdot [\text{Rafi}] - kd52 \cdot [\text{MEK_Rafi}])$$

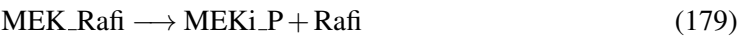
(178)

7.87 Reaction v87

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

Name v87

Reaction equation



Reactant

Table 178: Properties of each reactant.

Id	Name	SBO
MEK_Raf i	MEK_Rafi*	

Products

Table 179: Properties of each product.

Id	Name	SBO
MEKi_P	MEKi_P	
Raf i	Rafi*	

Kinetic Law

Derived unit contains undeclared units

$$v_{87} = \text{vol}(\text{Compartment}) \cdot \text{kd45} \cdot [\text{MEK_Rafi}] \quad (180)$$

7.88 Reaction v88

This is a reversible reaction of two reactants forming one product.

Name v88

Reaction equation



Reactants

Table 180: Properties of each reactant.

Id	Name	SBO
Raf i	Rafi*	
MEKi_P	MEKi_P	

Product

Table 181: Properties of each product.

Id	Name	SBO
MEK_P_Raf i	MEK_P_Rafi*	

Kinetic Law

Derived unit contains undeclared units

$$v_{88} = \text{vol}(\text{Compartment}) \cdot (k_{44} \cdot [\text{Rafi}] \cdot [\text{MEKi_P}] - k_{d52} \cdot [\text{MEK_P_Rafi}]) \quad (182)$$

7.89 Reaction v89

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

Name v89

Reaction equation



Reactant

Table 182: Properties of each reactant.

Id	Name	SBO
MEK_P_Raf i	MEK_P_Rafi*	

Products

Table 183: Properties of each product.

Id	Name	SBO
Raf i	Rafi*	
MEKi_PP	MEKi_PP	

Kinetic Law

Derived unit contains undeclared units

$$v_{89} = \text{vol}(\text{Compartment}) \cdot k_{d47} \cdot [\text{MEK_P_Rafi}] \quad (184)$$

7.90 Reaction v90

This is a reversible reaction of two reactants forming one product.

Name v90

Reaction equation



Reactants

Table 184: Properties of each reactant.

Id	Name	SBO
MEKi_PP	MEKi_PP	
phosphatse2	phosphatse2	

Product

Table 185: Properties of each product.

Id	Name	SBO
MEKi_PP_phosphatase2	MEKi_PP_phosphatase2	

Kinetic Law

Derived unit contains undeclared units

$$v_{90} = \text{vol}(\text{Compartment}) \cdot (k_{48} \cdot [\text{MEKi_PP}] \cdot [\text{phosphatse2}] - k_{d48} \cdot [\text{MEKi_PP_phosphatase2}]) \quad (186)$$

7.91 Reaction v91

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

Name v91

Reaction equation



Reactant

Table 186: Properties of each reactant.

Id	Name	SBO
MEKi_PP_phosphatase2	MEKi_PP_phosphatase2	

Products

Table 187: Properties of each product.

Id	Name	SBO
MEKi_P_phosphatse2	MEKi_P_phosphatse2	

Kinetic Law

Derived unit contains undeclared units

$$v_{91} = \text{vol}(\text{Compartment}) \cdot \text{kd49} \cdot [\text{MEKi_PP_phosphatase2}] \quad (188)$$

7.92 Reaction v92

This is a reversible reaction of two reactants forming one product.

Name v92

Reaction equation



Reactants

Table 188: Properties of each reactant.

Id	Name	SBO
phosphatse2	phosphatse2	
MEKi_P	MEKi_P	

Product

Table 189: Properties of each product.

Id	Name	SBO
MEKi_P_phosphatase2	MEKi_P_phosphatase2	

Kinetic Law

Derived unit contains undeclared units

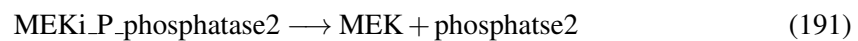
$$v_{92} = \text{vol}(\text{Compartment}) \cdot (k50 \cdot [\text{phosphatse2}] \cdot [\text{MEKi_P}] - kd50 \cdot [\text{MEKi_P_phosphatase2}]) \quad (190)$$

7.93 Reaction v93

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

Name v93

Reaction equation



Reactant

Table 190: Properties of each reactant.

Id	Name	SBO
MEKi_P_phosphatase2	MEKi_P_phosphatase2	

Products

Table 191: Properties of each product.

Id	Name	SBO
MEK	MEK	
phosphatse2	phosphatse2	

Kinetic Law

Derived unit contains undeclared units

$$v_{93} = \text{vol}(\text{Compartment}) \cdot \text{kd49} \cdot [\text{MEKi_P_phosphatase2}] \quad (192)$$

7.94 Reaction v94

This is a reversible reaction of two reactants forming one product.

Name v94

Reaction equation



Reactants

Table 192: Properties of each reactant.

Id	Name	SBO
ERK	ERK	
MEKi_PP	MEKi_PP	

Product

Table 193: Properties of each product.

Id	Name	SBO
ERKi_MEKi_PP_0	ERKi_MEKi_PP	

Kinetic Law

Derived unit contains undeclared units

$$v_{94} = \text{vol}(\text{Compartment}) \cdot (\text{k52} \cdot [\text{ERK}] \cdot [\text{MEKi_PP}] - \text{kd44} \cdot [\text{ERKi_MEKi_PP_0}]) \quad (194)$$

7.95 Reaction v95

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

Name v95

Reaction equation



Reactant

Table 194: Properties of each reactant.

Id	Name	SBO
ERKi_MEKi_PP_0	ERKi_MEKi_PP	

Products

Table 195: Properties of each product.

Id	Name	SBO
ERKi_P	ERKi_P	
MEKi_PP	MEKi_PP	

Kinetic Law

Derived unit contains undeclared units

$$v_{95} = \text{vol}(\text{Compartment}) \cdot \text{kd53} \cdot [\text{ERKi_MEKi_PP_0}] \quad (196)$$

7.96 Reaction v96

This is a reversible reaction of two reactants forming one product.

Name v96

Reaction equation



Reactants

Table 196: Properties of each reactant.

Id	Name	SBO
MEKi_PP	MEKi_PP	
ERKi_P	ERKi_P	

Product

Table 197: Properties of each product.

Id	Name	SBO
ERKi_P_MEKi_PP	ERKi_P_MEKi_PP	

Kinetic Law

Derived unit contains undeclared units

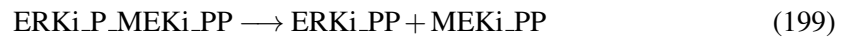
$$v_{96} = \text{vol}(\text{Compartment}) \cdot (k_{52} \cdot [\text{MEKi_PP}] \cdot [\text{ERKi_P}] - k_{d44} \cdot [\text{ERKi_P_MEKi_PP}]) \quad (198)$$

7.97 Reaction v97

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

Name v97

Reaction equation



Reactant

Table 198: Properties of each reactant.

Id	Name	SBO
ERKi_P_MEKi_PP	ERKi_P_MEKi_PP	

Products

Table 199: Properties of each product.

Id	Name	SBO
ERKi_PP	ERKi_PP	
MEKi_PP	MEKi_PP	

Kinetic Law

Derived unit contains undeclared units

$$v_{97} = \text{vol}(\text{Compartment}) \cdot \text{kd55} \cdot [\text{ERKi_P_MEKi_PP}] \quad (200)$$

7.98 Reaction v98

This is a reversible reaction of two reactants forming one product.

Name v98

Reaction equation



Reactants

Table 200: Properties of each reactant.

Id	Name	SBO
ERKi_PP	ERKi_PP	
phosphatase3	phosphatase3	

Product

Table 201: Properties of each product.

Id	Name	SBO
ERKi_PP_phosphatase3	ERKi_PP_phosphatase3	

Kinetic Law

Derived unit contains undeclared units

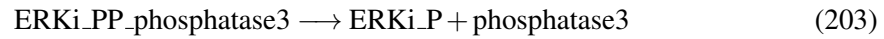
$$v_{98} = \text{vol}(\text{Compartment}) \cdot (\text{k56} \cdot [\text{ERKi_PP}] \cdot [\text{phosphatase3}] - \text{kd56} \cdot [\text{ERKi_PP_phosphatase3}]) \quad (202)$$

7.99 Reaction v99

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

Name v99

Reaction equation



Reactant

Table 202: Properties of each reactant.

Id	Name	SBO
ERKi_PP_phosphatase3	ERKi_PP_phosphatase3	

Products

Table 203: Properties of each product.

Id	Name	SBO
ERKi_P phosphatase3	ERKi_P phosphatase3	

Kinetic Law

Derived unit contains undeclared units

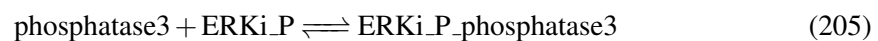
$$v_{99} = \text{vol}(\text{Compartment}) \cdot \text{kd57} \cdot [\text{ERKi_PP_phosphatase3}] \quad (204)$$

7.100 Reaction v100

This is a reversible reaction of two reactants forming one product.

Name v100

Reaction equation



Reactants

Table 204: Properties of each reactant.

Id	Name	SBO
phosphatase3	phosphatase3	
ERKi_P	ERKi_P	

Product

Table 205: Properties of each product.

Id	Name	SBO
ERKi_P_phosphatase3	ERKi_P_phosphatase3	

Kinetic Law

Derived unit contains undeclared units

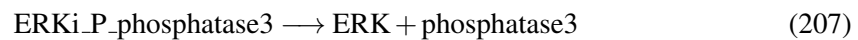
$$v_{100} = \text{vol}(\text{Compartment}) \cdot (k58 \cdot [\text{phosphatase3}] \cdot [\text{ERKi_P}] - kd58 \cdot [\text{ERKi_P_phosphatase3}]) \quad (206)$$

7.101 Reaction v101

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

Name v101

Reaction equation



Reactant

Table 206: Properties of each reactant.

Id	Name	SBO
ERKi_P_phosphatase3	ERKi_P_phosphatase3	

Products

Table 207: Properties of each product.

Id	Name	SBO
ERK	ERK	
phosphatase3	phosphatase3	

Kinetic Law**Derived unit** contains undeclared units

$$v_{101} = \text{vol}(\text{Compartment}) \cdot \text{kd57} \cdot [\text{ERKi_P_phosphatase3}] \quad (208)$$

7.102 Reaction v102

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

Name v102**Reaction equation****Reactant**

Table 208: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR_2_GAP	(EGF_EGFR*)2_GAP	

Product

Table 209: Properties of each product.

Id	Name	SBO
_EGF_EGFRi_2_GAP	(EGF_EGFRi*)2_GAP	

Kinetic Law**Derived unit** contains undeclared units

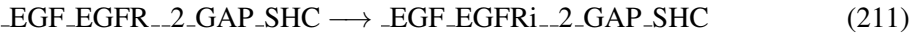
$$v_{102} = \text{vol}(\text{Compartment}) \cdot \text{k6} \cdot [\text{_EGF_EGFR_2_GAP}] \quad (210)$$

7.103 Reaction v103

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

Name v103

Reaction equation



Reactant

Table 210: Properties of each reactant.

Id	Name	SBO
$_EGF_EGFR_2_GAP_SHC$	$(EGF_EGFR^*)2_GAP_SHC$	

Product

Table 211: Properties of each product.

