

SBML Model Report

Model name: “Haberichter2007_cellcycle”



May 5, 2016

1 General Overview

This is a document in SBML Level 2 Version 1 format. This model was created by the following two authors: Enuo He¹ and Steven Dowdy² at March 20th 2007 at 1:29 p.m. and last time modified at July fifth 2012 at 2:49 p.m. Table 1 gives an overview of the quantities of all components of this model.

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

Element	Quantity	Element	Quantity
compartment types	0	compartments	1
species types	0	species	57
events	1	constraints	0
reactions	138	function definitions	0
global parameters	61	unit definitions	2
rules	12	initial assignments	0

Model Notes

This model is according to the paper *A systems biology dynamical model of mammalian G1 cell cycle progression*. Supplementary Figure 2A has been reproduced by the MathSBML and CellDesigner. All the data of this model are from the set 2 of Supplementary talbe2.

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2 Unit Definitions

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

2.1 Unit time

Name min

Definition 60 s

2.2 Unit substance

Name #

Definition item

2.3 Unit volume

Notes Litre is the predefined SBML unit for volume.

Definition l

2.4 Unit area

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

Definition m²

2.5 Unit length

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

Definition m

3 Compartment

This model contains one compartment.

Table 2: Properties of all compartments.

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

3.1 Compartment X

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

Name cell

4 Species

This model contains 57 species. Section 9 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
APCC		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
APCCYCdk1Y00YCdk1Y01YInt		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
APCCYCdk1Y10YCdk1Y11YInt		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
APCCYCdk2Y000YCdk2Y002YInt		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
APCCYCdk2Y010YCdk2Y012YInt		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
APCCYCdk2Y100YCdk2Y102YInt		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
APCCYCdk2Y110YCdk2Y112YInt		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
APCCYCyclinAYInt		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
APCCYEmi1		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
Cdk1Y00		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
Cdk1Y01		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
Cdk1Y10		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
Cdk1Y11		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
Cdk1Y11YpRbY10YpRbY20YInt		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
Cdk1Y11YpRbY11YpRbY21YInt		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
Cdk2Y000		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
Cdk2Y001		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
Cdk2Y002		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
Cdk2Y010		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
Cdk2Y011		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
Cdk2Y011YpRbY10YpRbY20YInt		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square
Cdk2Y011YpRbY11YpRbY21YInt		X	$\text{item} \cdot \text{l}^{-1}$	\square	\square

Id	Name	Compartment	Derived Unit	Constant	Boundary Condi- tion
Cdk2Y012		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Cdk2Y012YpRbY10YpRbY20YInt		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Cdk2Y012YpRbY11YpRbY21YInt		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Cdk2Y100		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Cdk2Y101		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Cdk2Y102		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Cdk2Y110		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Cdk2Y111		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Cdk2Y112		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Cdk4Y00		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Cdk4Y01		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Cdk4Y01YpRbY00YpRbY10YInt		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Cdk4Y01YpRbY01YpRbY11YInt		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Cdk4Y10		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Cdk4Y11		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
CyclinA		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
CyclinD		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
CyclinE		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
E2F		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
Emi1		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
p27		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
pRbY00		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
pRbY01		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
pRbY10		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
pRbY11		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
pRbY20		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
pRbY21		X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

Id	Name	Compartment	Derived Unit	Constant	Boundary Condi- tion
	totalYCyclinYD	X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
	totalYCyclinYE	X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
	totalYCyclinYA	X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
	totalYp27	X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
	hypophosphorylatedYpRb	X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
	hyperphosphorylatedYpRb	X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
	totalYEmi1	X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
	activeYCdk2	X	$\text{item} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

5 Parameters

This model contains 61 global parameters.

Table 4: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
ksYE2F			0.000		<input type="checkbox"/>
ksYEmi1			0.000		<input type="checkbox"/>
ksYCyclinA			0.000		<input type="checkbox"/>
ksYCyclinE			0.000		<input type="checkbox"/>
kYact			0.000		<input type="checkbox"/>
ksYCyclinD			1354.231		<input checked="" type="checkbox"/>
ksYp27			195.472		<input checked="" type="checkbox"/>
kdYp27			0.002		<input checked="" type="checkbox"/>
kd1Yp27			0.071		<input checked="" type="checkbox"/>
ks0YCyclinE			254.074		<input checked="" type="checkbox"/>
ks1YCyclinE			980.611		<input checked="" type="checkbox"/>
ksMYCyclinE			9992.647		<input checked="" type="checkbox"/>
ks0YCyclinA			499.944		<input checked="" type="checkbox"/>
ks1YCyclinA			7999.996		<input checked="" type="checkbox"/>
ksMYCyclinA			4064.384		<input checked="" type="checkbox"/>
ks0YE2F			6.927		<input checked="" type="checkbox"/>
ks1YE2F			65.443		<input checked="" type="checkbox"/>
ksMYE2F			9818.780		<input checked="" type="checkbox"/>
kdYE2F			0.006		<input checked="" type="checkbox"/>
kd0YE2F			0.002		<input checked="" type="checkbox"/>
ks0YEmi1			2.005		<input checked="" type="checkbox"/>
ks1YEmi1			1788.517		<input checked="" type="checkbox"/>
ksMYEmi1			9608.162		<input checked="" type="checkbox"/>
kdYEmi1			0.018		<input checked="" type="checkbox"/>
kbYCyclinDYCdk4			$1.43 \cdot 10^{-6}$		<input checked="" type="checkbox"/>
kbYp27YYCdk4			$6.34 \cdot 10^{-6}$		<input checked="" type="checkbox"/>
kbYp27YYCdk2			$1.23 \cdot 10^{-5}$		<input checked="" type="checkbox"/>
k1Yact			0.011		<input checked="" type="checkbox"/>
timeYModifier			240.064		<input checked="" type="checkbox"/>
kbYCyclinEYYCdk2			$5.01 \cdot 10^{-5}$		<input checked="" type="checkbox"/>
kbYCyclinAYYCdk2			$9.52 \cdot 10^{-5}$		<input checked="" type="checkbox"/>
kbYCyclinAYYCdk1			$6.48 \cdot 10^{-5}$		<input checked="" type="checkbox"/>
kbYD4YYpRb			$3.15 \cdot 10^{-5}$		<input checked="" type="checkbox"/>
kupYD4YYpRb			1.695		<input checked="" type="checkbox"/>
kbYE2YYpRb			$5.74 \cdot 10^{-5}$		<input checked="" type="checkbox"/>
kupYE2YYpRb			4.783		<input checked="" type="checkbox"/>
kbYA2YYpRb			$6.25 \cdot 10^{-5}$		<input checked="" type="checkbox"/>

Id	Name	SBO	Value	Unit	Constant
kupYA2YYpRb			0.200		✓
kbYA1YYpRb			$6.73 \cdot 10^{-5}$		✓
kupYA1YYpRb			0.202		✓
ktYpRbYYDephos			0.023		✓
kbYE2FYYpRb			$9.66 \cdot 10^{-6}$		✓
kbYEmi1YYAPCC			10^{-4}		✓
kbYAPCCYYCyclinA			$1.61 \cdot 10^{-5}$		✓
kudYAPCCYYCyclinA			5.000		✓
kdYCyclinD			0.050		✓
kdYCyclinE			0.050		✓
kdYCyclinA			0.050		✓
kuYCyclinDYYCdk4			0.100		✓
kuYp27YYCdk4			0.100		✓
kuYCyclinEYYCdk2			0.100		✓
kuYp27YYCdk2			0.100		✓
kuYCyclinAYYCdk2			0.100		✓
kuYCyclinAYYCdk1			0.100		✓
kuYD4YYpRb			0.100		✓
kuYE2YYpRb			0.100		✓
kuYA2YYpRb			0.100		✓
kuYA1YYpRb			0.100		✓
kuYE2FYYpRb			0.100		✓
kuYEmi1YYAPCC			0.100		✓
kuYAPCCYYCyclinA			0.100		✓

6 Rules

This is an overview of twelve rules.

6.1 Rule `totalYCyclinYD`

Rule `totalYCyclinYD` is an assignment rule for species `totalYCyclinYD`:

$$\text{totalYCyclinYD} = [\text{CyclinD}] + [\text{Cdk4Y01}] + [\text{Cdk4Y11}] \quad (1)$$

Derived unit $\text{item} \cdot \text{l}^{-1}$

6.2 Rule `totalYCyclinYE`

Rule `totalYCyclinYE` is an assignment rule for species `totalYCyclinYE`:

$$\text{totalYCyclinYE} = [\text{CyclinE}] + [\text{Cdk2Y001}] + [\text{Cdk2Y011}] + [\text{Cdk2Y101}] + [\text{Cdk2Y111}] \quad (2)$$

Derived unit $\text{item} \cdot \text{l}^{-1}$

6.3 Rule `totalYCyclinYA`

Rule `totalYCyclinYA` is an assignment rule for species `totalYCyclinYA`:

$$\begin{aligned} \text{totalYCyclinYA} = & [\text{CyclinA}] + [\text{Cdk1Y01}] + [\text{Cdk1Y11}] + [\text{Cdk2Y002}] \\ & + [\text{Cdk2Y012}] + [\text{Cdk2Y102}] + [\text{Cdk2Y112}] \end{aligned} \quad (3)$$

Derived unit $\text{item} \cdot \text{l}^{-1}$

6.4 Rule `totalYp27`

Rule `totalYp27` is an assignment rule for species `totalYp27`:

$$\begin{aligned} \text{totalYp27} = & [\text{p27}] + [\text{Cdk4Y10}] + [\text{Cdk4Y11}] + [\text{Cdk2Y100}] + [\text{Cdk2Y101}] \\ & + [\text{Cdk2Y102}] + [\text{Cdk2Y110}] + [\text{Cdk2Y111}] + [\text{Cdk2Y112}] \end{aligned} \quad (4)$$

Derived unit $\text{item} \cdot \text{l}^{-1}$

6.5 Rule `hypophosphorylatedYpRb`

Rule `hypophosphorylatedYpRb` is an assignment rule for species `hypophosphorylatedYpRb`:

$$\text{hypophosphorylatedYpRb} = [\text{pRbY10}] + [\text{pRbY11}] \quad (5)$$

Derived unit $\text{item} \cdot \text{l}^{-1}$

6.6 Rule `hyperphosphorylatedYpRb`

Rule `hyperphosphorylatedYpRb` is an assignment rule for species `hyperphosphorylatedYpRb`:

$$\text{hyperphosphorylatedYpRb} = [\text{pRbY20}] + [\text{pRbY21}] \quad (6)$$

Derived unit $\text{item} \cdot \text{l}^{-1}$

6.7 Rule `activeYCdk2`

Rule `activeYCdk2` is an assignment rule for species `activeYCdk2`:

$$\text{activeYCdk2} = [\text{Cdk2Y011}] + [\text{Cdk2Y012}] \quad (7)$$

Derived unit $\text{item} \cdot \text{l}^{-1}$

6.8 Rule `totalYEmi1`

Rule `totalYEmi1` is an assignment rule for species `totalYEmi1`:

$$\text{totalYEmi1} = [\text{Emi1}] + [\text{APCCYEmi1}] \quad (8)$$

Derived unit $\text{item} \cdot \text{l}^{-1}$

6.9 Rule `ksYCyclinE`

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

$$\text{ksYCyclinE} = \text{ks0YCyclinE} + \frac{\text{ks1YCyclinE} \cdot [\text{E2F}]}{\text{ksMYCyclinE} + [\text{E2F}]} \quad (9)$$

6.10 Rule `ksYCyclinA`

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

$$\text{ksYCyclinA} = \text{ks0YCyclinA} + \frac{\text{ks1YCyclinA} \cdot [\text{E2F}]}{\text{ksMYCyclinA} + [\text{E2F}]} \quad (10)$$

6.11 Rule `ksYEmi1`

Rule `ksYEmi1` is an assignment rule for parameter `ksYEmi1`:

$$\text{ksYEmi1} = \text{ks0YEmi1} + \frac{\text{ks1YEmi1} \cdot [\text{E2F}]}{\text{ksMYEmi1} + [\text{E2F}]} \quad (11)$$

6.12 Rule `ksYE2F`

Rule `ksYE2F` is an assignment rule for parameter `ksYE2F`:

$$\text{ksYE2F} = \text{ks0YE2F} + \frac{\text{ks1YE2F} \cdot [\text{E2F}]}{\text{ksMYE2F} + [\text{E2F}]} \quad (12)$$

7 Event

This is an overview of one event. Each event is initiated whenever its trigger condition switches from `false` to `true`. A delay function postpones the effects of an event to a later time point. At the time of execution, an event can assign values to species, parameters or compartments if these are not set to constant.