Id	Name	SBO
$_EGF_EGFRi_2_GAP_SHC$	$(EGF_EGFRi^*)2_GAP_SHC$	

Kinetic Law

Derived unit contains undeclared units

$$v_{103} = \text{vol}(\text{Compartment}) \cdot k_6 \cdot [_EGF_EGFR_2_GAP_SHC]$$

(212)

7.104 Reaction v104

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

Name v104

Reaction equation



Reactant

Table 212: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR__2_GAP_SHC_0	(EGF_EGFR*)2_GAP_SHC*	

Product

Table 213: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2_GAP_SHC_0	(EGF_EGFRi*)2_GAP_SHC*	

Kinetic Law

Derived unit contains undeclared units

$$v_{104} = \text{vol}(\text{Compartment}) \cdot k_6 \cdot [_\text{EGF_EGFR_}2_ \text{GAP_SHC_}0] \quad (214)$$

7.105 Reaction v105

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

Name v105

Reaction equation



Reactant

Table 214: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR__2_GAP_Grb2_Sos	(EGF_EGFR*)2_GAP_Grb2_Sos	

Product

Table 215: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2_GAP_Grb2_Sos	(EGF_EGFRi*)2_GAP_Grb2_Sos	

Kinetic Law

Derived unit contains undeclared units

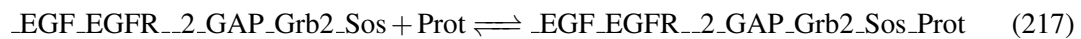
$$v_{105} = \text{vol}(\text{Compartment}) \cdot k_6 \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos}] \quad (216)$$

7.106 Reaction v106

This is a reversible reaction of two reactants forming one product.

Name v106

Reaction equation



Reactants

Table 216: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR__2_GAP_Grb2_Sos	(EGF_EGFR*)2_GAP_Grb2_Sos	
Prot	Prot	

Product

Table 217: Properties of each product.

Id	Name	SBO
_EGF_EGFR__2_GAP_Grb2_Sos_Prot	(EGF_EGFR*)2_GAP_Grb2_Sos_Prot	

Kinetic Law

Derived unit contains undeclared units

$$v_{106} = \text{vol}(\text{Compartment}) \cdot (k4 \cdot [_\text{EGF_EGFR_2_GAP_Grb2_Sos}] \cdot [\text{Prot}] - kd4 \cdot [_\text{EGF_EGFR_2_GAP_Grb2_Sos_Prot}]) \quad (218)$$

7.107 Reaction v107

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

Name v107

Reaction equation



Reactant

Table 218: Properties of each reactant.

Id	Name	SBO
_\text{EGF_EGFR_2_GAP_Grb2_Sos_Prot}	(EGF_EGFR*)2_GAP_Grb2_Sos_Prot	

Products

Table 219: Properties of each product.

Id	Name	SBO
Proti	Proti	
_\text{EGF_EGFRi_2_GAP_Grb2_Sos}	(EGF_EGFRi*)2_GAP_Grb2_Sos	

Kinetic Law

Derived unit contains undeclared units

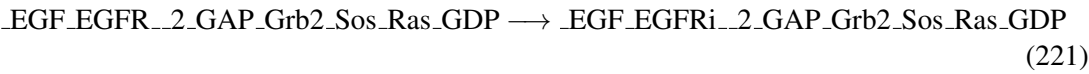
$$v_{107} = \text{vol}(\text{Compartment}) \cdot kd5 \cdot [_\text{EGF_EGFR_2_GAP_Grb2_Sos_Prot}] \quad (220)$$

7.108 Reaction v108

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

Name v108

Reaction equation



Reactant

Table 220: Properties of each reactant.

Id	Name	SBO
$_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GDP$	$(EGF_EGFR^*)2_GAP_Grb2_Sos_Ras_GDP$	

Product

Table 221: Properties of each product.

Id	Name	SBO
$_EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GDP$	$(EGF_EGFRi^*)2_GAP_Grb2_Sos_Ras_GDP$	

Kinetic Law

Derived unit contains undeclared units

$$v_{108} = \text{vol}(\text{Compartment}) \cdot k_6 \cdot [_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GDP]$$

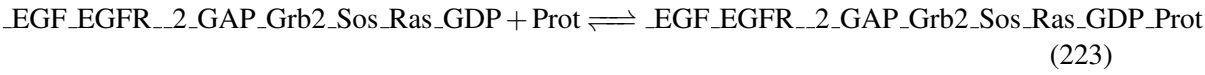
(222)

7.109 Reaction v109

This is a reversible reaction of two reactants forming one product.

Name v109

Reaction equation



Reactants

Table 222: Properties of each reactant.

Id	Name	SBO
<code>_EGF_EGFR__2_GAP_Grb2_Sos_Ras_GDP</code> Prot	<code>(EGF_EGFR*)2_GAP_Grb2_Sos_Ras_GDP</code> Prot	

Product

Table 223: Properties of each product.

Id	Name	SBO
<code>_EGF_EGFR__2_GAP_Grb2_Sos_Ras_GDP_Prot</code>	<code>(EGF_EGFR*)2_GAP_Grb2_Sos_Ras_GDP_Prot</code>	

Kinetic Law

Derived unit contains undeclared units

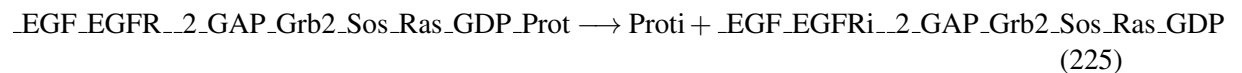
$$v_{109} = \text{vol}(\text{Compartment}) \cdot (k_4 \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GDP}] \cdot [\text{Prot}] - k_{d4} \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GDP_Prot}]) \quad (224)$$

7.110 Reaction v110

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

Name v110

Reaction equation



Reactant

Table 224: Properties of each reactant.

Id	Name	SBO
<code>_EGF_EGFR__2_GAP_Grb2_Sos_Ras_GDP_Prot</code>	<code>(EGF_EGFR*)2_GAP_Grb2_Sos_Ras_GDP_Prot</code>	

Products

Table 225: Properties of each product.

Id	Name	SBO
Proti	Proti	
_EGF_EGFRi__2_GAP_Grb2_Sos_Ras_GDP	(EGF_EGFRi*)2_GAP_Grb2_Sos_Ras_GDP	

Kinetic Law

Derived unit contains undeclared units

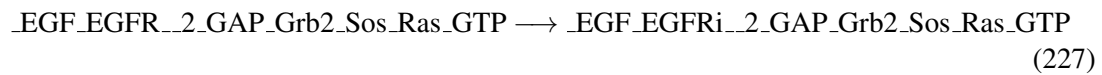
$$v_{110} = \text{vol}(\text{Compartment}) \cdot \text{kd5} \cdot [\text{EGF_EGFR_2_GAP_Grb2_Sos_Ras_GDP_Prot}] \quad (226)$$

7.111 Reaction v111

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

Name v111

Reaction equation



Reactant

Table 226: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR__2_GAP_Grb2_Sos_Ras_GTP	(EGF_EGFR*)2_GAP_Grb2_Sos_Ras_GTP	

Product

Table 227: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2_GAP_Grb2_Sos_Ras_GTP	(EGF_EGFRi*)2_GAP_Grb2_Sos_Ras_GTP	

Kinetic Law

Derived unit contains undeclared units

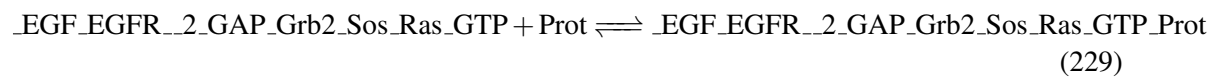
$$v_{111} = \text{vol}(\text{Compartment}) \cdot k_6 \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GTP}] \quad (228)$$

7.112 Reaction v112

This is a reversible reaction of two reactants forming one product.

Name v112

Reaction equation



Reactants

Table 228: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GTP Prot	(EGF_EGFR*)2_GAP_Grb2_Sos_Ras_GTP Prot	

Product

Table 229: Properties of each product.

Id	Name	SBO
_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GTP_Prot	(EGF_EGFR*)2_GAP_Grb2_Sos_Ras_GTP_Prot	

Kinetic Law

Derived unit contains undeclared units

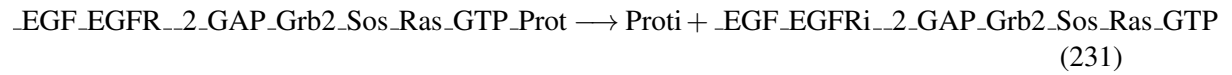
$$v_{112} = \text{vol}(\text{Compartment}) \cdot (k_4 \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GTP}] \cdot [\text{Prot}] - k_{d4} \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GTP_Prot}]) \quad (230)$$

7.113 Reaction v113

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

Name v113

Reaction equation



Reactant

Table 230: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GTP_Prot	(EGF_EGFR*)2_GAP_Grb2_Sos_Ras_GTP_Prot	

Products

Table 231: Properties of each product.

Id	Name	SBO
Proti	Proti	
_EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GTP	(EGF_EGFRi*)2_GAP_Grb2_Sos_Ras_GTP	

Kinetic Law

Derived unit contains undeclared units

$$v_{113} = \text{vol}(\text{Compartment}) \cdot \text{kd5} \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GTP_Prot}] \quad (232)$$

7.114 Reaction v114

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

Name v114

Reaction equation



Reactant

Table 232: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR__2_GAP_SHC__Grb2	(EGF_EGFR*)2_GAP_SHC*_Grb2	

Product

Table 233: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2_GAP_SHC__Grb2	(EGF_EGFRi*)2_GAP_SHC*_Grb2	

Kinetic Law

Derived unit contains undeclared units

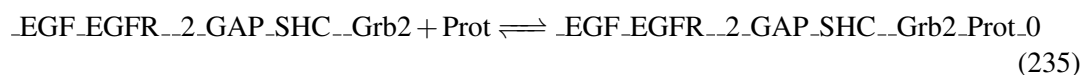
$$v_{114} = \text{vol}(\text{Compartment}) \cdot k_6 \cdot [_\text{EGF_EGFR_}2_ \text{GAP_SHC_} \text{Grb2}] \quad (234)$$

7.115 Reaction v115

This is a reversible reaction of two reactants forming one product.

Name v115

Reaction equation



Reactants

Table 234: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR__2_GAP_SHC__Grb2	(EGF_EGFR*)2_GAP_SHC*_Grb2	
Prot	Prot	

Product

Table 235: Properties of each product.

Id	Name	SBO
<code>_EGF_EGFR__2_GAP_SHC__Grb2_Prot_0</code>	<code>(EGF_EGFR*)2_GAP_SHC*_Grb2_Prot</code>	

Kinetic Law

Derived unit contains undeclared units

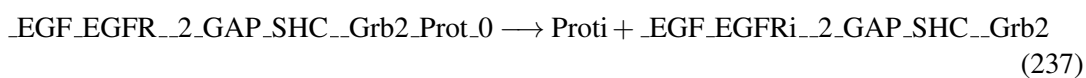
$$v_{115} = \text{vol}(\text{Compartment}) \cdot (k_4 \cdot [_\text{EGF_EGFR_2_GAP_SHC_Grb2}] \cdot [\text{Prot}] - k_{d4} \cdot [_\text{EGF_EGFR_2_GAP_SHC_Grb2_Prot}_0]) \quad (236)$$

7.116 Reaction v116

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

Name v116

Reaction equation



Reactant

Table 236: Properties of each reactant.

Id	Name	SBO
<code>_EGF_EGFR__2_GAP_SHC__Grb2_Prot_0</code>	<code>(EGF_EGFR*)2_GAP_SHC*_Grb2_Prot</code>	

Products

Table 237: Properties of each product.

Id	Name	SBO
<code>Proti</code>	<code>Proti</code>	
<code>_EGF_EGFRi__2_GAP_SHC__Grb2</code>	<code>(EGF_EGFRi*)2_GAP_SHC*_Grb2</code>	

Kinetic Law

Derived unit contains undeclared units

$$v_{116} = \text{vol}(\text{Compartment}) \cdot k_{d5} \cdot [_{\text{EGF_EGFR_2_GAP_SHC_Grb2_Prot_0}}] \quad (238)$$

7.117 Reaction v117

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

Name v117

Reaction equation



Reactant

Table 238: Properties of each reactant.

Id	Name	SBO
$_{\text{EGF_EGFR_2_GAP_SHC_Grb2_Sos}}$	$(\text{EGF_EGFR}^*)2_GAP_SHC^*_Grb2_Sos$	

Product

Table 239: Properties of each product.

Id	Name	SBO
$_{\text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos}}$	$(\text{EGF_EGFRi}^*)2_GAP_SHC^*_Grb2_Sos$	

Kinetic Law

Derived unit contains undeclared units

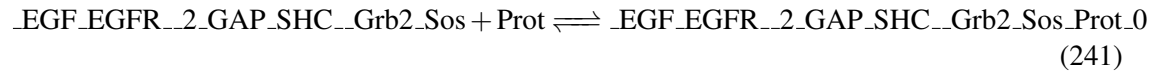
$$v_{117} = \text{vol}(\text{Compartment}) \cdot k_6 \cdot [_{\text{EGF_EGFR_2_GAP_SHC_Grb2_Sos}}] \quad (240)$$

7.118 Reaction v118

This is a reversible reaction of two reactants forming one product.

Name v118

Reaction equation



Reactants

Table 240: Properties of each reactant.

Id	Name	SBO
$_EGF_EGFR_2_GAP_SHC_Grb2_Sos$	$(EGF_EGFR^*)2_GAP_SHC^*_Grb2_Sos$	
Prot	Prot	

Product

Table 241: Properties of each product.

Id	Name	SBO
$_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Prot_0$	$(EGF_EGFR^*)2_GAP_SHC^*_Grb2_Sos_Prot$	

Kinetic Law

Derived unit contains undeclared units

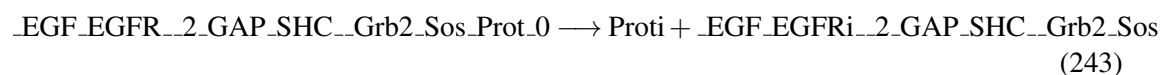
$$v_{118} = \text{vol}(\text{Compartment}) \cdot (k_4 \cdot [_EGF_EGFR_2_GAP_SHC_Grb2_Sos] \cdot [\text{Prot}] - kd_4 \cdot [_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Prot_0]) \quad (242)$$

7.119 Reaction v_{119}

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

Name v_{119}

Reaction equation



Reactant

Table 242: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR__2_GAP_SHC__Grb2_Sos_Prot_0	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos_Prot	

Products

Table 243: Properties of each product.

Id	Name	SBO
Proti	Proti	
_EGF_EGFRi__2_GAP_SHC__Grb2_Sos	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos	

Kinetic Law

Derived unit contains undeclared units

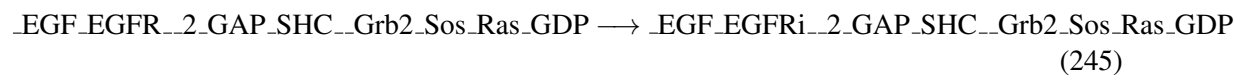
$$v_{119} = \text{vol}(\text{Compartment}) \cdot \text{kd5} \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Prot_0}] \quad (244)$$

7.120 Reaction v120

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

Name v120

Reaction equation



Reactant

Table 244: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR__2_GAP_SHC__Grb2_Sos_Ras_GDP	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos_Ras_GDP	

Product

Table 245: Properties of each product.

Id	Name	SBO
_EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GDP	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos_Ras_GDP	

Kinetic Law

Derived unit contains undeclared units

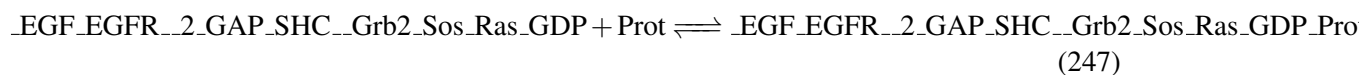
$$v_{120} = \text{vol}(\text{Compartment}) \cdot k_6 \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GDP}] \quad (246)$$

7.121 Reaction v121

This is a reversible reaction of two reactants forming one product.

Name v121

Reaction equation



Reactants

Table 246: Properties of each reactant.

Id	Name	SBO
_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GDP	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos_Ras_GDP	
Prot	Prot	

Product

Table 247: Properties of each product.

Id	Name	SBO
_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GDP_Prot_0	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos_Ras_GDP_Prot	

Kinetic Law

Derived unit contains undeclared units

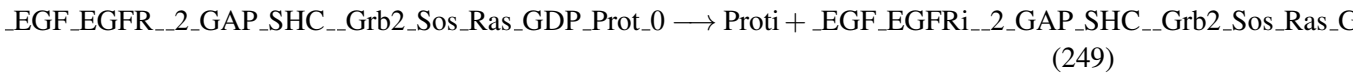
$$v_{121} = \text{vol}(\text{Compartment}) \cdot (k_4 \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GDP}] \cdot [\text{Prot}] - k_{d4} \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GDP_Prot_0}]) \tag{248}$$

7.122 Reaction v122

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

Name v122

Reaction equation



Reactant

Table 248: Properties of each reactant.

Id	Name
_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GDP_Prot_0	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos_Ras_GDP_Prot

Products

Table 249: Properties of each product.

Id	Name	SBO
Prot <i>i</i>	Prot <i>i</i>	
_EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GDP	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos_Ras_GDP	

Kinetic Law

Derived unit contains undeclared units

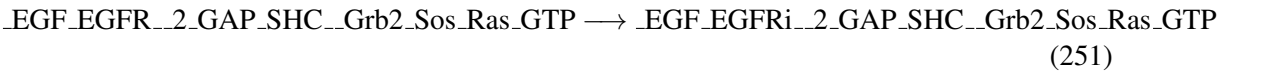
$$v_{122} = \text{vol}(\text{Compartment}) \cdot k_{d5} \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GDP_Prot_0}] \tag{250}$$

7.123 Reaction v123

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

Name v123

Reaction equation



Reactant

Table 250: Properties of each reactant.

Id	Name	SBO
$_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GTP$	$(EGF_EGFR^*)2_GAP_SHC^*_Grb2_Sos_Ras_GTP$	

Product

Table 251: Properties of each product.

Id	Name	SBO
$_EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GTP$	$(EGF_EGFRi^*)2_GAP_SHC^*_Grb2_Sos_Ras_GTP$	

Kinetic Law

Derived unit contains undeclared units

$$v_{123} = \text{vol}(\text{Compartment}) \cdot k_6 \cdot [_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GTP]$$

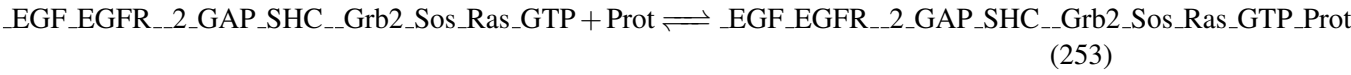
(252)

7.124 Reaction v124

This is a reversible reaction of two reactants forming one product.

Name v124

Reaction equation



Reactants

Table 252: Properties of each reactant.

Id	Name	SBO
<code>_EGF_EGFR__2_GAP_SHC__Grb2_Sos_Ras_GTP</code> Prot	<code>(EGF_EGFR*)_2_GAP_SHC*_Grb2_Sos_Ras_GTP</code> Prot	

Product

Table 253: Properties of each product.

Id	Name
<code>_EGF_EGFR__2_GAP_SHC__Grb2_Sos_Ras_GTP_Prot_0</code>	<code>(EGF_EGFR*)_2_GAP_SHC*_Grb2_Sos_Ras_GTP_Prot</code>

Kinetic Law

Derived unit contains undeclared units

$$v_{124} = \text{vol}(\text{Compartment}) \cdot (k4 \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GTP}] \cdot [\text{Prot}] - kd4 \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GTP_Prot_0}])$$

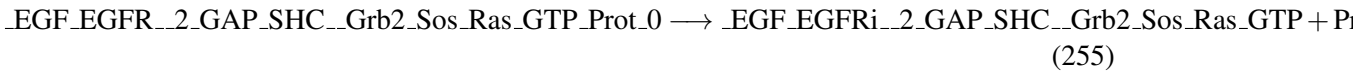
(254)

7.125 Reaction v125

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

Name v125

Reaction equation



Reactant

Table 254: Properties of each reactant.

Id	Name
<code>_EGF_EGFR__2_GAP_SHC__Grb2_Sos_Ras_GTP_Prot_0</code>	<code>(EGF_EGFR*)_2_GAP_SHC*_Grb2_Sos_Ras_GTP_Prot</code>

Products

Table 255: Properties of each product.

Id	Name	SBO
<code>_EGF_EGFRi__2_GAP_SHC__Grb2_Sos_Ras_GTP</code> Proti	<code>(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos_Ras_GTP</code> Proti	

Kinetic Law

Derived unit contains undeclared units

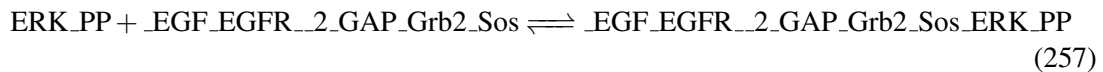
$$v_{125} = \text{vol}(\text{Compartment}) \cdot \text{kd5} \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GTP_Prot_0}] \quad (256)$$

7.126 Reaction v126

This is a reversible reaction of two reactants forming one product.

Name v126

Reaction equation



Reactants

Table 256: Properties of each reactant.

Id	Name	SBO
<code>ERK_PP</code> <code>_EGF_EGFR__2_GAP_Grb2_Sos</code>	<code>ERK_PP</code> <code>(EGF_EGFR*)2_GAP_Grb2_Sos</code>	

Product

Table 257: Properties of each product.

Id	Name	SBO
<code>_EGF_EGFR__2_GAP_Grb2_Sos_ERK_PP</code>	<code>(EGF_EGFR*)2_GAP_Grb2_Sos_ERK_PP</code>	

Kinetic Law

Derived unit contains undeclared units

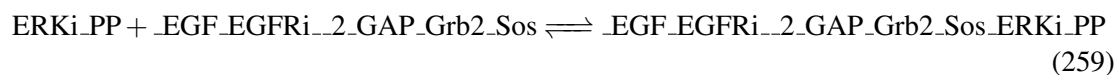
$$v_{126} = \text{vol}(\text{Compartment}) \cdot (k_{126} \cdot [\text{ERK_PP}] \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos}] - k_{d126} \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos_ERK_PP}]) \quad (258)$$

7.127 Reaction v127

This is a reversible reaction of two reactants forming one product.