7.1 Event `event_0`

Name modifier activation

Notes when `time >= time_Modifier`, `kYact=k1Yact`, otherwise `kYact=0`. Here `time_Modifier=240.0637` from the set2 of the supplementary table 2.

Trigger condition

$$\text{time} > 240.0637 \quad (13)$$

Assignment

$$\text{kYact} = \text{k1Yact} \quad (14)$$

8 Reactions

This model contains 138 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	rxnY001		$\emptyset \longrightarrow \text{CyclinD}$	
2	rxnY002		$\text{CyclinD} \longrightarrow \emptyset$	
3	rxnY003		$\text{Cdk4Y01} \longrightarrow \text{Cdk4Y00}$	
4	rxnY004		$\text{Cdk4Y11} \longrightarrow \text{Cdk4Y10}$	
5	rxnY005		$\emptyset \longrightarrow \text{p27}$	
6	rxnY006		$\text{p27} \longrightarrow \emptyset$	
7	rxnY007		$\text{Cdk4Y10} \longrightarrow \text{Cdk4Y00}$	
8	rxnY008		$\text{Cdk4Y11} \longrightarrow \text{Cdk4Y01}$	
9	rxnY009		$\text{Cdk2Y100} \longrightarrow \text{Cdk2Y000}$	
10	rxnY010		$\text{Cdk2Y101} \longrightarrow \text{Cdk2Y001}$	
11	rxnY011		$\text{Cdk2Y102} \longrightarrow \text{Cdk2Y002}$	
12	rxnY012		$\text{Cdk2Y110} \longrightarrow \text{Cdk2Y010}$	
13	rxnY013		$\text{Cdk2Y111} \longrightarrow \text{Cdk2Y011}$	
14	rxnY014		$\text{Cdk2Y112} \longrightarrow \text{Cdk2Y012}$	
15	rxnY015		$\emptyset \longrightarrow \text{CyclinE}$	
16	rxnY016		$\text{CyclinE} \longrightarrow \emptyset$	
17	rxnY017		$\text{Cdk2Y001} \longrightarrow \text{Cdk2Y000}$	
18	rxnY018		$\text{Cdk2Y101} \longrightarrow \text{Cdk2Y100}$	
19	rxnY019		$\text{Cdk2Y011} \longrightarrow \text{Cdk2Y010}$	
20	rxnY020		$\text{Cdk2Y111} \longrightarrow \text{Cdk2Y110}$	
21	rxnY021		$\emptyset \longrightarrow \text{CyclinA}$	
22	rxnY022		$\text{CyclinA} \longrightarrow \emptyset$	
23	rxnY023		$\text{Cdk1Y01} \longrightarrow \text{Cdk1Y00}$	

Nº	Id	Name	Reaction Equation	SBO
24	rxnY024		$\text{Cdk1Y11} \longrightarrow \text{Cdk1Y10}$	
25	rxnY025		$\text{Cdk2Y002} \longrightarrow \text{Cdk2Y000}$	
26	rxnY026		$\text{Cdk2Y102} \longrightarrow \text{Cdk2Y100}$	
27	rxnY027		$\text{Cdk2Y012} \longrightarrow \text{Cdk2Y010}$	
28	rxnY028		$\text{Cdk2Y112} \longrightarrow \text{Cdk2Y110}$	
29	rxnY029		$\emptyset \longrightarrow \text{E2F}$	
30	rxnY030		$\text{E2F} \longrightarrow \emptyset$	
31	rxnY031		$\text{pRbY01} \longrightarrow \text{pRbY00}$	
32	rxnY032		$\text{pRbY11} \longrightarrow \text{pRbY10}$	
33	rxnY033		$\text{pRbY21} \longrightarrow \text{pRbY20}$	
34	rxnY034		$\emptyset \longrightarrow \text{Emi1}$	
35	rxnY035		$\text{Emi1} \longrightarrow \emptyset$	
36	rxnY036		$\text{APCCYEmi1} \longrightarrow \text{APCC}$	
37	rxnY037		$\text{Cdk4Y00} + \text{CyclinD} \longrightarrow \text{Cdk4Y01}$	
38	rxnY038		$\text{Cdk4Y01} \longrightarrow \text{Cdk4Y00} + \text{CyclinD}$	
39	rxnY039		$\text{Cdk4Y10} + \text{CyclinD} \longrightarrow \text{Cdk4Y11}$	
40	rxnY040		$\text{Cdk4Y11} \longrightarrow \text{Cdk4Y10} + \text{CyclinD}$	
41	rxnY041		$\text{Cdk4Y00} + \text{p27} \longrightarrow \text{Cdk4Y10}$	
42	rxnY042		$\text{Cdk4Y10} \longrightarrow \text{Cdk4Y00} + \text{p27}$	
43	rxnY043		$\text{Cdk4Y01} + \text{p27} \longrightarrow \text{Cdk4Y11}$	
44	rxnY044		$\text{Cdk4Y11} \longrightarrow \text{Cdk4Y01} + \text{p27}$	
45	rxnY045		$\text{Cdk2Y000} + \text{p27} \longrightarrow \text{Cdk2Y100}$	
46	rxnY046		$\text{Cdk2Y100} \longrightarrow \text{Cdk2Y000} + \text{p27}$	
47	rxnY047		$\text{Cdk2Y001} + \text{p27} \longrightarrow \text{Cdk2Y101}$	
48	rxnY048		$\text{Cdk2Y101} \longrightarrow \text{Cdk2Y001} + \text{p27}$	
49	rxnY049		$\text{Cdk2Y002} + \text{p27} \longrightarrow \text{Cdk2Y102}$	
50	rxnY050		$\text{Cdk2Y102} \longrightarrow \text{Cdk2Y002} + \text{p27}$	
51	rxnY051		$\text{Cdk2Y010} + \text{p27} \longrightarrow \text{Cdk2Y110}$	
52	rxnY052		$\text{Cdk2Y110} \longrightarrow \text{Cdk2Y010} + \text{p27}$	

Nº	Id	Name	Reaction Equation	SBO
53	rxnY053		$\text{Cdk2Y011} + \text{p27} \longrightarrow \text{Cdk2Y111}$	
54	rxnY054		$\text{Cdk2Y111} \longrightarrow \text{Cdk2Y011} + \text{p27}$	
55	rxnY055		$\text{Cdk2Y012} + \text{p27} \longrightarrow \text{Cdk2Y112}$	
56	rxnY056		$\text{Cdk2Y112} \longrightarrow \text{Cdk2Y012} + \text{p27}$	
57	rxnY057		$\text{Cdk2Y000} \longrightarrow \text{Cdk2Y010}$	
58	rxnY058		$\text{Cdk2Y100} \longrightarrow \text{Cdk2Y110}$	
59	rxnY059		$\text{Cdk2Y001} \longrightarrow \text{Cdk2Y011}$	
60	rxnY060		$\text{Cdk2Y101} \longrightarrow \text{Cdk2Y111}$	
61	rxnY061		$\text{Cdk2Y002} \longrightarrow \text{Cdk2Y012}$	
62	rxnY062		$\text{Cdk2Y102} \longrightarrow \text{Cdk2Y112}$	
63	rxnY063		$\text{Cdk2Y000} + \text{CyclinE} \longrightarrow \text{Cdk2Y001}$	
64	rxnY064		$\text{Cdk2Y001} \longrightarrow \text{Cdk2Y000} + \text{CyclinE}$	
65	rxnY065		$\text{Cdk2Y100} + \text{CyclinE} \longrightarrow \text{Cdk2Y101}$	
66	rxnY066		$\text{Cdk2Y101} \longrightarrow \text{Cdk2Y100} + \text{CyclinE}$	
67	rxnY067		$\text{Cdk2Y010} + \text{CyclinE} \longrightarrow \text{Cdk2Y011}$	
68	rxnY068		$\text{Cdk2Y011} \longrightarrow \text{Cdk2Y010} + \text{CyclinE}$	
69	rxnY069		$\text{Cdk2Y110} + \text{CyclinE} \longrightarrow \text{Cdk2Y111}$	
70	rxnY070		$\text{Cdk2Y111} \longrightarrow \text{Cdk2Y110} + \text{CyclinE}$	
71	rxnY071		$\text{Cdk2Y000} + \text{CyclinA} \longrightarrow \text{Cdk2Y002}$	
72	rxnY072		$\text{Cdk2Y002} \longrightarrow \text{Cdk2Y000} + \text{CyclinA}$	
73	rxnY073		$\text{Cdk2Y100} + \text{CyclinA} \longrightarrow \text{Cdk2Y102}$	
74	rxnY074		$\text{Cdk2Y102} \longrightarrow \text{Cdk2Y100} + \text{CyclinA}$	
75	rxnY075		$\text{Cdk2Y010} + \text{CyclinA} \longrightarrow \text{Cdk2Y012}$	
76	rxnY076		$\text{Cdk2Y012} \longrightarrow \text{Cdk2Y010} + \text{CyclinA}$	
77	rxnY077		$\text{Cdk2Y110} + \text{CyclinA} \longrightarrow \text{Cdk2Y112}$	
78	rxnY078		$\text{Cdk2Y112} \longrightarrow \text{Cdk2Y110} + \text{CyclinA}$	
79	rxnY079		$\text{Cdk1Y00} \longrightarrow \text{Cdk1Y10}$	
80	rxnY080		$\text{Cdk1Y01} \longrightarrow \text{Cdk1Y11}$	
81	rxnY081		$\text{Cdk1Y00} + \text{CyclinA} \longrightarrow \text{Cdk1Y01}$	

Nº	Id	Name	Reaction Equation	SBO
82	rxnY082		$\text{Cdk1Y01} \longrightarrow \text{Cdk1Y00} + \text{CyclinA}$	
83	rxnY083		$\text{Cdk1Y10} + \text{CyclinA} \longrightarrow \text{Cdk1Y11}$	
84	rxnY084		$\text{Cdk1Y11} \longrightarrow \text{Cdk1Y10} + \text{CyclinA}$	
85	rxnY085		$\text{pRbY00} + \text{Cdk4Y01} \longrightarrow \text{Cdk4Y01YpRbY00YpRbY10YInt}$	
86	rxnY086		$\text{Cdk4Y01YpRbY00YpRbY10YInt} \longrightarrow \text{pRbY00} + \text{Cdk4Y01}$	
87	rxnY087		$\text{Cdk4Y01YpRbY00YpRbY10YInt} \longrightarrow \text{pRbY10} + \text{Cdk4Y01}$	
88	rxnY088		$\text{pRbY01} + \text{Cdk4Y01} \longrightarrow \text{Cdk4Y01YpRbY01YpRbY11YInt}$	
89	rxnY089		$\text{Cdk4Y01YpRbY01YpRbY11YInt} \longrightarrow \text{pRbY01} + \text{Cdk4Y01}$	
90	rxnY090		$\text{Cdk4Y01YpRbY01YpRbY11YInt} \longrightarrow \text{pRbY11} + \text{Cdk4Y01}$	
91	rxnY091		$\text{pRbY10} + \text{Cdk2Y011} \longrightarrow \text{Cdk2Y011YpRbY10YpRbY20YInt}$	
92	rxnY092		$\text{Cdk2Y011YpRbY10YpRbY20YInt} \longrightarrow \text{pRbY10} + \text{Cdk2Y011}$	
93	rxnY093		$\text{Cdk2Y011YpRbY10YpRbY20YInt} \longrightarrow \text{pRbY20} + \text{Cdk2Y011}$	
94	rxnY094		$\text{pRbY11} + \text{Cdk2Y011} \longrightarrow \text{Cdk2Y011YpRbY11YpRbY21YInt}$	
95	rxnY095		$\text{Cdk2Y011YpRbY11YpRbY21YInt} \longrightarrow \text{pRbY11} + \text{Cdk2Y011}$	
96	rxnY096		$\text{Cdk2Y011YpRbY11YpRbY21YInt} \longrightarrow \text{pRbY21} + \text{Cdk2Y011}$	
97	rxnY097		$\text{pRbY10} + \text{Cdk2Y012} \longrightarrow \text{Cdk2Y012YpRbY10YpRbY20YInt}$	
98	rxnY098		$\text{Cdk2Y012YpRbY10YpRbY20YInt} \longrightarrow \text{pRbY10} + \text{Cdk2Y012}$	
99	rxnY099		$\text{Cdk2Y012YpRbY10YpRbY20YInt} \longrightarrow \text{pRbY20} + \text{Cdk2Y012}$	
100	rxnY100		$\text{pRbY11} + \text{Cdk2Y012} \longrightarrow \text{Cdk2Y012YpRbY11YpRbY21YInt}$	