Name v127

Reaction equation



Reactants

Table 258: Properties of each reactant.

Id	Name	SBO
ERKi_PP	ERKi_PP	
_EGF_EGFRi_2_GAP_Grb2_Sos	(EGF_EGFRi*)2_GAP_Grb2_Sos	

Product

Table 259: Properties of each product.

Id	Name	SBO
_EGF_EGFRi_2_GAP_Grb2_Sos_ERKi_PP	(EGF_EGFRi*)2_GAP_Grb2_Sos_ERKi_PP	

Kinetic Law

Derived unit contains undeclared units

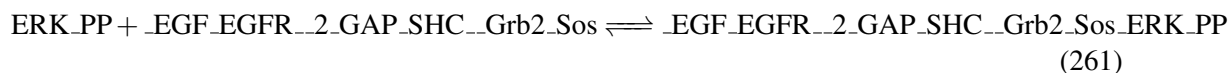
$$v_{127} = \text{vol}(\text{Compartment}) \cdot (k_{126} \cdot [\text{ERKi_PP}] \cdot [\text{_EGF_EGFRi_2_GAP_Grb2_Sos}] - k_{d126} \cdot [\text{_EGF_EGFRi_2_GAP_Grb2_Sos_ERKi_PP}]) \quad (260)$$

7.128 Reaction v128

This is a reversible reaction of two reactants forming one product.

Name v128

Reaction equation



Reactants

Table 260: Properties of each reactant.

Id	Name	SBO
ERK_PP	ERK_PP	
_EGF_EGFR_2_GAP_SHC_Grb2_Sos	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos	

Product

Table 261: Properties of each product.

Id	Name	SBO
_EGF_EGFR_2_GAP_SHC_Grb2_Sos_ERK_PP	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos_ERK_PP	

Kinetic Law

Derived unit contains undeclared units

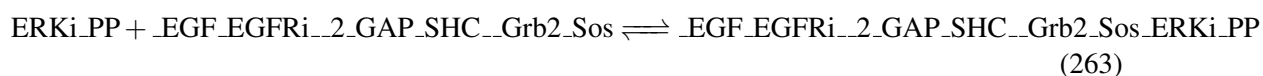
$$v_{128} = \text{vol}(\text{Compartment}) \cdot (k_{126} \cdot [\text{ERK_PP}] \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos}] - k_{d126} \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_ERK_PP}]) \quad (262)$$

7.129 Reaction v129

This is a reversible reaction of two reactants forming one product.

Name v129

Reaction equation



Reactants

Table 262: Properties of each reactant.

Id	Name	SBO
ERKi_PP	ERKi_PP	
_EGF_EGFRi__2_GAP_SHC__Grb2_Sos	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos	

Product

Table 263: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2_GAP_SHC__Grb2_Sos_ERKi_PP	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos_ERKi_PP	

Kinetic Law

Derived unit contains undeclared units

$$v_{129} = \text{vol}(\text{Compartment}) \cdot (k_{126} \cdot [\text{ERKi_PP}] \cdot [\text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos}] - k_{d126} \cdot [\text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos_ERKi_PP}]) \tag{264}$$

7.130 Reaction v130

This is a reversible reaction of two reactants forming one product.

Name v130

Reaction equation



Reactants

Table 264: Properties of each reactant.

Id	Name	SBO
ERK_PP	ERK_PP	
Sos	Sos	

Product

Table 265: Properties of each product.

Id	Name	SBO
Sos_ERK_PP	Sos_ERK_PP	

Kinetic Law

Derived unit contains undeclared units

$$v_{130} = \text{vol}(\text{Compartment}) \cdot (k_{126} \cdot [\text{ERK_PP}] \cdot [\text{Sos}] - k_{d126} \cdot [\text{Sos_ERK_PP}]) \quad (266)$$

7.131 Reaction v131

This is a reversible reaction of two reactants forming one product.

Name v131

Reaction equation



Reactants

Table 266: Properties of each reactant.

Id	Name	SBO
ERKi_PP	ERKi_PP	
Sos	Sos	

Product

Table 267: Properties of each product.

Id	Name	SBO
Sos_ERKi_PP	Sos_ERKi_PP	

Kinetic Law

Derived unit contains undeclared units

$$v_{131} = \text{vol}(\text{Compartment}) \cdot (k_{126} \cdot [\text{ERKi_PP}] \cdot [\text{Sos}] - k_{d126} \cdot [\text{Sos_ERKi_PP}]) \quad (268)$$

7.132 Reaction v132

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

Name v132

Reaction equation



Reactant

Table 268: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi_2_GAP	(EGF_EGFRi*)2_GAP	

Product

Table 269: Properties of each product.

Id	Name	SBO
_EGF_EGFRi_2deg	(EGF_EGFRi*)*2deg	

Kinetic Law

Derived unit contains undeclared units

$$v_{132} = \text{vol}(\text{Compartment}) \cdot k_{60} \cdot [\text{_EGF_EGFRi_2_GAP}] \quad (270)$$

7.133 Reaction v133

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

Name v133

Reaction equation



Reactant

Table 270: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi_2_GAP_Grb2	(EGF_EGFRi*)2_GAP_Grb2	

Product

Table 271: Properties of each product.

Id	Name	SBO
_EGF_EGFRi_2deg	(EGF_EGFRi*)*2deg	

Kinetic Law

Derived unit contains undeclared units

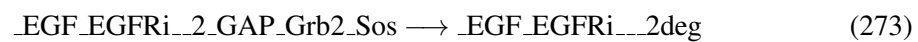
$$v_{133} = \text{vol}(\text{Compartment}) \cdot k60 \cdot [\text{_EGF_EGFRi_2_GAP_Grb2}] \quad (272)$$

7.134 Reaction [v134](#)

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

Name [v134](#)

Reaction equation



Reactant

Table 272: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi_2_GAP_Grb2_Sos	(EGF_EGFRi*)2_GAP_Grb2_Sos	

Product

Table 273: Properties of each product.

Id	Name	SBO
_EGF_EGFRi_2deg	(EGF_EGFRi*)*2deg	

Kinetic Law

Derived unit contains undeclared units

$$v_{134} = \text{vol}(\text{Compartment}) \cdot k_{60} \cdot [_\text{EGF_EGFRi_2_GAP_Grb2_Sos}] \quad (274)$$

7.135 Reaction v135

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

Name v135

Reaction equation



Reactant

Table 274: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GDP	(EGF_EGFRi*)2_GAP_Grb2_Sos_Ras_GDP	

Product

Table 275: Properties of each product.

Id	Name	SBO
_EGF_EGFRi_2deg	(EGF_EGFRi*)*2deg	

Kinetic Law

Derived unit contains undeclared units

$$v_{135} = \text{vol}(\text{Compartment}) \cdot k60 \cdot [\text{_EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GDP}] \quad (276)$$

7.136 Reaction v136

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

Name v136

Reaction equation



Reactant

Table 276: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GTP	(EGF_EGFRi*)2_GAP_Grb2_Sos_Ras_GTP	

Product

Table 277: Properties of each product.

Id	Name	SBO
_EGF_EGFRi_2deg	(EGF_EGFRi*)*2deg	

Kinetic Law

Derived unit contains undeclared units

$$v_{136} = \text{vol}(\text{Compartment}) \cdot k60 \cdot [\text{_EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GTP}] \quad (278)$$

7.137 Reaction v137

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

Name v137

Reaction equation



Reactant

Table 278: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi__2_GAP_SHC	(EGF_EGFRi*)2_GAP_SHC	

Product

Table 279: Properties of each product.

Id	Name	SBO
_EGF_EGFRi___2deg	(EGF_EGFRi*)*2deg	

Kinetic Law

Derived unit contains undeclared units

$$v_{137} = \text{vol}(\text{Compartment}) \cdot k_{60} \cdot [_\text{EGF_EGFRi_2_GAP_SHC}] \quad (280)$$

7.138 Reaction v138

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

Name v138

Reaction equation



Reactant

Table 280: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi__2_GAP_SHC_0	(EGF_EGFRi*)2_GAP_SHC*	

Product

Table 281: Properties of each product.

Id	Name	SBO
_EGF_EGFRi___2deg	(EGF_EGFRi*)*2deg	

Kinetic Law**Derived unit** contains undeclared units

$$v_{138} = \text{vol}(\text{Compartment}) \cdot k_{60} \cdot [_\text{EGF_EGFRi_2_GAP_SHC_0}] \quad (282)$$

7.139 Reaction v139

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

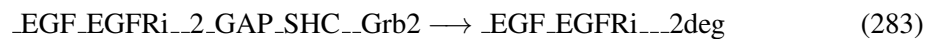
Name v139**Reaction equation****Reactant**

Table 282: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi__2_GAP_SHC__Grb2	(EGF_EGFRi*)2_GAP_SHC*_Grb2	

Product

Table 283: Properties of each product.

Id	Name	SBO
_EGF_EGFRi___2deg	(EGF_EGFRi*)*2deg	

Kinetic Law**Derived unit** contains undeclared units

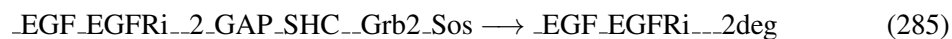
$$v_{139} = \text{vol}(\text{Compartment}) \cdot k_{60} \cdot [_\text{EGF_EGFRi_2_GAP_SHC_Grb2}] \quad (284)$$

7.140 Reaction v140

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

Name v140

Reaction equation



Reactant

Table 284: Properties of each reactant.

Id	Name	SBO
_EGF_EGFRi_2_GAP_SHC_Grb2_Sos	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos	

Product

Table 285: Properties of each product.

Id	Name	SBO
_EGF_EGFRi_2deg	(EGF_EGFRi*)*2deg	

Kinetic Law

Derived unit contains undeclared units

$$v_{140} = \text{vol}(\text{Compartment}) \cdot k60 \cdot [\text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos}] \quad (286)$$

7.141 Reaction v141

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

Name v141

Reaction equation



Reactant

Table 286: Properties of each reactant.

Id	Name	SBO
<code>_EGF_EGFRi__2_GAP_SHC__Grb2_Sos_Ras_GDP</code>	<code>(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos_Ras_GDP</code>	

Product

Table 287: Properties of each product.

Id	Name	SBO
<code>_EGF_EGFRi___2deg</code>	<code>(EGF_EGFRi*)*2deg</code>	

Kinetic Law

Derived unit contains undeclared units

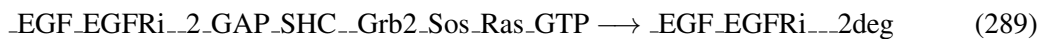
$$v_{141} = \text{vol}(\text{Compartment}) \cdot k_{60} \cdot [\text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GDP}] \quad (288)$$

7.142 Reaction `v142`

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

Name `v142`

Reaction equation



Reactant

Table 288: Properties of each reactant.

Id	Name	SBO
<code>_EGF_EGFRi__2_GAP_SHC__Grb2_Sos_Ras_GTP</code>	<code>(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos_Ras_GTP</code>	

Product

Table 289: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2deg	(EGF_EGFRi*)*2deg	

Kinetic Law

Derived unit contains undeclared units

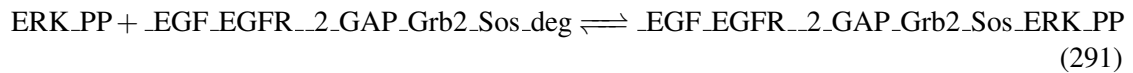
$$v_{142} = \text{vol}(\text{Compartment}) \cdot k60 \cdot [_\text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GTP}] \quad (290)$$

7.143 Reaction v143

This is a reversible reaction of two reactants forming one product.

Name v143

Reaction equation



Reactants

Table 290: Properties of each reactant.

Id	Name	SBO
ERK_PP	ERK_PP	
_EGF_EGFR_2_GAP_Grb2_Sos_deg	(EGF_EGFR*)2_GAP_Grb2_Sos deg	

Product

Table 291: Properties of each product.

Id	Name	SBO
_EGF_EGFR_2_GAP_Grb2_Sos_ERK_PP	(EGF_EGFR*)2_GAP_Grb2_Sos_ERK_PP	

Kinetic Law

Derived unit contains undeclared units

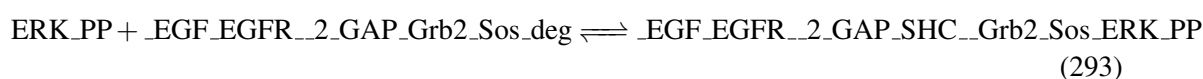
$$v_{143} = \text{vol}(\text{Compartment}) \cdot (k_{127} \cdot [\text{ERK_PP}] \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos_deg}] - k_{d127} \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos_ERK_PP}]) \quad (292)$$

7.144 Reaction v144

This is a reversible reaction of two reactants forming one product.

Name v144

Reaction equation



Reactants

Table 292: Properties of each reactant.

Id	Name	SBO
ERK_PP	ERK_PP	
_EGF_EGFR_2_GAP_Grb2_Sos_deg	(EGF_EGFR*)2_GAP_Grb2_Sos deg	

Product

Table 293: Properties of each product.

Id	Name	SBO
_EGF_EGFR_2_GAP_SHC_Grb2_Sos_ERK_PP	(EGF_EGFR*)2_GAP_SHC*_Grb2_Sos_ERK_PP	

Kinetic Law

Derived unit contains undeclared units

$$v_{144} = \text{vol}(\text{Compartment}) \cdot (k_{127} \cdot [\text{ERK_PP}] \cdot [\text{_EGF_EGFR_2_GAP_Grb2_Sos_deg}] - k_{d127} \cdot [\text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_ERK_PP}]) \quad (294)$$

7.145 Reaction v145

This is a reversible reaction of two reactants forming one product.

Name v145

Reaction equation



Reactants

Table 294: Properties of each reactant.

Id	Name	SBO
ERK_PP	ERK_PP	
Sosi	Sosi	

Product

Table 295: Properties of each product.

Id	Name	SBO
Sos_ERK_PP	Sos_ERK_PP	

Kinetic Law

Derived unit contains undeclared units

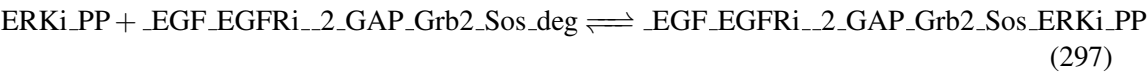
$v_{145} = vol(Compartment) \cdot (k_{127} \cdot [ERK_PP] \cdot [Sosi] - kd_{127} \cdot [Sos_ERK_PP])$ (296)

7.146 Reaction v146

This is a reversible reaction of two reactants forming one product.

Name v146

Reaction equation



Reactants

Table 296: Properties of each reactant.

Id	Name	SBO
ERKi_PP	ERKi_PP	
_EGF_EGFRi__2_GAP_Grb2_Sos_deg	(EGF_EGFRi*)2_GAP_Grb2_Sos deg	

Product

Table 297: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2_GAP_Grb2_Sos_ERKi_PP	(EGF_EGFRi*)2_GAP_Grb2_Sos_ERKi_PP	

Kinetic Law

Derived unit contains undeclared units

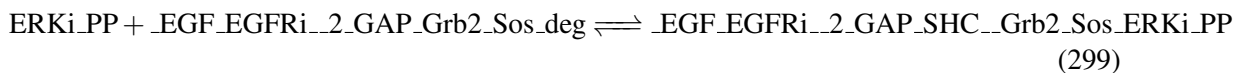
$$v_{146} = \text{vol}(\text{Compartment}) \cdot (k_{127} \cdot [\text{ERKi_PP}] \cdot [\text{_EGF_EGFRi_2_GAP_Grb2_Sos_deg}] - k_{d127} \cdot [\text{_EGF_EGFRi_2_GAP_Grb2_Sos_ERKi_PP}]) \quad (298)$$

7.147 Reaction v147

This is a reversible reaction of two reactants forming one product.

Name v147

Reaction equation



Reactants

Table 298: Properties of each reactant.

Id	Name	SBO
ERKi_PP	ERKi_PP	
_EGF_EGFRi__2_GAP_Grb2_Sos_deg	(EGF_EGFRi*)2_GAP_Grb2_Sos deg	

Product

Table 299: Properties of each product.

Id	Name	SBO
_EGF_EGFRi__2_GAP_SHC__Grb2_Sos_ERKi_PP	(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos_ERKi_PP	

Kinetic Law

Derived unit contains undeclared units

$$v_{147} = \text{vol}(\text{Compartment}) \cdot (k_{127} \cdot [\text{ERKi_PP}] \cdot [\text{_EGF_EGFRi_2_GAP_Grb2_Sos_deg}] - k_{d127} \cdot [\text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos_ERKi_PP}]) \quad (300)$$

7.148 Reaction v148

This is a reversible reaction of two reactants forming one product.

Name v148

Reaction equation



Reactants

Table 300: Properties of each reactant.

Id	Name	SBO
ERKi_PP	ERKi_PP	
Sosi	Sosi	

Product

Table 301: Properties of each product.

Id	Name	SBO
Sos_ERKi_PP	Sos_ERKi_PP	

Kinetic Law

Derived unit contains undeclared units

$$v_{148} = \text{vol}(\text{Compartment}) \cdot (k_{127} \cdot [\text{ERKi_PP}] \cdot [\text{Sosi}] - k_{d127} \cdot [\text{Sos_ERKi_PP}]) \quad (302)$$

8 Derived Rate Equations

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

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

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

8.1 Species EGF

Name EGF

Initial concentration $4.99999999999939 \cdot 10^{-8} \text{ mol} \cdot \text{l}^{-1}$

This species takes part in one reaction (as a modifier in [v1](#)).

$$\frac{d}{dt} \text{EGF} = 0 \quad (303)$$

8.2 Species EGFR

Name EGFR

Initial concentration $49999.99999999991 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in three reactions (as a reactant in [v1](#), [v6](#) and as a product in [v13](#)).

$$\frac{d}{dt} \text{EGFR} = v_{13} - v_1 - v_6 \quad (304)$$

8.3 Species EGF_EGFR

Name EGF_EGFR

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

This species takes part in two reactions (as a reactant in [v2](#) and as a product in [v1](#)).

$$\frac{d}{dt} \text{EGF_EGFR} = v_1 - 2 v_2 \quad (305)$$

8.4 Species `_EGF_EGFR_2`

Name (EGF_EGFR)2

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in [v3](#) and as a product in [v2](#)).

$$\frac{d}{dt} \text{_EGF_EGFR_2} = v_2 - v_3 \quad (306)$$

8.5 Species `_EGF_EGFR__2`

Name (EGF_EGFR*)2

Initial concentration 0 mol · l⁻¹

This species takes part in three reactions (as a reactant in [v7](#), [v8](#) and as a product in [v3](#)).

$$\frac{d}{dt} \text{_EGF_EGFR_2} = v_3 - v_7 - v_8 \quad (307)$$

8.6 Species `EGFRi`

Name EGFRi

Initial concentration 0 mol · l⁻¹

This species takes part in three reactions (as a reactant in [v10](#), [v60](#) and as a product in [v6](#)).

$$\frac{d}{dt} \text{EGFRi} = v_6 - v_{10} - v_{60} \quad (308)$$

8.7 Species `_EGF_EGFR__2_GAP_Grb2_Prot`

Name (EGF_EGFR*)2_GAP_Grb2_Prot

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in [v5](#) and as a product in [v4](#)).

$$\frac{d}{dt} \text{_EGF_EGFR_2_GAP_Grb2_Prot} = v_4 - v_5 \quad (309)$$

8.8 Species `_EGF_EGFRi__2`

Name (EGF-EGFRi*)2

Initial concentration 0 mol · l⁻¹

This species takes part in four reactions (as a reactant in [v14](#), [v62](#) and as a product in [v7](#), [v12](#)).

$$\frac{d}{dt} \text{_EGF_EGFRi_2} = v_7 + v_{12} - v_{14} - v_{62} \quad (310)$$

8.9 Species Proti

Name Proti

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

This species takes part in nine reactions (as a reactant in v_{15} and as a product in v_5 , v_{107} , v_{110} , v_{113} , v_{116} , v_{119} , v_{122} , v_{125}).

$$\frac{d}{dt}\text{Proti} = v_5 + v_{107} + v_{110} + v_{113} + v_{116} + v_{119} + v_{122} + v_{125} - v_{15} \quad (311)$$

8.10 Species EGF_EGFRi

Name EGF_EGFRi

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

This species takes part in two reactions (as a reactant in v_{11} and as a product in v_{10}).

$$\frac{d}{dt}\text{EGF_EGFRi} = v_{10} - 2 v_{11} \quad (312)$$

8.11 Species _EGF_EGFRi_2

Name $(\text{EGF-EGFRi})_2$

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

This species takes part in two reactions (as a reactant in v_{12} and as a product in v_{11}).

$$\frac{d}{dt}\text{_EGF_EGFRi_2} = v_{11} - v_{12} \quad (313)$$

8.12 Species Prot

Name Prot

Initial concentration $80999.99999999976 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in nine reactions (as a reactant in v_4 , v_{106} , v_{109} , v_{112} , v_{115} , v_{118} , v_{121} , v_{124} and as a product in v_{15}).

$$\frac{d}{dt}\text{Prot} = v_{15} - v_4 - v_{106} - v_{109} - v_{112} - v_{115} - v_{118} - v_{121} - v_{124} \quad (314)$$

8.13 Species `EGFideg`

Name `EGFideg`

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

This species takes part in one reaction (as a product in [v61](#)).

$$\frac{d}{dt} \text{EGFideg} = v_{61} \quad (315)$$

8.14 Species `GAP`

Name `GAP`

Initial concentration $11999.9999999997 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in two reactions (as a reactant in [v8](#), [v14](#)).

$$\frac{d}{dt} \text{GAP} = -v_8 - v_{14} \quad (316)$$

8.15 Species `_EGF_EGFR__2_GAP`

Name `(EGF_EGFR*)2_GAP`

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

This species takes part in eight reactions (as a reactant in [v16](#), [v22](#), [v32](#), [v34](#), [v37](#), [v39](#), [v102](#) and as a product in [v8](#)).