Nº	Id	Name	Reaction Equation	SBO
101	rxnY101		$\text{Cdk2Y012YpRbY11YpRbY21YInt} \longrightarrow \text{pRbY11} + \text{Cdk2Y012}$	
102	rxnY102		$\text{Cdk2Y012YpRbY11YpRbY21YInt} \longrightarrow \text{pRbY21} + \text{Cdk2Y012}$	
103	rxnY103		$\text{pRbY10} + \text{Cdk1Y11} \longrightarrow \text{Cdk1Y11YpRbY10YpRbY20YInt}$	
104	rxnY104		$\text{Cdk1Y11YpRbY10YpRbY20YInt} \longrightarrow \text{pRbY10} + \text{Cdk1Y11}$	
105	rxnY105		$\text{Cdk1Y11YpRbY10YpRbY20YInt} \longrightarrow \text{pRbY20} + \text{Cdk1Y11}$	
106	rxnY106		$\text{pRbY11} + \text{Cdk1Y11} \xrightarrow{\text{pRbY10}} \text{Cdk1Y11YpRbY11YpRbY21YInt}$	
107	rxnY107		$\text{Cdk1Y11YpRbY11YpRbY21YInt} \longrightarrow \text{pRbY11} + \text{Cdk1Y11}$	
108	rxnY108		$\text{Cdk1Y11YpRbY11YpRbY21YInt} \longrightarrow \text{pRbY21} + \text{Cdk1Y11}$	
109	rxnY109		$\text{pRbY20} \longrightarrow \text{pRbY00}$	
110	rxnY110		$\text{pRbY21} \longrightarrow \text{pRbY01}$	
111	rxnY111		$\text{pRbY00} + \text{E2F} \longrightarrow \text{pRbY01}$	
112	rxnY112		$\text{pRbY01} \longrightarrow \text{pRbY00} + \text{E2F}$	
113	rxnY113		$\text{pRbY10} + \text{E2F} \longrightarrow \text{pRbY11}$	
114	rxnY114		$\text{pRbY11} \longrightarrow \text{pRbY10} + \text{E2F}$	
115	rxnY115		$\text{pRbY21} \longrightarrow \text{pRbY20} + \text{E2F}$	
116	rxnY116		$\text{APCC} + \text{Emi1} \longrightarrow \text{APCCYEmi1}$	
117	rxnY117		$\text{APCCYEmi1} \longrightarrow \text{APCC} + \text{Emi1}$	
118	rxnY118		$\text{CyclinA} + \text{APCC} \longrightarrow \text{APCCYCyclinAYInt}$	
119	rxnY119		$\text{APCCYCyclinAYInt} \longrightarrow \text{CyclinA} + \text{APCC}$	
120	rxnY120		$\text{APCCYCyclinAYInt} \longrightarrow \text{APCC}$	
121	rxnY121		$\text{Cdk2Y002} + \text{APCC} \longrightarrow \text{APCCYCdk2Y000YCdk2Y002YInt}$	
122	rxnY122		$\text{APCCYCdk2Y000YCdk2Y002YInt} \longrightarrow \text{Cdk2Y002} + \text{APCC}$	

Nº	Id	Name	Reaction Equation	SBO
123	rxnY123		$\text{APCCYCdk2Y000YCdk2Y002YInt} \longrightarrow \text{Cdk2Y000} + \text{APCC}$	
124	rxnY124		$\text{Cdk2Y102} + \text{APCC} \longrightarrow \text{APCCYCdk2Y100YCdk2Y102YInt}$	
125	rxnY125		$\text{APCCYCdk2Y100YCdk2Y102YInt} \longrightarrow \text{Cdk2Y102} + \text{APCC}$	
126	rxnY126		$\text{APCCYCdk2Y100YCdk2Y102YInt} \longrightarrow \text{Cdk2Y100} + \text{APCC}$	
127	rxnY127		$\text{Cdk2Y012} + \text{APCC} \xrightarrow{\text{Cdk2Y102}} \text{APCCYCdk2Y010YCdk2Y012YInt}$	
128	rxnY128		$\text{APCCYCdk2Y010YCdk2Y012YInt} \longrightarrow \text{Cdk2Y012} + \text{APCC}$	
129	rxnY129		$\text{APCCYCdk2Y010YCdk2Y012YInt} \longrightarrow \text{Cdk2Y010} + \text{APCC}$	
130	rxnY130		$\text{Cdk2Y112} + \text{APCC} \longrightarrow \text{APCCYCdk2Y110YCdk2Y112YInt}$	
131	rxnY131		$\text{APCCYCdk2Y110YCdk2Y112YInt} \longrightarrow \text{Cdk2Y112} + \text{APCC}$	
132	rxnY132		$\text{APCCYCdk2Y110YCdk2Y112YInt} \longrightarrow \text{Cdk2Y110} + \text{APCC}$	
133	rxnY133		$\text{Cdk1Y01} + \text{APCC} \longrightarrow \text{APCCYCdk1Y00YCdk1Y01YInt}$	
134	rxnY134		$\text{APCCYCdk1Y00YCdk1Y01YInt} \longrightarrow \text{Cdk1Y01} + \text{APCC}$	
135	rxnY135		$\text{APCCYCdk1Y00YCdk1Y01YInt} \longrightarrow \text{Cdk1Y00} + \text{APCC}$	
136	rxnY136		$\text{Cdk1Y11} + \text{APCC} \longrightarrow \text{APCCYCdk1Y10YCdk1Y11YInt}$	
137	rxnY137		$\text{APCCYCdk1Y10YCdk1Y11YInt} \longrightarrow \text{Cdk1Y11} + \text{APCC}$	
138	rxnY138		$\text{APCCYCdk1Y10YCdk1Y11YInt} \longrightarrow \text{Cdk1Y10} + \text{APCC}$	

8.1 Reaction rxnY001

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

Reaction equation



Product

Table 6: Properties of each product.

Id	Name	SBO
	CyclinD	

Kinetic Law

Derived unit contains undeclared units

$$v_1 = k_{sY} \text{CyclinD} \cdot \text{vol}(X) \quad (16)$$

8.2 Reaction rxnY002

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

Reaction equation



Reactant

Table 7: Properties of each reactant.

Id	Name	SBO
	CyclinD	

Kinetic Law

Derived unit contains undeclared units

$$v_2 = k_{dY} \text{CyclinD} \cdot [\text{CyclinD}] \cdot \text{vol}(X) \quad (18)$$

8.3 Reaction rxnY003

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

Reaction equation



Reactant

Table 8: Properties of each reactant.

Id	Name	SBO
Cdk4Y01		

Product

Table 9: Properties of each product.

Id	Name	SBO
Cdk4Y00		

Kinetic Law

Derived unit contains undeclared units

$$v_3 = \text{kdYCyclinD} \cdot [\text{Cdk4Y01}] \cdot \text{vol}(\text{X}) \quad (20)$$

8.4 Reaction rxnY004

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

Reaction equation



Reactant

Table 10: Properties of each reactant.

Id	Name	SBO
Cdk4Y11		

Product

Table 11: Properties of each product.

Id	Name	SBO
Cdk4Y10		

Kinetic Law

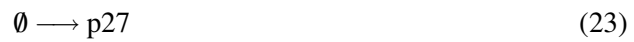
Derived unit contains undeclared units

$$v_4 = \text{kdYCyclinD} \cdot [\text{Cdk4Y11}] \cdot \text{vol}(\text{X}) \quad (22)$$

8.5 Reaction rxnY005

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

Reaction equation



Product

Table 12: Properties of each product.

Id	Name	SBO
p27		

Kinetic Law

Derived unit contains undeclared units

$$v_5 = \text{ksYp27} \cdot \text{vol}(\text{X}) \quad (24)$$

8.6 Reaction rxnY006

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

Reaction equation



Reactant

Table 13: Properties of each reactant.

Id	Name	SBO
p27		

Kinetic Law

Derived unit contains undeclared units

$$v_6 = kdYp27 \cdot [p27] \cdot vol(X) \quad (26)$$

8.7 Reaction rxnY007

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

Reaction equation



Reactant

Table 14: Properties of each reactant.

Id	Name	SBO
Cdk4Y10		

Product

Table 15: Properties of each product.

Id	Name	SBO
Cdk4Y00		

Kinetic Law

Derived unit contains undeclared units

$$v_7 = kdYp27 \cdot [Cdk4Y10] \cdot vol(X) \quad (28)$$

8.8 Reaction rxnY008

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

Reaction equation



Reactant

Table 16: Properties of each reactant.

Id	Name	SBO
Cdk4Y11		

Product

Table 17: Properties of each product.

Id	Name	SBO
Cdk4Y01		

Kinetic Law

Derived unit contains undeclared units

$$v_8 = k_{\text{dYp27}} \cdot [\text{Cdk4Y11}] \cdot \text{vol}(\text{X}) \quad (30)$$

8.9 Reaction rxnY009

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

Reaction equation



Reactant

Table 18: Properties of each reactant.

Id	Name	SBO
Cdk2Y100		

Product

Table 19: Properties of each product.

Id	Name	SBO
Cdk2Y000		

Kinetic Law

Derived unit contains undeclared units

$$v_9 = k_{dYp27} \cdot [Cdk2Y100] \cdot vol(X) \quad (32)$$

8.10 Reaction rxnY010

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

Reaction equation



Reactant

Table 20: Properties of each reactant.

Id	Name	SBO
Cdk2Y101		

Product

Table 21: Properties of each product.

Id	Name	SBO
Cdk2Y001		

Kinetic Law

Derived unit contains undeclared units

$$v_{10} = k_{dYp27} \cdot [Cdk2Y101] \cdot vol(X) \quad (34)$$

8.11 Reaction rxnY011

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

Reaction equation



Reactant

Table 22: Properties of each reactant.

Id	Name	SBO
Cdk2Y102		

Product

Table 23: Properties of each product.

Id	Name	SBO
Cdk2Y002		

Kinetic Law

Derived unit contains undeclared units

$$v_{11} = k_{\text{dYp27}} \cdot [\text{Cdk2Y102}] \cdot \text{vol}(\text{X}) \quad (36)$$

8.12 Reaction rxnY012

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

Reaction equation



Reactant

Table 24: Properties of each reactant.

Id	Name	SBO
Cdk2Y110		

Product

Table 25: Properties of each product.

Id	Name	SBO
Cdk2Y010		

Kinetic Law

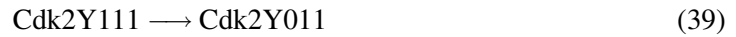
Derived unit contains undeclared units

$$v_{12} = kdYp27 \cdot [Cdk2Y110] \cdot vol(X) \quad (38)$$

8.13 Reaction rxnY013

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

Reaction equation



Reactant

Table 26: Properties of each reactant.

Id	Name	SBO
Cdk2Y111		

Product

Table 27: Properties of each product.

Id	Name	SBO
Cdk2Y011		

Kinetic Law

Derived unit contains undeclared units

$$v_{13} = kd1Yp27 \cdot [Cdk2Y111] \cdot vol(X) \quad (40)$$

8.14 Reaction rxnY014

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

Reaction equation



Reactant

Table 28: Properties of each reactant.

Id	Name	SBO
Cdk2Y112		

Product

Table 29: Properties of each product.

Id	Name	SBO
Cdk2Y012		

Kinetic Law

Derived unit contains undeclared units

$$v_{14} = k_{\text{dYp27}} \cdot [\text{Cdk2Y112}] \cdot \text{vol}(\text{X}) \quad (42)$$

8.15 Reaction rxnY015

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

Reaction equation



Product

Table 30: Properties of each product.

Id	Name	SBO
CyclinE		

Kinetic Law

Derived unit contains undeclared units

$$v_{15} = ksYCyclinE \cdot vol(X) \quad (44)$$

8.16 Reaction rxnY016

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

Reaction equation



Reactant

Table 31: Properties of each reactant.

Id	Name	SBO
CyclinE		

Kinetic Law

Derived unit contains undeclared units

$$v_{16} = kdYCyclinE \cdot [CyclinE] \cdot vol(X) \quad (46)$$

8.17 Reaction rxnY017

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

Reaction equation



Reactant

Table 32: Properties of each reactant.

Id	Name	SBO
Cdk2Y001		

Product

Table 33: Properties of each product.

Id	Name	SBO
Cdk2Y000		

Kinetic Law

Derived unit contains undeclared units

$$v_{17} = \text{kdYCyclinE} \cdot [\text{Cdk2Y001}] \cdot \text{vol}(\text{X}) \quad (48)$$

8.18 Reaction rxnY018

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

Reaction equation



Reactant

Table 34: Properties of each reactant.

Id	Name	SBO
Cdk2Y101		

Product

Table 35: Properties of each product.

Id	Name	SBO
Cdk2Y100		

Kinetic Law

Derived unit contains undeclared units

$$v_{18} = \text{kdYCyclinE} \cdot [\text{Cdk2Y101}] \cdot \text{vol}(\text{X}) \quad (50)$$

8.19 Reaction rxnY019

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

Reaction equation



Reactant

Table 36: Properties of each reactant.

Id	Name	SBO
Cdk2Y011		

Product

Table 37: Properties of each product.

Id	Name	SBO
Cdk2Y010		

Kinetic Law

Derived unit contains undeclared units

$$v_{19} = \text{kdYCyclinE} \cdot [\text{Cdk2Y011}] \cdot \text{vol}(\text{X}) \quad (52)$$

8.20 Reaction rxnY020

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

Reaction equation



Reactant

Table 38: Properties of each reactant.

Id	Name	SBO
Cdk2Y111		

Product

Table 39: Properties of each product.

Id	Name	SBO
Cdk2Y110		

Kinetic Law

Derived unit contains undeclared units

$$v_{20} = kdYCyclinE \cdot [Cdk2Y111] \cdot vol(X) \quad (54)$$

8.21 Reaction rxnY021

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

Reaction equation



Product

Table 40: Properties of each product.

Id	Name	SBO
CyclinA		

Kinetic Law

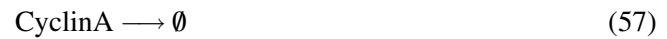
Derived unit contains undeclared units

$$v_{21} = ksYCyclinA \cdot vol(X) \quad (56)$$

8.22 Reaction rxnY022

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

Reaction equation



Reactant

Table 41: Properties of each reactant.

Id	Name	SBO
CyclinA		

Kinetic Law

Derived unit contains undeclared units

$$v_{22} = kdYCyclinA \cdot [CyclinA] \cdot vol(X) \quad (58)$$

8.23 Reaction rxnY023

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

Reaction equation



Reactant

Table 42: Properties of each reactant.

Id	Name	SBO
Cdk1Y01		

Product

Table 43: Properties of each product.

Id	Name	SBO
Cdk1Y00		

Kinetic Law

Derived unit contains undeclared units

$$v_{23} = kdYCyclinA \cdot [Cdk1Y01] \cdot vol(X) \quad (60)$$

8.24 Reaction rxnY024

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

Reaction equation



Reactant

Table 44: Properties of each reactant.

Id	Name	SBO
Cdk1Y11		

Product

Table 45: Properties of each product.

Id	Name	SBO
Cdk1Y10		

Kinetic Law

Derived unit contains undeclared units

$$v_{24} = \text{kdYCyclinA} \cdot [\text{Cdk1Y11}] \cdot \text{vol}(\text{X}) \quad (62)$$

8.25 Reaction rxnY025

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

Reaction equation



Reactant

Table 46: Properties of each reactant.

Id	Name	SBO
Cdk2Y002		

Product

Table 47: Properties of each product.

Id	Name	SBO
Cdk2Y000		

Kinetic Law

Derived unit contains undeclared units

$$v_{25} = kdYCyclinA \cdot [Cdk2Y002] \cdot vol(X) \quad (64)$$

8.26 Reaction rxnY026

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

Reaction equation



Reactant

Table 48: Properties of each reactant.

Id	Name	SBO
Cdk2Y102		

Product

Table 49: Properties of each product.

Id	Name	SBO
Cdk2Y100		

Kinetic Law

Derived unit contains undeclared units

$$v_{26} = kdYCyclinA \cdot [Cdk2Y102] \cdot vol(X) \quad (66)$$

8.27 Reaction rxnY027

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

Reaction equation



Reactant

Table 50: Properties of each reactant.

Id	Name	SBO
Cdk2Y012		

Product

Table 51: Properties of each product.

Id	Name	SBO
Cdk2Y010		

Kinetic Law

Derived unit contains undeclared units

$$v_{27} = \text{kdYCyclinA} \cdot [\text{Cdk2Y012}] \cdot \text{vol}(\text{X}) \quad (68)$$

8.28 Reaction rxnY028

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

Reaction equation



Reactant

Table 52: Properties of each reactant.

Id	Name	SBO
Cdk2Y112		

Product

Table 53: Properties of each product.

Id	Name	SBO
Cdk2Y110		

Kinetic Law

Derived unit contains undeclared units

$$v_{28} = kdYCyclinA \cdot [Cdk2Y112] \cdot vol(X) \quad (70)$$

8.29 Reaction rxnY029

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

Reaction equation



Product

Table 54: Properties of each product.

Id	Name	SBO
E2F		

Kinetic Law

Derived unit contains undeclared units

$$v_{29} = ksYE2F \cdot vol(X) \quad (72)$$

8.30 Reaction rxnY030

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

Reaction equation



Reactant

Table 55: Properties of each reactant.

Id	Name	SBO
E2F		

Kinetic Law

Derived unit contains undeclared units

$$v_{30} = kd0YE2F \cdot [E2F] \cdot vol(X) \quad (74)$$

8.31 Reaction rxnY031

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

Reaction equation**Reactant**

Table 56: Properties of each reactant.

Id	Name	SBO
pRbY01		

Product

Table 57: Properties of each product.

Id	Name	SBO
pRbY00		

Kinetic Law

Derived unit contains undeclared units

$$v_{31} = kdYE2F \cdot [pRbY01] \cdot vol(X) \quad (76)$$

8.32 Reaction rxnY032

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

Reaction equation



Reactant

Table 58: Properties of each reactant.

Id	Name	SBO
pRbY11		

Product

Table 59: Properties of each product.

Id	Name	SBO
pRbY10		

Kinetic Law

Derived unit contains undeclared units

$$v_{32} = k_{\text{dYE2F}} \cdot [\text{pRbY11}] \cdot \text{vol}(\text{X}) \quad (78)$$

8.33 Reaction rxnY033

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

Reaction equation



Reactant

Table 60: Properties of each reactant.

Id	Name	SBO
pRbY21		

Product

Table 61: Properties of each product.

Id	Name	SBO
pRbY20		

Kinetic Law

Derived unit contains undeclared units

$$v_{33} = k_{dYE2F} \cdot [pRbY21] \cdot vol(X) \tag{80}$$

8.34 Reaction rxnY034

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

Reaction equation



Product

Table 62: Properties of each product.

Id	Name	SBO
Emi1		

Kinetic Law

Derived unit contains undeclared units

$$v_{34} = k_{sYEmi1} \cdot vol(X) \tag{82}$$

8.35 Reaction rxnY035

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

Reaction equation



Reactant

Table 63: Properties of each reactant.

Id	Name	SBO
Emi1		

Kinetic Law

Derived unit contains undeclared units

$$v_{35} = kdYEmi1 \cdot [Emi1] \cdot vol(X) \quad (84)$$

8.36 Reaction rxnY036

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

Reaction equation



Reactant

Table 64: Properties of each reactant.

Id	Name	SBO
APCCYEmi1		

Product

Table 65: Properties of each product.

Id	Name	SBO
APCC		

Kinetic Law

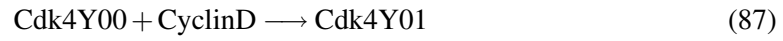
Derived unit contains undeclared units

$$v_{36} = kdYEmi1 \cdot [APCCYEmi1] \cdot vol(X) \quad (86)$$

8.37 Reaction rxnY037

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

Reaction equation



Reactants

Table 66: Properties of each reactant.

Id	Name	SBO
Cdk4Y00		
CyclinD		

Product

Table 67: Properties of each product.

Id	Name	SBO
Cdk4Y01		

Kinetic Law

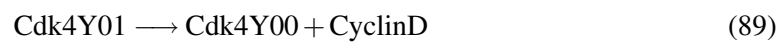
Derived unit contains undeclared units

$$v_{37} = \text{kbYCyclinDYCdk4} \cdot [\text{Cdk4Y00}] \cdot [\text{CyclinD}] \cdot \text{vol}(\text{X}) \quad (88)$$

8.38 Reaction rxnY038

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

Reaction equation



Reactant

Table 68: Properties of each reactant.

Id	Name	SBO
Cdk4Y01		

Products

Table 69: Properties of each product.

Id	Name	SBO
Cdk4Y00		
CyclinD		

Kinetic Law

Derived unit contains undeclared units

$$v_{38} = k_{uY} \text{CyclinD} Y Y \text{Cdk4} \cdot [\text{Cdk4Y01}] \cdot \text{vol}(\text{X}) \quad (90)$$

8.39 Reaction rxnY039

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

Reaction equation



Reactants

Table 70: Properties of each reactant.

Id	Name	SBO
Cdk4Y10		
CyclinD		

Product

Table 71: Properties of each product.

Id	Name	SBO
Cdk4Y11		

Kinetic Law

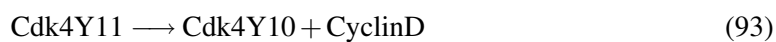
Derived unit contains undeclared units

$$v_{39} = k_{bY} \text{CyclinD} Y Y \text{Cdk4} \cdot [\text{Cdk4Y10}] \cdot [\text{CyclinD}] \cdot \text{vol}(\text{X}) \quad (92)$$

8.40 Reaction rxnY040

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

Reaction equation



Reactant

Table 72: Properties of each reactant.

Id	Name	SBO
Cdk4Y11		

Products

Table 73: Properties of each product.

Id	Name	SBO
Cdk4Y10		
CyclinD		

Kinetic Law

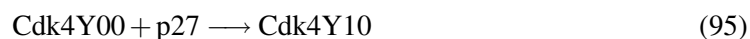
Derived unit contains undeclared units

$$v_{40} = k_{uY\text{CyclinD}Y\text{Cdk4}} \cdot [\text{Cdk4Y11}] \cdot \text{vol}(\text{X}) \quad (94)$$

8.41 Reaction rxnY041

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

Reaction equation



Reactants

Table 74: Properties of each reactant.

Id	Name	SBO
Cdk4Y00		

Id	Name	SBO
p27		

Product

Table 75: Properties of each product.

Id	Name	SBO
Cdk4Y10		

Kinetic Law

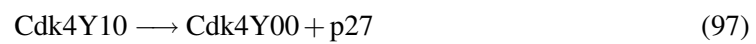
Derived unit contains undeclared units

$$v_{41} = kbYp27YYCdk4 \cdot [Cdk4Y00] \cdot [p27] \cdot vol(X) \quad (96)$$

8.42 Reaction rxnY042

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

Reaction equation



Reactant

Table 76: Properties of each reactant.

Id	Name	SBO
Cdk4Y10		

Products

Table 77: Properties of each product.

Id	Name	SBO
Cdk4Y00		
p27		

Kinetic Law

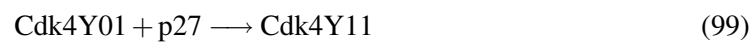
Derived unit contains undeclared units

$$v_{42} = k_{uYp27YYCdk4} \cdot [Cdk4Y10] \cdot vol(X) \quad (98)$$

8.43 Reaction rxnY043

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

Reaction equation



Reactants

Table 78: Properties of each reactant.

Id	Name	SBO
Cdk4Y01		
p27		

Product

Table 79: Properties of each product.

Id	Name	SBO
Cdk4Y11		

Kinetic Law

Derived unit contains undeclared units

$$v_{43} = k_{bYp27YYCdk4} \cdot [Cdk4Y01] \cdot [p27] \cdot vol(X) \quad (100)$$

8.44 Reaction rxnY044

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

Reaction equation



Reactant

Table 80: Properties of each reactant.

Id	Name	SBO
Cdk4Y11		

Products

Table 81: Properties of each product.

Id	Name	SBO
Cdk4Y01		
p27		

Kinetic Law

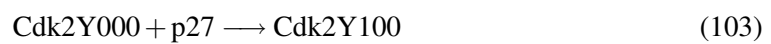
Derived unit contains undeclared units

$$v_{44} = k_{uYp27YYCdk4} \cdot [Cdk4Y11] \cdot vol(X) \quad (102)$$

8.45 Reaction rxnY045

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

Reaction equation



Reactants

Table 82: Properties of each reactant.

Id	Name	SBO
Cdk2Y000		
p27		

Product

Table 83: Properties of each product.