$$\frac{d}{dt} \text{_EGF_EGFR_2_GAP} = v_8 - v_{16} - v_{22} - v_{32} - v_{34} - v_{37} - v_{39} - v_{102} \quad (317)$$

8.16 Species `EGFi`

Name `EGFi`

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

This species takes part in two reactions (as a reactant in [v10](#), [v61](#)).

$$\frac{d}{dt} \text{EGFi} = -v_{10} - v_{61} \quad (318)$$

8.17 Species `_EGF_EGFRi__2_GAP`

Name `(EGF_EGFRi*)2_GAP`

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

This species takes part in nine reactions (as a reactant in [v63](#), [v69](#), [v79](#), [v80](#), [v81](#), [v82](#), [v132](#) and as a product in [v14](#), [v102](#)).

$$\frac{d}{dt} \text{_EGF_EGFRi_2_GAP} = v_{14} + v_{102} - v_{63} - v_{69} - v_{79} - v_{80} - v_{81} - v_{82} - v_{132} \quad (319)$$

8.18 Species `_EGF_EGFRi__2_GAP_Grb2`

Name `(EGF_EGFRi*)2_GAP_Grb2`

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

This species takes part in five reactions (as a reactant in [v64](#), [v133](#) and as a product in [v5](#), [v9](#), [v63](#)).

$$\frac{d}{dt} \text{_EGF_EGFRi_2_GAP_Grb2} = v_5 + v_9 + v_{63} - v_{64} - v_{133} \quad (320)$$

8.19 Species `_EGF_EGFRi__2_GAP_Grb2_Sos`

Name `(EGF_EGFRi*)2_GAP_Grb2_Sos`

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

This species takes part in ten reactions (as a reactant in [v65](#), [v66](#), [v67](#), [v68](#), [v127](#), [v134](#) and as a product in [v64](#), [v80](#), [v105](#), [v107](#)).

$$\begin{aligned} \frac{d}{dt} \text{_EGF_EGFRi_2_GAP_Grb2_Sos} = & v_{64} + v_{80} + v_{105} + v_{107} - v_{65} \\ & - v_{66} - v_{67} - v_{68} - v_{127} - v_{134} \end{aligned} \quad (321)$$

8.20 Species `_EGF_EGFRi__2_GAP_Grb2_Sos_Ras_GDP`

Name `(EGF_EGFRi*)2_GAP_Grb2_Sos_Ras_GDP`

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

This species takes part in five reactions (as a reactant in [v135](#) and as a product in [v65](#), [v66](#), [v108](#), [v110](#)).

$$\frac{d}{dt} \text{_EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GDP} = v_{65} + v_{66} + v_{108} + v_{110} - v_{135} \quad (322)$$

8.21 Species `_EGF_EGFRi__2_GAP_Grb2_Sos_Ras_GTP`

Name `(EGF_EGFRi*)2_GAP_Grb2_Sos_Ras_GTP`

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

This species takes part in five reactions (as a reactant in [v136](#) and as a product in [v67](#), [v68](#), [v111](#), [v113](#)).

$$\frac{d}{dt} \text{EGF_EGFRi_2_GAP_Grb2_Sos_Ras_GTP} = v_{67} + v_{68} + v_{111} + v_{113} - v_{136} \quad (323)$$

8.22 Species `Grb2`

Name `Grb2`

Initial concentration $10999.9999999996 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in [v16](#), [v24](#), [v35](#), [v38](#), [v63](#), [v71](#)).

$$\frac{d}{dt} \text{Grb2} = -v_{16} - v_{24} - v_{35} - v_{38} - v_{63} - v_{71} \quad (324)$$

8.23 Species `_EGF_EGFR__2_GAP_Grb2`

Name `(EGF_EGFR*)2_GAP_Grb2`

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

This species takes part in four reactions (as a reactant in [v4](#), [v9](#), [v17](#) and as a product in [v16](#)).

$$\frac{d}{dt} \text{EGF_EGFR_2_GAP_Grb2} = v_{16} - v_4 - v_9 - v_{17} \quad (325)$$

8.24 Species `Sos`

Name `Sos`

Initial concentration $26299.9999999984 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in [v17](#), [v25](#), [v35](#), [v40](#), [v64](#), [v72](#), [v130](#), [v131](#)).

$$\frac{d}{dt} \text{Sos} = -v_{17} - v_{25} - v_{35} - v_{40} - v_{64} - v_{72} - v_{130} - v_{131} \quad (326)$$

8.25 Species `_EGF_EGFR__2_GAP_Grb2_Sos`

Name `(EGF_EGFR*)2_GAP_Grb2_Sos`

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

This species takes part in nine reactions (as a reactant in [v18](#), [v19](#), [v20](#), [v21](#), [v105](#), [v106](#), [v126](#) and as a product in [v17](#), [v34](#)).

$$\frac{d}{dt} \text{_EGF_EGFR_2_GAP_Grb2_Sos} = \text{_v17} + \text{_v34} - \text{_v18} - \text{_v19} - \text{_v20} - \text{_v21} - \text{_v105} - \text{_v106} - \text{_v126} \quad (327)$$

8.26 Species `Ras_GDP`

Name `Ras_GDP`

Initial concentration $71999.9999999998 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in eight reactions (as a reactant in [v18](#), [v21](#), [v26](#), [v31](#), [v65](#), [v68](#), [v73](#), [v78](#)).

$$\frac{d}{dt} \text{Ras_GDP} = -\text{_v18} - \text{_v21} - \text{_v26} - \text{_v31} - \text{_v65} - \text{_v68} - \text{_v73} - \text{_v78} \quad (328)$$

8.27 Species `_EGF_EGFR__2_GAP_Grb2_Sos_Ras_GDP`

Name `(EGF_EGFR*)2_GAP_Grb2_Sos_Ras_GDP`

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

This species takes part in four reactions (as a reactant in [v108](#), [v109](#) and as a product in [v18](#), [v19](#)).

$$\frac{d}{dt} \text{_EGF_EGFR_2_GAP_Grb2_Sos_Ras_GDP} = \text{_v18} + \text{_v19} - \text{_v108} - \text{_v109} \quad (329)$$

8.28 Species `Ras_GTP`

Name `Ras_GTP`

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

This species takes part in three reactions (as a reactant in [v19](#), [v27](#), [v28](#)).

$$\frac{d}{dt} \text{Ras_GTP} = -\text{_v19} - \text{_v27} - \text{_v28} \quad (330)$$

8.29 Species `_EGF_EGFR__2_GAP_Grb2_Sos_Ras_GTP`

Name `(EGF_EGFR*)2_GAP_Grb2_Sos_Ras_GTP`

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

This species takes part in four reactions (as a reactant in [v111](#), [v112](#) and as a product in [v20](#), [v21](#)).

$$\frac{d}{dt} \text{EGF_EGFR_2_GAP_Grb2_Sos_Ras_GTP} = v_{20} + v_{21} - v_{111} - v_{112} \quad (331)$$

8.30 Species `Grb2_Sos`

Name `Grb2_Sos`

Initial concentration $40000 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in six reactions (as a reactant in [v33](#), [v34](#), [v41](#), [v80](#), [v83](#) and as a product in [v35](#)).

$$\frac{d}{dt} \text{Grb2_Sos} = v_{35} - v_{33} - v_{34} - v_{41} - v_{80} - v_{83} \quad (332)$$

8.31 Species `Shc`

Name `Shc`

Initial concentration $100999.999999999 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in three reactions (as a reactant in [v22](#), [v69](#) and as a product in [v36](#)).

$$\frac{d}{dt} \text{Shc} = v_{36} - v_{22} - v_{69} \quad (333)$$

8.32 Species `_EGF_EGFR__2_GAP_SHC`

Name `(EGF_EGFR*)2_GAP_SHC`

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

This species takes part in three reactions (as a reactant in [v23](#), [v103](#) and as a product in [v22](#)).

$$\frac{d}{dt} \text{EGF_EGFR_2_GAP_SHC} = v_{22} - v_{23} - v_{103} \quad (334)$$

8.33 Species `_EGF_EGFR__2_GAP_SHC_0`

Name `(EGF_EGFR*)_2_GAP_SHC*`

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

This species takes part in five reactions (as a reactant in [v24](#), [v41](#), [v104](#) and as a product in [v23](#), [v37](#)).

$$\frac{d}{dt} \text{EGF_EGFR_2_GAP_SHC_0} = v_{23} + v_{37} - v_{24} - v_{41} - v_{104} \quad (335)$$

8.34 Species `_EGF_EGFR__2_GAP_SHC__Grb2`

Name `(EGF_EGFR*)_2_GAP_SHC*_Grb2`

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

This species takes part in five reactions (as a reactant in [v25](#), [v114](#), [v115](#) and as a product in [v24](#), [v39](#)).

$$\frac{d}{dt} \text{EGF_EGFR_2_GAP_SHC_Grb2} = v_{24} + v_{39} - v_{25} - v_{114} - v_{115} \quad (336)$$

8.35 Species `_EGF_EGFR__2_GAP_SHC__Grb2_Sos`

Name `(EGF_EGFR*)_2_GAP_SHC*_Grb2_Sos`

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

This species takes part in ten reactions (as a reactant in [v26](#), [v27](#), [v30](#), [v31](#), [v117](#), [v118](#), [v128](#) and as a product in [v25](#), [v32](#), [v41](#)).

$$\begin{aligned} \frac{d}{dt} \text{EGF_EGFR_2_GAP_SHC_Grb2_Sos} = & v_{25} + v_{32} + v_{41} - v_{26} - v_{27} \\ & - v_{30} - v_{31} - v_{117} - v_{118} - v_{128} \end{aligned} \quad (337)$$

8.36 Species `_EGF_EGFR__2_GAP_SHC__Grb2_Sos_Ras_GDP`

Name `(EGF_EGFR*)_2_GAP_SHC*_Grb2_Sos_Ras_GDP`

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

This species takes part in four reactions (as a reactant in [v120](#), [v121](#) and as a product in [v26](#), [v27](#)).

$$\frac{d}{dt} \text{EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GDP} = v_{26} + v_{27} - v_{120} - v_{121} \quad (338)$$

8.37 Species `_EGF_EGFR__2_GAP_SHC__Grb2_Sos_Ras_GTP`

Name `(EGF_EGFR*)_2_GAP_SHC*_Grb2_Sos_Ras_GTP`

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

This species takes part in four reactions (as a reactant in [v123](#), [v124](#) and as a product in [v30](#), [v31](#)).

$$\frac{d}{dt} \text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GTP} = v_{30} + v_{31} - v_{123} - v_{124} \quad (339)$$

8.38 Species `Shc__Grb2_Sos`

Name `Shc*_Grb2_Sos`

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

This species takes part in four reactions (as a reactant in [v32](#), [v79](#) and as a product in [v33](#), [v40](#)).

$$\frac{d}{dt} \text{Shc_Grb2_Sos} = v_{33} + v_{40} - v_{32} - v_{79} \quad (340)$$

8.39 Species `Shc__Grb2`

Name `Shc*_Grb2`

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

This species takes part in four reactions (as a reactant in [v39](#), [v40](#), [v82](#) and as a product in [v38](#)).