Id	Name	SBO
Cdk2Y100		

Kinetic Law

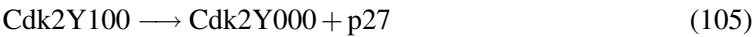
Derived unit contains undeclared units

$$v_{45} = kbYp27YYCdk2 \cdot [Cdk2Y000] \cdot [p27] \cdot vol(X) \tag{104}$$

8.46 Reaction rxnY046

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

Reaction equation



Reactant

Table 84: Properties of each reactant.

Id	Name	SBO
Cdk2Y100		

Products

Table 85: Properties of each product.

Id	Name	SBO
Cdk2Y000		
p27		

Kinetic Law

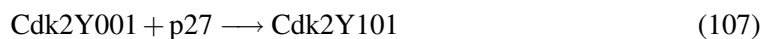
Derived unit contains undeclared units

$$v_{46} = kuYp27YYCdk2 \cdot [Cdk2Y100] \cdot vol(X) \tag{106}$$

8.47 Reaction rxnY047

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

Reaction equation



Reactants

Table 86: Properties of each reactant.

Id	Name	SBO
Cdk2Y001		
p27		

Product

Table 87: Properties of each product.

Id	Name	SBO
Cdk2Y101		

Kinetic Law

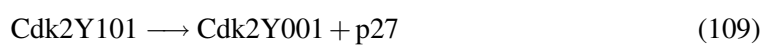
Derived unit contains undeclared units

$$v_{47} = \text{kbYp27YYCdk2} \cdot [\text{Cdk2Y001}] \cdot [\text{p27}] \cdot \text{vol}(\text{X}) \quad (108)$$

8.48 Reaction rxnY048

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

Reaction equation



Reactant

Table 88: Properties of each reactant.

Id	Name	SBO
Cdk2Y101		

Products

Table 89: Properties of each product.

Id	Name	SBO
Cdk2Y001		
p27		

Kinetic Law

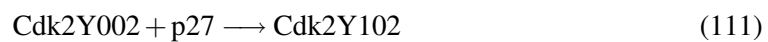
Derived unit contains undeclared units

$$v_{48} = k_{uYp27YYCdk2} \cdot [Cdk2Y101] \cdot vol(X) \quad (110)$$

8.49 Reaction rxnY049

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

Reaction equation



Reactants

Table 90: Properties of each reactant.

Id	Name	SBO
Cdk2Y002		
p27		

Product

Table 91: Properties of each product.

Id	Name	SBO
Cdk2Y102		

Kinetic Law

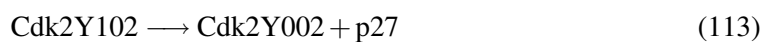
Derived unit contains undeclared units

$$v_{49} = k_{bYp27YYCdk2} \cdot [Cdk2Y002] \cdot [p27] \cdot vol(X) \quad (112)$$

8.50 Reaction rxnY050

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

Reaction equation



Reactant

Table 92: Properties of each reactant.

Id	Name	SBO
Cdk2Y102		

Products

Table 93: Properties of each product.

Id	Name	SBO
Cdk2Y002		
p27		

Kinetic Law

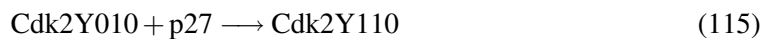
Derived unit contains undeclared units

$$v_{50} = k_{\text{uYp27YYCdk2}} \cdot [\text{Cdk2Y102}] \cdot \text{vol}(\text{X}) \quad (114)$$

8.51 Reaction rxnY051

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

Reaction equation



Reactants

Table 94: Properties of each reactant.

Id	Name	SBO
Cdk2Y010		

Id	Name	SBO
p27		

Product

Table 95: Properties of each product.

Id	Name	SBO
Cdk2Y110		

Kinetic Law

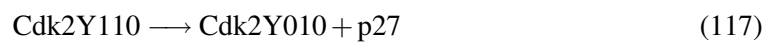
Derived unit contains undeclared units

$$v_{51} = kbYp27YYCdk2 \cdot [Cdk2Y010] \cdot [p27] \cdot vol(X) \quad (116)$$

8.52 Reaction rxnY052

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

Reaction equation



Reactant

Table 96: Properties of each reactant.

Id	Name	SBO
Cdk2Y110		

Products

Table 97: Properties of each product.

Id	Name	SBO
Cdk2Y010		
p27		

Kinetic Law

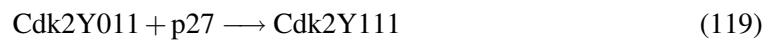
Derived unit contains undeclared units

$$v_{52} = k_{uYp27YYCdk2} \cdot [Cdk2Y110] \cdot vol(X) \quad (118)$$

8.53 Reaction rxnY053

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

Reaction equation



Reactants

Table 98: Properties of each reactant.

Id	Name	SBO
Cdk2Y011		
p27		

Product

Table 99: Properties of each product.

Id	Name	SBO
Cdk2Y111		

Kinetic Law

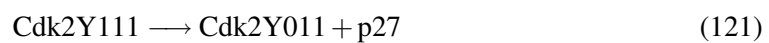
Derived unit contains undeclared units

$$v_{53} = k_{bYp27YYCdk2} \cdot [Cdk2Y011] \cdot [p27] \cdot vol(X) \quad (120)$$

8.54 Reaction rxnY054

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

Reaction equation



Reactant

Table 100: Properties of each reactant.

Id	Name	SBO
Cdk2Y111		

Products

Table 101: Properties of each product.

Id	Name	SBO
Cdk2Y011		
p27		

Kinetic Law

Derived unit contains undeclared units

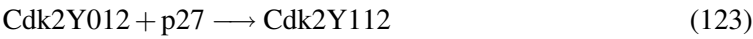
$$v_{54} = k_{uYp27YYCdk2} \cdot [Cdk2Y111] \cdot vol(X)$$

(122)

8.55 Reaction rxnY055

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

Reaction equation



Reactants

Table 102: Properties of each reactant.

Id	Name	SBO
Cdk2Y012		
p27		

Product

Table 103: Properties of each product.

Id	Name	SBO
Cdk2Y112		

Kinetic Law

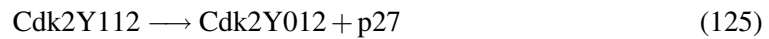
Derived unit contains undeclared units

$$v_{55} = kbYp27YYCdk2 \cdot [Cdk2Y012] \cdot [p27] \cdot vol(X) \quad (124)$$

8.56 Reaction rxnY056

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

Reaction equation



Reactant

Table 104: Properties of each reactant.

Id	Name	SBO
Cdk2Y112		

Products

Table 105: Properties of each product.

Id	Name	SBO
Cdk2Y012		
p27		

Kinetic Law

Derived unit contains undeclared units

$$v_{56} = kuYp27YYCdk2 \cdot [Cdk2Y112] \cdot vol(X) \quad (126)$$

8.57 Reaction rxnY057

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

Reaction equation



Reactant

Table 106: Properties of each reactant.

Id	Name	SBO
Cdk2Y000		

Product

Table 107: Properties of each product.

Id	Name	SBO
Cdk2Y010		

Kinetic Law

Derived unit contains undeclared units

$$v_{57} = k_{Yact} \cdot [Cdk2Y000] \cdot vol(X)$$

(128)

8.58 Reaction rxnY058

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

Reaction equation



Reactant

Table 108: Properties of each reactant.

Id	Name	SBO
Cdk2Y100		

Product

Table 109: Properties of each product.

Id	Name	SBO
Cdk2Y110		

Kinetic Law

Derived unit contains undeclared units

$$v_{58} = k_{Yact} \cdot [Cdk2Y100] \cdot vol(X) \quad (130)$$

8.59 Reaction rxnY059

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

Reaction equation



Reactant

Table 110: Properties of each reactant.

Id	Name	SBO
Cdk2Y001		

Product

Table 111: Properties of each product.

Id	Name	SBO
Cdk2Y011		

Kinetic Law

Derived unit contains undeclared units

$$v_{59} = k_{Yact} \cdot [Cdk2Y001] \cdot vol(X) \quad (132)$$

8.60 Reaction rxnY060

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

Reaction equation



Reactant

Table 112: Properties of each reactant.

Id	Name	SBO
Cdk2Y101		

Product

Table 113: Properties of each product.

Id	Name	SBO
Cdk2Y111		

Kinetic Law

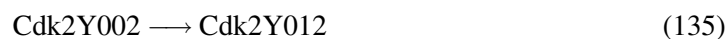
Derived unit contains undeclared units

$$v_{60} = kY_{\text{act}} \cdot [\text{Cdk2Y101}] \cdot \text{vol}(\text{X}) \quad (134)$$

8.61 Reaction rxnY061

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

Reaction equation



Reactant

Table 114: Properties of each reactant.

Id	Name	SBO
Cdk2Y002		

Product

Table 115: Properties of each product.

Id	Name	SBO
Cdk2Y012		

Kinetic Law

Derived unit contains undeclared units

$$v_{61} = k_{Yact} \cdot [Cdk2Y002] \cdot vol(X) \quad (136)$$

8.62 Reaction rxnY062

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

Reaction equation



Reactant

Table 116: Properties of each reactant.

Id	Name	SBO
Cdk2Y102		

Product

Table 117: Properties of each product.

Id	Name	SBO
Cdk2Y112		

Kinetic Law

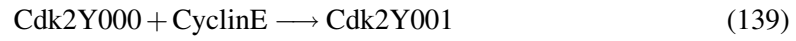
Derived unit contains undeclared units

$$v_{62} = k_{Yact} \cdot [Cdk2Y102] \cdot vol(X) \quad (138)$$

8.63 Reaction rxnY063

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

Reaction equation



Reactants

Table 118: Properties of each reactant.

Id	Name	SBO
Cdk2Y000		
CyclinE		

Product

Table 119: Properties of each product.

Id	Name	SBO
Cdk2Y001		

Kinetic Law

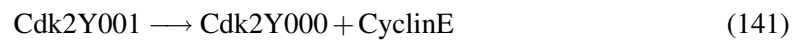
Derived unit contains undeclared units

$$v_{63} = k_{bY} \text{CyclinE} Y \text{Cdk2} \cdot [\text{Cdk2Y000}] \cdot [\text{CyclinE}] \cdot \text{vol}(\text{X}) \quad (140)$$

8.64 Reaction rxnY064

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

Reaction equation



Reactant

Table 120: Properties of each reactant.

Id	Name	SBO
Cdk2Y001		

Products

Table 121: Properties of each product.

Id	Name	SBO
Cdk2Y000		
CyclinE		

Kinetic Law

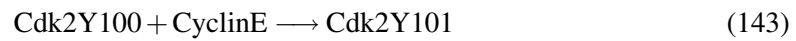
Derived unit contains undeclared units

$$v_{64} = k_{uY} \text{CyclinE} Y \text{Cdk2} \cdot [\text{Cdk2Y001}] \cdot \text{vol}(\text{X}) \quad (142)$$

8.65 Reaction rxnY065

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

Reaction equation



Reactants

Table 122: Properties of each reactant.

Id	Name	SBO
Cdk2Y100		
CyclinE		

Product

Table 123: Properties of each product.

Id	Name	SBO
Cdk2Y101		

Kinetic Law

Derived unit contains undeclared units

$$v_{65} = k_{bY} \text{CyclinE} Y \text{Cdk2} \cdot [\text{Cdk2Y100}] \cdot [\text{CyclinE}] \cdot \text{vol}(\text{X}) \quad (144)$$

8.66 Reaction rxnY066

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

Reaction equation



Reactant

Table 124: Properties of each reactant.

Id	Name	SBO
Cdk2Y101		

Products

Table 125: Properties of each product.

Id	Name	SBO
Cdk2Y100		
CyclinE		

Kinetic Law

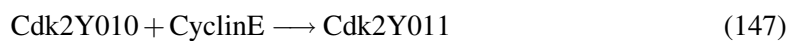
Derived unit contains undeclared units

$$v_{66} = k_{uY\text{CyclinE}Y\text{Cdk2}} \cdot [\text{Cdk2Y101}] \cdot \text{vol}(X) \quad (146)$$

8.67 Reaction rxnY067

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

Reaction equation



Reactants

Table 126: Properties of each reactant.

Id	Name	SBO
Cdk2Y010		

Id	Name	SBO
	CyclinE	

Product

Table 127: Properties of each product.

Id	Name	SBO
	Cdk2Y011	

Kinetic Law

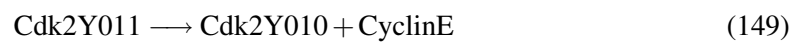
Derived unit contains undeclared units

$$v_{67} = kbYCyclinEYYCdk2 \cdot [Cdk2Y010] \cdot [CyclinE] \cdot vol(X) \quad (148)$$

8.68 Reaction rxnY068

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

Reaction equation



Reactant

Table 128: Properties of each reactant.

Id	Name	SBO
	Cdk2Y011	

Products

Table 129: Properties of each product.

Id	Name	SBO
	Cdk2Y010	
	CyclinE	

Kinetic Law

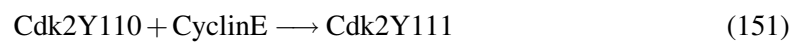
Derived unit contains undeclared units

$$v_{68} = k_{uY} \text{CyclinE} Y \text{Cdk2} \cdot [\text{Cdk2Y011}] \cdot \text{vol}(\text{X}) \quad (150)$$

8.69 Reaction rxnY069

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

Reaction equation



Reactants

Table 130: Properties of each reactant.

Id	Name	SBO
Cdk2Y110		
CyclinE		

Product

Table 131: Properties of each product.

Id	Name	SBO
Cdk2Y111		

Kinetic Law

Derived unit contains undeclared units

$$v_{69} = k_{bY} \text{CyclinE} Y \text{Cdk2} \cdot [\text{Cdk2Y110}] \cdot [\text{CyclinE}] \cdot \text{vol}(\text{X}) \quad (152)$$

8.70 Reaction rxnY070

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

Reaction equation



Reactant

Table 132: Properties of each reactant.

Id	Name	SBO
Cdk2Y111		

Products

Table 133: Properties of each product.

Id	Name	SBO
Cdk2Y110		
CyclinE		

Kinetic Law

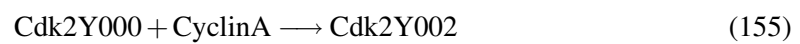
Derived unit contains undeclared units

$$v_{70} = k_{uY} \text{CyclinE} Y \text{Cdk2} \cdot [\text{Cdk2Y111}] \cdot \text{vol}(\text{X}) \quad (154)$$

8.71 Reaction rxnY071

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

Reaction equation



Reactants

Table 134: Properties of each reactant.

Id	Name	SBO
Cdk2Y000		
CyclinA		

Product

Table 135: Properties of each product.

Id	Name	SBO
Cdk2Y002		

Kinetic Law

Derived unit contains undeclared units

$$v_{71} = kbYCyclinAYYCdk2 \cdot [Cdk2Y000] \cdot [CyclinA] \cdot vol(X) \quad (156)$$

8.72 Reaction rxnY072

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

Reaction equation



Reactant

Table 136: Properties of each reactant.

Id	Name	SBO
Cdk2Y002		

Products

Table 137: Properties of each product.

Id	Name	SBO
Cdk2Y000		
CyclinA		

Kinetic Law

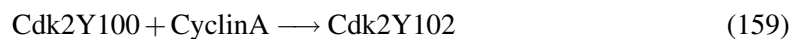
Derived unit contains undeclared units

$$v_{72} = kuYCyclinAYYCdk2 \cdot [Cdk2Y002] \cdot vol(X) \quad (158)$$

8.73 Reaction rxnY073

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

Reaction equation



Reactants

Table 138: Properties of each reactant.

Id	Name	SBO
Cdk2Y100		
CyclinA		

Product

Table 139: Properties of each product.

Id	Name	SBO
Cdk2Y102		

Kinetic Law

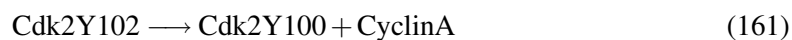
Derived unit contains undeclared units

$$v_{73} = k_{bY\text{CyclinA}Y\text{Cdk2}} \cdot [\text{Cdk2Y100}] \cdot [\text{CyclinA}] \cdot \text{vol}(\text{X}) \quad (160)$$

8.74 Reaction rxnY074

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

Reaction equation



Reactant

Table 140: Properties of each reactant.

Id	Name	SBO
Cdk2Y102		

Products

Table 141: Properties of each product.

Id	Name	SBO
Cdk2Y100		
CyclinA		

Kinetic Law

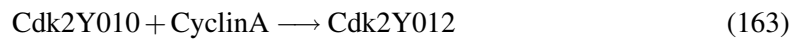
Derived unit contains undeclared units

$$v_{74} = \text{vol}(X) \cdot \text{kuYCyclinA} \cdot \text{Cdk2} \cdot [\text{Cdk2Y102}] \quad (162)$$

8.75 Reaction rxnY075

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

Reaction equation



Reactants

Table 142: Properties of each reactant.

Id	Name	SBO
Cdk2Y010		
CyclinA		

Product

Table 143: Properties of each product.

Id	Name	SBO
Cdk2Y012		

Kinetic Law

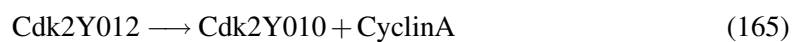
Derived unit contains undeclared units

$$v_{75} = \text{vol}(X) \cdot \text{kbYCyclinA} \cdot \text{Cdk2} \cdot [\text{Cdk2Y010}] \cdot [\text{CyclinA}] \quad (164)$$

8.76 Reaction rxnY076

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

Reaction equation



Reactant

Table 144: Properties of each reactant.

Id	Name	SBO
Cdk2Y012		

Products

Table 145: Properties of each product.

Id	Name	SBO
Cdk2Y010		
CyclinA		

Kinetic Law

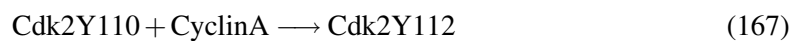
Derived unit contains undeclared units

$$v_{76} = \text{vol}(\text{X}) \cdot \text{kuYCyclinA} \cdot \text{Cdk2} \cdot [\text{Cdk2Y012}] \quad (166)$$

8.77 Reaction rxnY077

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

Reaction equation



Reactants

Table 146: Properties of each reactant.

Id	Name	SBO
Cdk2Y110		

Id	Name	SBO
	CyclinA	

Product

Table 147: Properties of each product.

Id	Name	SBO
	Cdk2Y112	

Kinetic Law

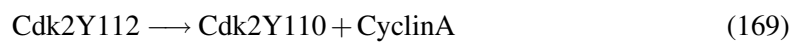
Derived unit contains undeclared units

$$v_{77} = \text{vol}(X) \cdot \text{kbYCyclinA} \cdot [\text{Cdk2Y110}] \cdot [\text{CyclinA}] \quad (168)$$

8.78 Reaction rxnY078

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

Reaction equation



Reactant

Table 148: Properties of each reactant.

Id	Name	SBO
	Cdk2Y112	

Products

Table 149: Properties of each product.

Id	Name	SBO
	Cdk2Y110	
	CyclinA	

Kinetic Law

Derived unit contains undeclared units

$$v_{78} = \text{vol}(X) \cdot \text{kuYCyclinAYYCdk2} \cdot [\text{Cdk2Y112}] \quad (170)$$

8.79 Reaction rxnY079

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

Reaction equation



Reactant

Table 150: Properties of each reactant.

Id	Name	SBO
Cdk1Y00		

Product

Table 151: Properties of each product.

Id	Name	SBO
Cdk1Y10		

Kinetic Law

Derived unit contains undeclared units

$$v_{79} = \text{vol}(X) \cdot \text{kYact} \cdot [\text{Cdk1Y00}] \quad (172)$$

8.80 Reaction rxnY080

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

Reaction equation



Reactant

Table 152: Properties of each reactant.

Id	Name	SBO
Cdk1Y01		

Product

Table 153: Properties of each product.

Id	Name	SBO
Cdk1Y11		

Kinetic Law

Derived unit contains undeclared units

$$v_{80} = \text{vol}(X) \cdot k_{\text{Yact}} \cdot [\text{Cdk1Y01}] \quad (174)$$

8.81 Reaction rxnY081

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

Reaction equation



Reactants

Table 154: Properties of each reactant.

Id	Name	SBO
Cdk1Y00		
CyclinA		

Product

Table 155: Properties of each product.

Id	Name	SBO
Cdk1Y01		

Kinetic Law

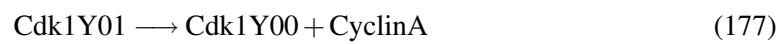
Derived unit contains undeclared units

$$v_{81} = \text{vol}(X) \cdot k_{bY\text{CyclinA}YY\text{Cdk1}} \cdot [\text{Cdk1Y00}] \cdot [\text{CyclinA}] \quad (176)$$

8.82 Reaction rxnY082

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

Reaction equation



Reactant

Table 156: Properties of each reactant.

Id	Name	SBO
Cdk1Y01		

Products

Table 157: Properties of each product.

Id	Name	SBO
Cdk1Y00		
CyclinA		

Kinetic Law

Derived unit contains undeclared units

$$v_{82} = \text{vol}(X) \cdot k_{uY\text{CyclinA}YY\text{Cdk1}} \cdot [\text{Cdk1Y01}] \quad (178)$$

8.83 Reaction rxnY083

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

Reaction equation



Reactants

Table 158: Properties of each reactant.

Id	Name	SBO
Cdk1Y10		
CyclinA		

Product

Table 159: Properties of each product.

Id	Name	SBO
Cdk1Y11		

Kinetic Law

Derived unit contains undeclared units

$$v_{83} = \text{vol}(X) \cdot k_{bY\text{CyclinA}YY\text{Cdk1}} \cdot [\text{Cdk1Y10}] \cdot [\text{CyclinA}] \quad (180)$$

8.84 Reaction rxnY084

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

Reaction equation



Reactant

Table 160: Properties of each reactant.

Id	Name	SBO
Cdk1Y11		

Products

Table 161: Properties of each product.

Id	Name	SBO
Cdk1Y10		
CyclinA		

Kinetic Law

Derived unit contains undeclared units

$$v_{84} = \text{vol}(X) \cdot \text{kuYCyclinAYYCdk1} \cdot [\text{Cdk1Y11}] \quad (182)$$

8.85 Reaction rxnY085

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

Reaction equation



Reactants

Table 162: Properties of each reactant.

Id	Name	SBO
pRbY00		
Cdk4Y01		

Product

Table 163: Properties of each product.

Id	Name	SBO
Cdk4Y01YpRbY00YpRbY10YInt		

Kinetic Law

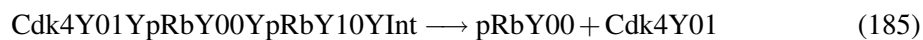
Derived unit contains undeclared units

$$v_{85} = \text{vol}(X) \cdot \text{kbYD4YYpRb} \cdot [\text{pRbY00}] \cdot [\text{Cdk4Y01}] \quad (184)$$

8.86 Reaction rxnY086

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

Reaction equation



Reactant

Table 164: Properties of each reactant.

Id	Name	SBO
Cdk4Y01YpRbY00YpRbY10YInt		

Products

Table 165: Properties of each product.

Id	Name	SBO
pRbY00		
Cdk4Y01		

Kinetic Law

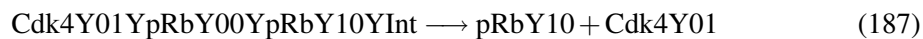
Derived unit contains undeclared units

$$v_{86} = \text{vol}(X) \cdot \text{kuYD4YYpRb} \cdot [\text{Cdk4Y01YpRbY00YpRbY10YInt}] \quad (186)$$

8.87 Reaction rxnY087

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

Reaction equation



Reactant

Table 166: Properties of each reactant.

Id	Name	SBO
Cdk4Y01YpRbY00YpRbY10YInt		

Products

Table 167: Properties of each product.

Id	Name	SBO
pRbY10		
Cdk4Y01		

Kinetic Law

Derived unit contains undeclared units

$$v_{87} = \text{vol}(X) \cdot \text{kupYD4YYpRb} \cdot [\text{Cdk4Y01YpRbY00YpRbY10YInt}] \quad (188)$$

8.88 Reaction rxnY088

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

Reaction equation



Reactants

Table 168: Properties of each reactant.

Id	Name	SBO
pRbY01		
Cdk4Y01		

Product

Table 169: Properties of each product.

Id	Name	SBO
Cdk4Y01YpRbY01YpRbY11YInt		

Kinetic Law

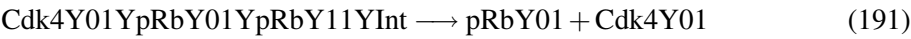
Derived unit contains undeclared units

$$v_{88} = \text{vol}(X) \cdot \text{kbYD4YYpRb} \cdot [\text{pRbY01}] \cdot [\text{Cdk4Y01}] \quad (190)$$

8.89 Reaction rxnY089

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

Reaction equation



Reactant

Table 170: Properties of each reactant.