$$\frac{d}{dt} \text{Shc_Grb2} = v_{38} - v_{39} - v_{40} - v_{82} \quad (341)$$

8.40 Species `Shc_0`

Name `Shc*`

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

This species takes part in five reactions (as a reactant in [v33](#), [v36](#), [v37](#), [v38](#), [v81](#)).

$$\frac{d}{dt} \text{Shc}_0 = -v_{33} - v_{36} - v_{37} - v_{38} - v_{81} \quad (342)$$

8.41 Species `Raf`

Name `Raf`

Initial concentration $40000 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in [v28](#), [v75](#) and as a product in [v43](#), [v85](#)).

$$\frac{d}{dt} \text{Raf} = v_{43} + v_{85} - v_{28} - v_{75} \quad (343)$$

8.42 Species Raf_Ras_GTP

Name Raf_Ras_GTP

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a product in v28, v29).

$$\frac{d}{dt}\text{Raf_Ras_GTP} = v_{28} + v_{29} \quad (344)$$

8.43 Species Ras_GTP_

Name Ras_GTP*

Initial concentration 0 mol · l⁻¹

This species takes part in three reactions (as a reactant in v20, v29, v30).

$$\frac{d}{dt}\text{Ras_GTP_} = -v_{20} - v_{29} - v_{30} \quad (345)$$

8.44 Species Phosphatase1

Name Phosphatase1

Initial concentration 40000 mol · l⁻¹

This species takes part in four reactions (as a reactant in v42, v84 and as a product in v43, v85).

$$\frac{d}{dt}\text{Phosphatase1} = v_{43} + v_{85} - v_{42} - v_{84} \quad (346)$$

8.45 Species Raf_0

Name Raf*

Initial concentration 0 mol · l⁻¹

This species takes part in six reactions (as a reactant in v29, v42, v44, v46 and as a product in v45, v47).

$$\frac{d}{dt}\text{Raf_0} = v_{45} + v_{47} - v_{29} - v_{42} - v_{44} - v_{46} \quad (347)$$

8.46 Species Raf__phosphatase1

Name Raf*_phosphatase1

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in v43 and as a product in v42).

$$\frac{d}{dt}\text{Raf_phosphatase1} = v_{42} - v_{43} \quad (348)$$

8.47 Species MEK

Name MEK

Initial concentration $2.09999999999994 \cdot 10^7 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in four reactions (as a reactant in v44, v86 and as a product in v51, v93).

$$\frac{d}{dt}\text{MEK} = v_{51} + v_{93} - v_{44} - v_{86} \quad (349)$$

8.48 Species MEK_Raf

Name MEK_Raf*

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

This species takes part in two reactions (as a reactant in v45 and as a product in v44).

$$\frac{d}{dt}\text{MEK_Raf} = v_{44} - v_{45} \quad (350)$$

8.49 Species MEK_P

Name MEK_P

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

This species takes part in four reactions (as a reactant in v46, v50 and as a product in v45, v49).

$$\frac{d}{dt}\text{MEK_P} = v_{45} + v_{49} - v_{46} - v_{50} \quad (351)$$

8.50 Species MEK_P_Raf

Name MEK_P_Raf*

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

This species takes part in two reactions (as a reactant in v47 and as a product in v46).

$$\frac{d}{dt}\text{MEK_P_Raf} = v_{46} - v_{47} \quad (352)$$

8.51 Species MEK_PP

Name MEK_PP

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

This species takes part in six reactions (as a reactant in v48, v52, v54 and as a product in v47, v53, v55).

$$\frac{d}{dt}\text{MEK_PP} = v_{47} + v_{53} + v_{55} - v_{48} - v_{52} - v_{54} \quad (353)$$

8.52 Species MEK_PP_phosphatase2

Name MEK_PP_phosphatase2

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in v49 and as a product in v48).

$$\frac{d}{dt}\text{MEK_PP_phosphatase2} = v_{48} - v_{49} \quad (354)$$

8.53 Species phosphatse2

Name phosphatse2

Initial concentration 40000 mol · l⁻¹

This species takes part in eight reactions (as a reactant in v48, v50, v90, v92 and as a product in v49, v51, v91, v93).

$$\frac{d}{dt}\text{phosphatse2} = v_{49} + v_{51} + v_{91} + v_{93} - v_{48} - v_{50} - v_{90} - v_{92} \quad (355)$$

8.54 Species MEK_P_phosphatase2

Name MEK_P_phosphatase2

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in v51 and as a product in v50).

$$\frac{d}{dt}\text{MEK_P_phosphatase2} = v_{50} - v_{51} \quad (356)$$

8.55 Species ERK

Name ERK

Initial concentration 2.20999999999994 · 10⁷ mol · l⁻¹

This species takes part in four reactions (as a reactant in v52, v94 and as a product in v59, v101).

$$\frac{d}{dt}\text{ERK} = v_{59} + v_{101} - v_{52} - v_{94} \quad (357)$$

8.56 Species ERK_MEK_PP

Name ERK_MEK_PP

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in v53 and as a product in v52).

$$\frac{d}{dt}\text{ERK_MEK_PP} = v_{52} - v_{53} \quad (358)$$

8.57 Species ERK_P

Name ERK_P

Initial concentration 0 mol · l⁻¹

This species takes part in four reactions (as a reactant in v54, v58 and as a product in v53, v57).

$$\frac{d}{dt}\text{ERK_P} = v_{53} + v_{57} - v_{54} - v_{58} \quad (359)$$

8.58 Species ERK_P_MEKPP

Name ERK_P_MEKPP

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in v55 and as a product in v54).

$$\frac{d}{dt}\text{ERK_P_MEKPP} = v_{54} - v_{55} \quad (360)$$

8.59 Species ERK_PP

Name ERK_PP

Initial concentration 0 mol · l⁻¹

This species takes part in eight reactions (as a reactant in v56, v126, v128, v130, v143, v144, v145 and as a product in v55).

$$\frac{d}{dt}\text{ERK_PP} = v_{55} - v_{56} - v_{126} - v_{128} - v_{130} - v_{143} - v_{144} - v_{145} \quad (361)$$

8.60 Species `phosphatase3`

Name `phosphatase3`

Initial concentration 9999999.99999974 mol · l⁻¹

This species takes part in eight reactions (as a reactant in [v56](#), [v58](#), [v98](#), [v100](#) and as a product in [v57](#), [v59](#), [v99](#), [v101](#)).

$$\frac{d}{dt}\text{phosphatase3} = v_{57} + v_{59} + v_{99} + v_{101} - v_{56} - v_{58} - v_{98} - v_{100} \quad (362)$$

8.61 Species `ERK_PP_phosphatase3`

Name `ERK_PP_phosphatase3`

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in [v57](#) and as a product in [v56](#)).

$$\frac{d}{dt}\text{ERK_PP_phosphatase3} = v_{56} - v_{57} \quad (363)$$

8.62 Species `ERK_P_phosphatase3`

Name `ERK_P_phosphatase3`

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in [v59](#) and as a product in [v58](#)).

$$\frac{d}{dt}\text{ERK_P_phosphatase3} = v_{58} - v_{59} \quad (364)$$

8.63 Species `_EGF_EGFRi__2_GAP_SHC`

Name `(EGF_EGFRi*)2_GAP_SHC`

Initial concentration 0 mol · l⁻¹

This species takes part in four reactions (as a reactant in [v70](#), [v137](#) and as a product in [v69](#), [v103](#)).

$$\frac{d}{dt}\text{_EGF_EGFRi_2_GAP_SHC} = v_{69} + v_{103} - v_{70} - v_{137} \quad (365)$$

8.64 Species `_EGF_EGFRi__2_GAP_SHC_0`

Name `(EGF_EGFRi*)2_GAP_SHC*`

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

This species takes part in six reactions (as a reactant in [v71](#), [v83](#), [v138](#) and as a product in [v70](#), [v81](#), [v104](#)).

$$\frac{d}{dt} \text{_EGF_EGFRi_2_GAP_SHC_0} = v_{70} + v_{81} + v_{104} - v_{71} - v_{83} - v_{138} \quad (366)$$

8.65 Species `_EGF_EGFRi__2_GAP_SHC__Grb2`

Name `(EGF_EGFRi*)2_GAP_SHC*_Grb2`

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

This species takes part in six reactions (as a reactant in [v72](#), [v139](#) and as a product in [v71](#), [v82](#), [v114](#), [v116](#)).

$$\frac{d}{dt} \text{_EGF_EGFRi_2_GAP_SHC_Grb2} = v_{71} + v_{82} + v_{114} + v_{116} - v_{72} - v_{139} \quad (367)$$

8.66 Species `_EGF_EGFRi__2_GAP_SHC__Grb2_Sos`

Name `(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos`

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

This species takes part in eleven reactions (as a reactant in [v73](#), [v74](#), [v77](#), [v78](#), [v129](#), [v140](#) and as a product in [v72](#), [v79](#), [v83](#), [v117](#), [v119](#)).

$$\begin{aligned} \frac{d}{dt} \text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos} = & v_{72} + v_{79} + v_{83} + v_{117} + v_{119} - v_{73} \\ & - v_{74} - v_{77} - v_{78} - v_{129} - v_{140} \end{aligned} \quad (368)$$

8.67 Species `_EGF_EGFRi__2_GAP_SHC__Grb2_Sos_Ras_GDP`

Name `(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos_Ras_GDP`

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

This species takes part in five reactions (as a reactant in [v141](#) and as a product in [v73](#), [v74](#), [v120](#), [v122](#)).

$$\frac{d}{dt} \text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GDP} = v_{73} + v_{74} + v_{120} + v_{122} - v_{141} \quad (369)$$

8.68 Species `EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GTP`

Name `(EGF_EGFRi*)2_GAP_SHC*_Grb2_Sos_Ras_GTP`

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

This species takes part in five reactions (as a reactant in [v142](#) and as a product in [v77](#), [v78](#), [v123](#), [v125](#)).

$$\frac{d}{dt} \text{EGF_EGFRi_2_GAP_SHC_Grb2_Sos_Ras_GTP} = v_{77} + v_{78} + v_{123} + v_{125} - v_{142} \quad (370)$$

8.69 Species `Ras_GTPi`

Name `Ras_GTPi`

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

This species takes part in three reactions (as a reactant in [v66](#), [v74](#), [v75](#)).

$$\frac{d}{dt} \text{Ras_GTPi} = -v_{66} - v_{74} - v_{75} \quad (371)$$

8.70 Species `Raf_Ras_GTPi`

Name `Raf_Ras_GTPi`

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

This species takes part in two reactions (as a product in [v75](#), [v76](#)).

$$\frac{d}{dt} \text{Raf_Ras_GTPi} = v_{75} + v_{76} \quad (372)$$

8.71 Species `Ras_GTPi_0`

Name `Ras_GTPi*`

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

This species takes part in three reactions (as a reactant in [v67](#), [v76](#), [v77](#)).

$$\frac{d}{dt} \text{Ras_GTPi_0} = -v_{67} - v_{76} - v_{77} \quad (373)$$

8.72 Species Rafi

Name Rafi*

Initial concentration 0 mol · l⁻¹

This species takes part in six reactions (as a reactant in v76, v84, v86, v88 and as a product in v87, v89).

$$\frac{d}{dt}\text{Rafi} = v_{87} + v_{89} - v_{76} - v_{84} - v_{86} - v_{88} \quad (374)$$

8.73 Species Rafi__phosphatase1

Name Rafi*_phosphatase1

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in v85 and as a product in v84).