Id	Name	SBO
Cdk4Y01YpRbY01YpRbY11YInt		

Products

Table 171: Properties of each product.

Id	Name	SBO
pRbY01		
Cdk4Y01		

Kinetic Law

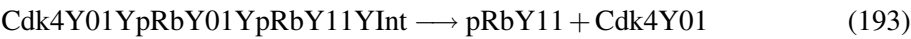
Derived unit contains undeclared units

v89 = vol(X) · kuYD4YYpRb · [Cdk4Y01YpRbY01YpRbY11YInt] (192)

8.90 Reaction rxnY090

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

Reaction equation



Reactant

Table 172: Properties of each reactant.

Id	Name	SBO
Cdk4Y01YpRbY01YpRbY11YInt		

Products

Table 173: Properties of each product.

Id	Name	SBO
pRbY11		
Cdk4Y01		

Kinetic Law

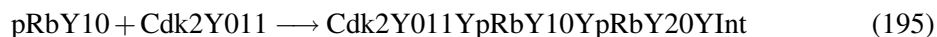
Derived unit contains undeclared units

$$v_{90} = \text{vol}(X) \cdot \text{kupYD4YYpRb} \cdot [\text{Cdk4Y01YpRbY01YpRbY11YInt}] \quad (194)$$

8.91 Reaction rxnY091

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

Reaction equation



Reactants

Table 174: Properties of each reactant.

Id	Name	SBO
pRbY10		
Cdk2Y011		

Product

Table 175: Properties of each product.

Id	Name	SBO
Cdk2Y011YpRbY10YpRbY20YInt		

Kinetic Law

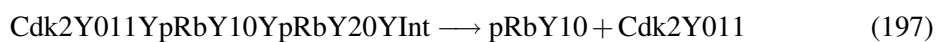
Derived unit contains undeclared units

$$v_{91} = \text{vol}(X) \cdot \text{kbYE2YYpRb} \cdot [\text{pRbY10}] \cdot [\text{Cdk2Y011}] \quad (196)$$

8.92 Reaction rxnY092

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

Reaction equation



Reactant

Table 176: Properties of each reactant.

Id	Name	SBO
Cdk2Y011YpRbY10YpRbY20YInt		

Products

Table 177: Properties of each product.

Id	Name	SBO
pRbY10		
Cdk2Y011		

Kinetic Law

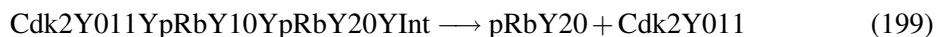
Derived unit contains undeclared units

$$v_{92} = \text{vol}(\text{X}) \cdot \text{kuYE2YYpRb} \cdot [\text{Cdk2Y011YpRbY10YpRbY20YInt}] \quad (198)$$

8.93 Reaction rxnY093

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

Reaction equation



Reactant

Table 178: Properties of each reactant.

Id	Name	SBO
Cdk2Y011YpRbY10YpRbY20YInt		

Products

Table 179: Properties of each product.

Id	Name	SBO
pRbY20		
Cdk2Y011		

Kinetic Law

Derived unit contains undeclared units

$$v_{93} = \text{vol}(X) \cdot \text{kupYE2YYpRb} \cdot [\text{Cdk2Y011YpRbY10YpRbY20YInt}] \quad (200)$$

8.94 Reaction rxnY094

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

Reaction equation



Reactants

Table 180: Properties of each reactant.

Id	Name	SBO
pRbY11		
Cdk2Y011		

Product

Table 181: Properties of each product.

Id	Name	SBO
Cdk2Y011YpRbY11YpRbY21YInt		

Kinetic Law

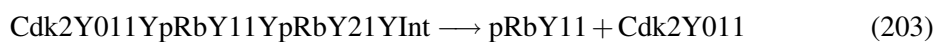
Derived unit contains undeclared units

$$v_{94} = \text{vol}(X) \cdot \text{kbYE2YYpRb} \cdot [\text{pRbY11}] \cdot [\text{Cdk2Y011}] \quad (202)$$

8.95 Reaction rxnY095

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

Reaction equation



Reactant

Table 182: Properties of each reactant.

Id	Name	SBO
Cdk2Y011YpRbY11YpRbY21YInt		

Products

Table 183: Properties of each product.

Id	Name	SBO
pRbY11		
Cdk2Y011		

Kinetic Law

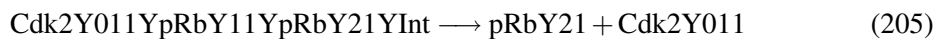
Derived unit contains undeclared units

$$v_{95} = \text{vol}(\text{X}) \cdot k_{\text{uYE2YYpRb}} \cdot [\text{Cdk2Y011YpRbY11YpRbY21YInt}] \quad (204)$$

8.96 Reaction rxnY096

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

Reaction equation



Reactant

Table 184: Properties of each reactant.

Id	Name	SBO
Cdk2Y011YpRbY11YpRbY21YInt		

Products

Table 185: Properties of each product.

Id	Name	SBO
pRbY21		
Cdk2Y011		

Kinetic Law

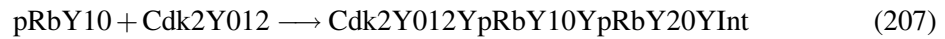
Derived unit contains undeclared units

$$v_{96} = \text{vol}(X) \cdot \text{kupYE2YYpRb} \cdot [\text{Cdk2Y011YpRbY11YpRbY21YInt}] \quad (206)$$

8.97 Reaction rxnY097

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

Reaction equation



Reactants

Table 186: Properties of each reactant.

Id	Name	SBO
pRbY10		
Cdk2Y012		

Product

Table 187: Properties of each product.

Id	Name	SBO
Cdk2Y012YpRbY10YpRbY20YInt		

Kinetic Law

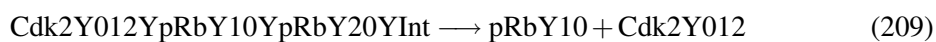
Derived unit contains undeclared units

$$v_{97} = \text{vol}(X) \cdot \text{kbYA2YYpRb} \cdot [\text{pRbY10}] \cdot [\text{Cdk2Y012}] \quad (208)$$

8.98 Reaction rxnY098

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

Reaction equation



Reactant

Table 188: Properties of each reactant.

Id	Name	SBO
Cdk2Y012YpRbY10YpRbY20YInt		

Products

Table 189: Properties of each product.

Id	Name	SBO
pRbY10		
Cdk2Y012		

Kinetic Law

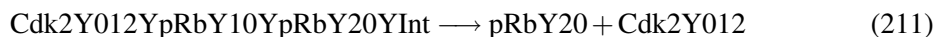
Derived unit contains undeclared units

$$v_{98} = \text{vol}(\text{X}) \cdot k_{\text{uYA2YYpRb}} \cdot [\text{Cdk2Y012YpRbY10YpRbY20YInt}] \quad (210)$$

8.99 Reaction rxnY099

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

Reaction equation



Reactant

Table 190: Properties of each reactant.

Id	Name	SBO
Cdk2Y012YpRbY10YpRbY20YInt		

Products

Table 191: Properties of each product.

Id	Name	SBO
pRbY20		
Cdk2Y012		

Kinetic Law

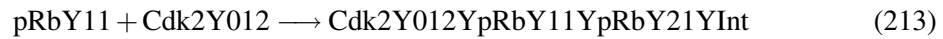
Derived unit contains undeclared units

$$v_{99} = \text{vol}(X) \cdot \text{kupYA2YYpRb} \cdot [\text{Cdk2Y012YpRbY10YpRbY20YInt}] \quad (212)$$

8.100 Reaction rxnY100

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

Reaction equation



Reactants

Table 192: Properties of each reactant.

Id	Name	SBO
pRbY11		
Cdk2Y012		

Product

Table 193: Properties of each product.

Id	Name	SBO
Cdk2Y012YpRbY11YpRbY21YInt		

Kinetic Law

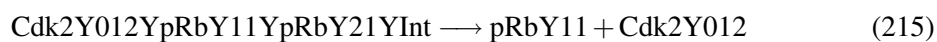
Derived unit contains undeclared units

$$v_{100} = \text{vol}(X) \cdot \text{kbYA2YYpRb} \cdot [\text{pRbY11}] \cdot [\text{Cdk2Y012}] \quad (214)$$

8.101 Reaction rxnY101

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

Reaction equation



Reactant

Table 194: Properties of each reactant.

Id	Name	SBO
Cdk2Y012YpRbY11YpRbY21YInt		

Products

Table 195: Properties of each product.

Id	Name	SBO
pRbY11		
Cdk2Y012		

Kinetic Law

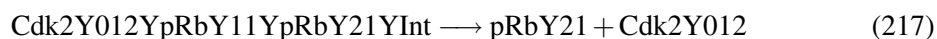
Derived unit contains undeclared units

$$v_{101} = \text{vol}(X) \cdot k_{\text{uYA2YYpRb}} \cdot [\text{Cdk2Y012YpRbY11YpRbY21YInt}] \quad (216)$$

8.102 Reaction rxnY102

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

Reaction equation



Reactant

Table 196: Properties of each reactant.

Id	Name	SBO
Cdk2Y012YpRbY11YpRbY21YInt		

Products

Table 197: Properties of each product.

Id	Name	SBO
pRbY21		
Cdk2Y012		

Kinetic Law

Derived unit contains undeclared units

$$v_{102} = \text{vol}(X) \cdot \text{kupYA2YYpRb} \cdot [\text{Cdk2Y012YpRbY11YpRbY21YInt}] \quad (218)$$

8.103 Reaction rxnY103

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

Reaction equation



Reactants

Table 198: Properties of each reactant.

Id	Name	SBO
pRbY10		
Cdk1Y11		

Product

Table 199: Properties of each product.

Id	Name	SBO
Cdk1Y11YpRbY10YpRbY20YInt		

Kinetic Law

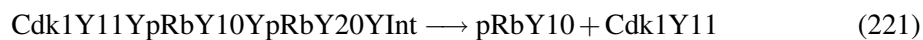
Derived unit contains undeclared units

$$v_{103} = \text{vol}(X) \cdot \text{kbYA1YYpRb} \cdot [\text{pRbY10}] \cdot [\text{Cdk1Y11}] \quad (220)$$

8.104 Reaction rxnY104

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

Reaction equation



Reactant

Table 200: Properties of each reactant.

Id	Name	SBO
Cdk1Y11YpRbY10YpRbY20YInt		

Products

Table 201: Properties of each product.

Id	Name	SBO
pRbY10		
Cdk1Y11		

Kinetic Law

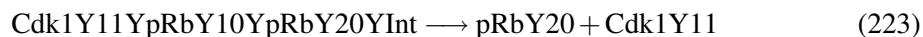
Derived unit contains undeclared units

$$v_{104} = \text{vol}(\text{X}) \cdot k_{\text{uYA1YYpRb}} \cdot [\text{Cdk1Y11YpRbY10YpRbY20YInt}] \quad (222)$$

8.105 Reaction rxnY105

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

Reaction equation



Reactant

Table 202: Properties of each reactant.

Id	Name	SBO
Cdk1Y11YpRbY10YpRbY20YInt		

Products

Table 203: Properties of each product.

Id	Name	SBO
pRbY20		
Cdk1Y11		

Kinetic Law

Derived unit contains undeclared units

$$v_{105} = \text{vol}(X) \cdot \text{kupYA1YYpRb} \cdot [\text{Cdk1Y11YpRbY10YpRbY20YInt}] \quad (224)$$

8.106 Reaction rxnY106

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

Reaction equation



Reactants

Table 204: Properties of each reactant.

Id	Name	SBO
pRbY11		
Cdk1Y11		

Modifier

Table 205: Properties of each modifier.

Id	Name	SBO
pRbY10		

Product

Table 206: Properties of each product.

Id	Name	SBO
Cdk1Y11YpRbY11YpRbY21YInt		

Kinetic Law

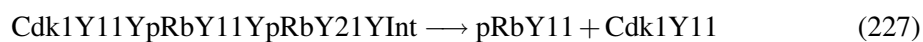
Derived unit contains undeclared units

$$v_{106} = \text{vol}(X) \cdot k_{bYA1YYpRb} \cdot [pRbY10] \cdot [Cdk1Y11] \quad (226)$$

8.107 Reaction rxnY107

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

Reaction equation



Reactant

Table 207: Properties of each reactant.

Id	Name	SBO
Cdk1Y11YpRbY11YpRbY21YInt		

Products

Table 208: Properties of each product.