$$\frac{d}{dt}\text{Rafi_phosphatase1} = v_{84} - v_{85} \quad (375)$$

8.74 Species MEK_Rafi

Name MEK_Rafi*

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in v87 and as a product in v86).

$$\frac{d}{dt}\text{MEK_Rafi} = v_{86} - v_{87} \quad (376)$$

8.75 Species MEKi_P

Name MEKi_P

Initial concentration 0 mol · l⁻¹

This species takes part in four reactions (as a reactant in v88, v92 and as a product in v87, v91).

$$\frac{d}{dt}\text{MEKi_P} = v_{87} + v_{91} - v_{88} - v_{92} \quad (377)$$

8.76 Species MEK_P_Rafi

Name MEK_P_Rafi*

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in v89 and as a product in v88).

$$\frac{d}{dt}\text{MEK_P_Rafi} = v_{88} - v_{89} \quad (378)$$

8.77 Species MEKi_PP

Name MEKi_PP

Initial concentration 0 mol · l⁻¹

This species takes part in six reactions (as a reactant in v90, v94, v96 and as a product in v89, v95, v97).

$$\frac{d}{dt}\text{MEKi_PP} = v_{89} + v_{95} + v_{97} - v_{90} - v_{94} - v_{96} \quad (379)$$

8.78 Species MEKi_PP_phosphatase2

Name MEKi_PP_phosphatase2

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in v91 and as a product in v90).

$$\frac{d}{dt}\text{MEKi_PP_phosphatase2} = v_{90} - v_{91} \quad (380)$$

8.79 Species MEKi_P_phosphatase2

Name MEKi_P_phosphatase2

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in v93 and as a product in v92).

$$\frac{d}{dt}\text{MEKi_P_phosphatase2} = v_{92} - v_{93} \quad (381)$$

8.80 Species ERKi_P

Name ERKi_P

Initial concentration 0 mol · l⁻¹

This species takes part in four reactions (as a reactant in v96, v100 and as a product in v95, v99).

$$\frac{d}{dt}\text{ERKi_P} = v_{95} + v_{99} - v_{96} - v_{100} \quad (382)$$

8.81 Species ERKi_P_MEKi_PP

Name ERKi_P_MEKi_PP

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in v97 and as a product in v96).

$$\frac{d}{dt}\text{ERKi_P_MEKi_PP} = v_{96} - v_{97} \quad (383)$$

8.82 Species ERKi_PP

Name ERKi_PP

Initial concentration 0 mol · l⁻¹

This species takes part in eight reactions (as a reactant in v98, v127, v129, v131, v146, v147, v148 and as a product in v97).

$$\frac{d}{dt}\text{ERKi_PP} = v_{97} - v_{98} - v_{127} - v_{129} - v_{131} - v_{146} - v_{147} - v_{148} \quad (384)$$

8.83 Species ERKi_PP_phosphatase3

Name ERKi_PP_phosphatase3

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in v99 and as a product in v98).

$$\frac{d}{dt}\text{ERKi_PP_phosphatase3} = v_{98} - v_{99} \quad (385)$$

8.84 Species ERKi_P_phosphatase3

Name ERKi_P_phosphatase3

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in v101 and as a product in v100).

$$\frac{d}{dt}\text{ERKi_P_phosphatase3} = v_{100} - v_{101} \quad (386)$$

8.85 Species EGFRidag

Name EGFRidag

Initial concentration 0 mol · l⁻¹

This species takes part in one reaction (as a product in v60).

$$\frac{d}{dt}\text{EGFRidag} = v_{60} \quad (387)$$

8.86 Species `_EGF_EGFRi___2deg`

Name (EGF_EGFRi*)*2deg

Initial concentration 0 mol · l⁻¹

This species takes part in twelve reactions (as a product in [v62](#), [v132](#), [v133](#), [v134](#), [v135](#), [v136](#), [v137](#), [v138](#), [v139](#), [v140](#), [v141](#), [v142](#)).

$$\frac{d}{dt} \text{EGF_EGFRi_2deg} = v_{62} + v_{132} + v_{133} + v_{134} + v_{135} + v_{136} + v_{137} + v_{138} + v_{139} + v_{140} + v_{141} + v_{142} \quad (388)$$

8.87 Species `_EGF_EGFR__2_GAP_Grb2_Sos_Prot`

Name (EGF_EGFR*)2_GAP_Grb2_Sos_Prot

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in [v107](#) and as a product in [v106](#)).

$$\frac{d}{dt} \text{EGF_EGFR__2_GAP_Grb2_Sos_Prot} = v_{106} - v_{107} \quad (389)$$

8.88 Species `_EGF_EGFR__2_GAP_Grb2_Sos_Ras_GDP_Prot`

Name (EGF_EGFR*)2_GAP_Grb2_Sos_Ras_GDP_Prot

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in [v110](#) and as a product in [v109](#)).

$$\frac{d}{dt} \text{EGF_EGFR__2_GAP_Grb2_Sos_Ras_GDP_Prot} = v_{109} - v_{110} \quad (390)$$

8.89 Species `_EGF_EGFR__2_GAP_Grb2_Sos_Ras_GTP_Prot`

Name (EGF_EGFR*)2_GAP_Grb2_Sos_Ras_GTP_Prot

Initial concentration 0 mol · l⁻¹

This species takes part in two reactions (as a reactant in [v113](#) and as a product in [v112](#)).

$$\frac{d}{dt} \text{EGF_EGFR__2_GAP_Grb2_Sos_Ras_GTP_Prot} = v_{112} - v_{113} \quad (391)$$

8.90 Species `_EGF_EGFR__2_GAP_Grb2_Sos_ERK_PP`

Name `(EGF_EGFR*)_2_GAP_Grb2_Sos_ERK_PP`

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

This species takes part in two reactions (as a product in [v126](#), [v143](#)).

$$\frac{d}{dt} \text{_EGF_EGFR_2_GAP_Grb2_Sos_ERK_PP} = v_{126} + v_{143} \quad (392)$$

8.91 Species `_EGF_EGFRi__2_GAP_Grb2_Sos_ERKi_PP`

Name `(EGF_EGFRi*)_2_GAP_Grb2_Sos_ERKi_PP`

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

This species takes part in two reactions (as a product in [v127](#), [v146](#)).

$$\frac{d}{dt} \text{_EGF_EGFRi_2_GAP_Grb2_Sos_ERKi_PP} = v_{127} + v_{146} \quad (393)$$

8.92 Species `_EGF_EGFR__2_GAP_SHC__Grb2_Sos_ERK_PP`

Name `(EGF_EGFR*)_2_GAP_SHC*_Grb2_Sos_ERK_PP`

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

This species takes part in two reactions (as a product in [v128](#), [v144](#)).

$$\frac{d}{dt} \text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_ERK_PP} = v_{128} + v_{144} \quad (394)$$

8.93 Species `_EGF_EGFRi__2_GAP_SHC__Grb2_Sos_ERKi_PP`

Name `(EGF_EGFRi*)_2_GAP_SHC*_Grb2_Sos_ERKi_PP`

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

This species takes part in two reactions (as a product in [v129](#), [v147](#)).

$$\frac{d}{dt} \text{_EGF_EGFRi_2_GAP_SHC_Grb2_Sos_ERKi_PP} = v_{129} + v_{147} \quad (395)$$

8.94 Species `_EGF_EGFR__2_GAP_Grb2_Sos_deg`

Name `(EGF_EGFR*)_2_GAP_Grb2_Sos_deg`

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

This species takes part in two reactions (as a reactant in [v143](#), [v144](#)).

$$\frac{d}{dt} \text{_EGF_EGFR_2_GAP_Grb2_Sos_deg} = -v_{143} - v_{144} \quad (396)$$

8.95 Species `_EGF_EGFRi__2_GAP_Grb2_Sos_deg`

Name `(EGF_EGFRi*)2_GAP_Grb2_Sos_deg`

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

This species takes part in two reactions (as a reactant in [v146](#), [v147](#)).

$$\frac{d}{dt} \text{_EGF_EGFRi_2_GAP_Grb2_Sos_deg} = -v_{146} - v_{147} \quad (397)$$

8.96 Species `Sos_ERK_PP`

Name `Sos_ERK_PP`

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

This species takes part in two reactions (as a product in [v130](#), [v145](#)).

$$\frac{d}{dt} \text{Sos_ERK_PP} = v_{130} + v_{145} \quad (398)$$

8.97 Species `Sos_ERKi_PP`

Name `Sos_ERKi_PP`

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

This species takes part in two reactions (as a product in [v131](#), [v148](#)).

$$\frac{d}{dt} \text{Sos_ERKi_PP} = v_{131} + v_{148} \quad (399)$$

8.98 Species `Sosi`

Name `Sosi`

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

This species takes part in two reactions (as a reactant in [v145](#), [v148](#)).

$$\frac{d}{dt} \text{Sosi} = -v_{145} - v_{148} \quad (400)$$

8.99 Species `ERKi_MEKi_PP_0`

Name `ERKi_MEKi_PP`

Initial concentration $0.999999999999997 \text{ mol} \cdot \text{l}^{-1}$

This species takes part in two reactions (as a reactant in [v95](#) and as a product in [v94](#)).

$$\frac{d}{dt} \text{ERKi_MEKi_PP_0} = v_{94} - v_{95} \quad (401)$$

8.100 Species `_EGF_EGFR__2_GAP_SHC__Grb2_Prot_0`

Name `(EGF_EGFR*)_2_GAP_SHC*_Grb2_Prot`

Initial concentration `0.999999999999972 mol · l-1`

This species takes part in two reactions (as a reactant in [v116](#) and as a product in [v115](#)).

$$\frac{d}{dt} \text{_EGF_EGFR_2_GAP_SHC_Grb2_Prot_0} = v_{115} - v_{116} \quad (402)$$

8.101 Species `_EGF_EGFR__2_GAP_SHC__Grb2_Sos_Prot_0`

Name `(EGF_EGFR*)_2_GAP_SHC*_Grb2_Sos_Prot`

Initial concentration `0.999999999999972 mol · l-1`

This species takes part in two reactions (as a reactant in [v119](#) and as a product in [v118](#)).

$$\frac{d}{dt} \text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Prot_0} = v_{118} - v_{119} \quad (403)$$

8.102 Species `_EGF_EGFR__2_GAP_SHC__Grb2_Sos_Ras_GDP_Prot_0`

Name `(EGF_EGFR*)_2_GAP_SHC*_Grb2_Sos_Ras_GDP_Prot`

Initial concentration `0.999999999999972 mol · l-1`

This species takes part in two reactions (as a reactant in [v122](#) and as a product in [v121](#)).

$$\frac{d}{dt} \text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GDP_Prot_0} = v_{121} - v_{122} \quad (404)$$

8.103 Species `_EGF_EGFR__2_GAP_SHC__Grb2_Sos_Ras_GTP_Prot_0`

Name `(EGF_EGFR*)_2_GAP_SHC*_Grb2_Sos_Ras_GTP_Prot`

Initial concentration `0.999999999999973 mol · l-1`

This species takes part in two reactions (as a reactant in [v125](#) and as a product in [v124](#)).

$$\frac{d}{dt} \text{_EGF_EGFR_2_GAP_SHC_Grb2_Sos_Ras_GTP_Prot_0} = v_{124} - v_{125} \quad (405)$$

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