Id	Name	SBO
pRbY11		
Cdk1Y11		

Kinetic Law

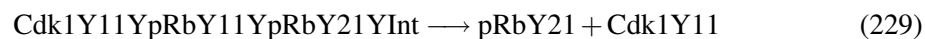
Derived unit contains undeclared units

$$v_{107} = \text{vol}(X) \cdot k_{uYA1YYpRb} \cdot [Cdk1Y11YpRbY11YpRbY21YInt] \quad (228)$$

8.108 Reaction rxnY108

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

Reaction equation



Reactant

Table 209: Properties of each reactant.

Id	Name	SBO
Cdk1Y11YpRbY11YpRbY21YInt		

Products

Table 210: Properties of each product.

Id	Name	SBO
pRbY21		
Cdk1Y11		

Kinetic Law

Derived unit contains undeclared units

$$v_{108} = \text{vol}(X) \cdot \text{kupYA1YYpRb} \cdot [\text{Cdk1Y11YpRbY11YpRbY21YInt}] \quad (230)$$

8.109 Reaction rxnY109

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

Reaction equation



Reactant

Table 211: Properties of each reactant.

Id	Name	SBO
pRbY20		

Product

Table 212: Properties of each product.

Id	Name	SBO
pRbY00		

Kinetic Law

Derived unit contains undeclared units

$$v_{109} = \text{vol}(\text{X}) \cdot \text{ktYpRbYYDephos} \cdot [\text{pRbY20}] \quad (232)$$

8.110 Reaction rxnY110

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

Reaction equation**Reactant**

Table 213: Properties of each reactant.

Id	Name	SBO
pRbY21		

Product

Table 214: Properties of each product.

Id	Name	SBO
pRbY01		

Kinetic Law

Derived unit contains undeclared units

$$v_{110} = \text{vol}(\text{X}) \cdot \text{ktYpRbYYDephos} \cdot [\text{pRbY21}] \quad (234)$$

8.111 Reaction rxnY111

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

Reaction equation



Reactants

Table 215: Properties of each reactant.

Id	Name	SBO
pRbY00		
E2F		

Product

Table 216: Properties of each product.

Id	Name	SBO
pRbY01		

Kinetic Law

Derived unit contains undeclared units

$$v_{111} = \text{vol}(X) \cdot \text{kbYE2FYYPb} \cdot [\text{pRbY00}] \cdot [\text{E2F}] \quad (236)$$

8.112 Reaction rxnY112

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

Reaction equation



Reactant

Table 217: Properties of each reactant.

Id	Name	SBO
pRbY01		

Products

Table 218: Properties of each product.

Id	Name	SBO
pRbY00		
E2F		

Kinetic Law

Derived unit contains undeclared units

$$v_{112} = \text{vol}(X) \cdot \text{kuYE2FYYpRb} \cdot [\text{pRbY01}] \quad (238)$$

8.113 Reaction rxnY113

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

Reaction equation



Reactants

Table 219: Properties of each reactant.

Id	Name	SBO
pRbY10		
E2F		

Product

Table 220: Properties of each product.

Id	Name	SBO
pRbY11		

Kinetic Law

Derived unit contains undeclared units

$$v_{113} = \text{vol}(X) \cdot \text{kbYE2FYYpRb} \cdot [\text{pRbY10}] \cdot [\text{E2F}] \quad (240)$$

8.114 Reaction rxnY114

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

Reaction equation



Reactant

Table 221: Properties of each reactant.

Id	Name	SBO
pRbY11		

Products

Table 222: Properties of each product.

Id	Name	SBO
pRbY10		
E2F		

Kinetic Law

Derived unit contains undeclared units

$$v_{114} = \text{vol}(\text{X}) \cdot \text{kuYE2FYpRb} \cdot [\text{pRbY11}]$$

(242)

8.115 Reaction rxnY115

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

Reaction equation



Reactant

Table 223: Properties of each reactant.

Id	Name	SBO
pRbY21		

Products

Table 224: Properties of each product.

Id	Name	SBO
pRbY20		
E2F		

Kinetic Law

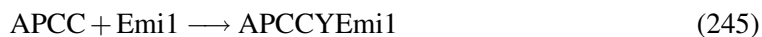
Derived unit contains undeclared units

$$v_{115} = \text{vol}(X) \cdot \text{kuYE2FYYPb} \cdot [\text{pRbY21}] \quad (244)$$

8.116 Reaction rxnY116

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

Reaction equation



Reactants

Table 225: Properties of each reactant.

Id	Name	SBO
APCC		
Emi1		

Product

Table 226: Properties of each product.

Id	Name	SBO
APCCYEmi1		

Kinetic Law

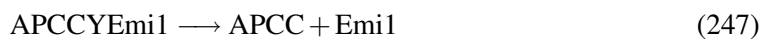
Derived unit contains undeclared units

$$v_{116} = \text{vol}(X) \cdot \text{kbYEmi1YYAPCC} \cdot [\text{APCC}] \cdot [\text{Emi1}] \quad (246)$$

8.117 Reaction rxnY117

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

Reaction equation



Reactant

Table 227: Properties of each reactant.

Id	Name	SBO
APCCYEmi1		

Products

Table 228: Properties of each product.

Id	Name	SBO
APCC		
Emi1		

Kinetic Law

Derived unit contains undeclared units

$$v_{117} = \text{vol}(\text{X}) \cdot \text{kuYEmi1YYAPCC} \cdot [\text{APCCYEmi1}] \quad (248)$$

8.118 Reaction rxnY118

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

Reaction equation



Reactants

Table 229: Properties of each reactant.

Id	Name	SBO
CyclinA		

Id	Name	SBO
APCC		

Product

Table 230: Properties of each product.

Id	Name	SBO
APCCYCYclinAYInt		

Kinetic Law

Derived unit contains undeclared units

$$v_{118} = \text{vol}(X) \cdot k_{bYAPCCYYCyclinA} \cdot [\text{CyclinA}] \cdot [\text{APCC}] \quad (250)$$

8.119 Reaction rxnY119

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

Reaction equation



Reactant

Table 231: Properties of each reactant.

Id	Name	SBO
APCCYCYclinAYInt		

Products

Table 232: Properties of each product.

Id	Name	SBO
CyclinA		
APCC		

Kinetic Law

Derived unit contains undeclared units

$$v_{119} = \text{vol}(X) \cdot k_{uYAPCCYYCyclinA} \cdot [\text{APCCYCyclinAYInt}] \quad (252)$$

8.120 Reaction rxnY120

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

Reaction equation



Reactant

Table 233: Properties of each reactant.

Id	Name	SBO
APCCYCyclinAYInt		

Product

Table 234: Properties of each product.

Id	Name	SBO
APCC		

Kinetic Law

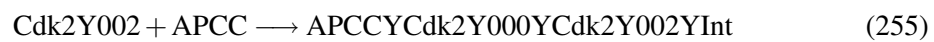
Derived unit contains undeclared units

$$v_{120} = \text{vol}(X) \cdot k_{uYAPCCYYCyclinA} \cdot [\text{APCCYCyclinAYInt}] \quad (254)$$

8.121 Reaction rxnY121

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

Reaction equation



Reactants

Table 235: Properties of each reactant.

Id	Name	SBO
Cdk2Y002		
APCC		

Product

Table 236: Properties of each product.

Id	Name	SBO
APCCYCdk2Y000YCdk2Y002YInt		

Kinetic Law

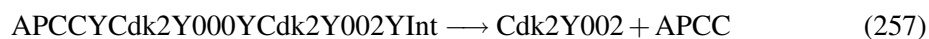
Derived unit contains undeclared units

$$v_{121} = \text{vol}(X) \cdot k_b YAPCCYYCyclinA \cdot [Cdk2Y002] \cdot [APCC] \quad (256)$$

8.122 Reaction rxnY122

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

Reaction equation



Reactant

Table 237: Properties of each reactant.

Id	Name	SBO
APCCYCdk2Y000YCdk2Y002YInt		

Products

Table 238: Properties of each product.

Id	Name	SBO
Cdk2Y002		
APCC		

Kinetic Law

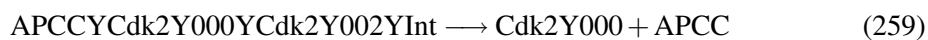
Derived unit contains undeclared units

$$v_{122} = \text{vol}(X) \cdot \text{kuYAPCCYYCyclinA} \cdot [\text{APCCYCdk2Y000YCdk2Y002YInt}] \quad (258)$$

8.123 Reaction rxnY123

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

Reaction equation



Reactant

Table 239: Properties of each reactant.

Id	Name	SBO
APCCYCdk2Y000YCdk2Y002YInt		

Products

Table 240: Properties of each product.

Id	Name	SBO
Cdk2Y000		
APCC		

Kinetic Law

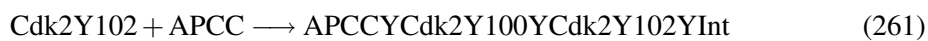
Derived unit contains undeclared units

$$v_{123} = \text{vol}(X) \cdot \text{kudYAPCCYYCyclinA} \cdot [\text{APCCYCdk2Y000YCdk2Y002YInt}] \quad (260)$$

8.124 Reaction rxnY124

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

Reaction equation



Reactants

Table 241: Properties of each reactant.

Id	Name	SBO
Cdk2Y102		
APCC		

Product

Table 242: Properties of each product.

Id	Name	SBO
APCCYCdk2Y100YCdk2Y102YInt		

Kinetic Law

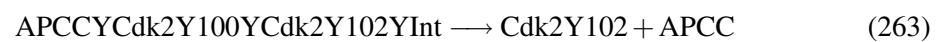
Derived unit contains undeclared units

$$v_{124} = \text{vol}(X) \cdot \text{kbYAPCCYYCyclinA} \cdot [\text{Cdk2Y102}] \cdot [\text{APCC}] \quad (262)$$

8.125 Reaction rxnY125

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

Reaction equation



Reactant

Table 243: Properties of each reactant.

Id	Name	SBO
APCCYCdk2Y100YCdk2Y102YInt		

Products

Table 244: Properties of each product.

Id	Name	SBO
Cdk2Y102		
APCC		

Kinetic Law

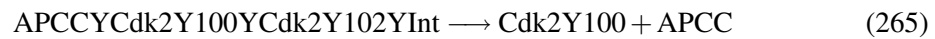
Derived unit contains undeclared units

$$v_{125} = \text{vol}(X) \cdot \text{kuYAPCCYYCyclinA} \cdot [\text{APCCYCdk2Y100YCdk2Y102YInt}] \quad (264)$$

8.126 Reaction rxnY126

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

Reaction equation



Reactant

Table 245: Properties of each reactant.

Id	Name	SBO
APCCYCdk2Y100YCdk2Y102YInt		

Products

Table 246: Properties of each product.

Id	Name	SBO
Cdk2Y100		
APCC		

Kinetic Law

Derived unit contains undeclared units

$$v_{126} = \text{vol}(X) \cdot \text{kudYAPCCYYCyclinA} \cdot [\text{APCCYCdk2Y100YCdk2Y102YInt}] \quad (266)$$

8.127 Reaction rxnY127

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

Reaction equation



Reactants

Table 247: Properties of each reactant.

Id	Name	SBO
Cdk2Y012		
APCC		

Modifier

Table 248: Properties of each modifier.

Id	Name	SBO
Cdk2Y102		

Product

Table 249: Properties of each product.

Id	Name	SBO
APCCYCdk2Y010YCdk2Y012YInt		

Kinetic Law

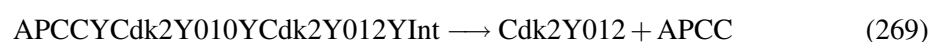
Derived unit contains undeclared units

$$v_{127} = \text{vol}(X) \cdot \text{kbYAPCCYYCyclinA} \cdot [\text{Cdk2Y102}] \cdot [\text{APCC}] \quad (268)$$

8.128 Reaction rxnY128

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

Reaction equation



Reactant

Table 250: Properties of each reactant.

Id	Name	SBO
APCCYCdk2Y010YCdk2Y012YInt		

Products

Table 251: Properties of each product.

Id	Name	SBO
Cdk2Y012		
APCC		

Kinetic Law

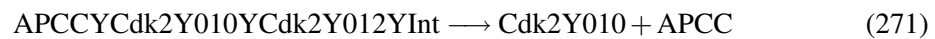
Derived unit contains undeclared units

$$v_{128} = \text{vol}(X) \cdot k_{\text{uYAPCCYYCyclinA}} \cdot [\text{APCCYCdk2Y010YCdk2Y012YInt}] \quad (270)$$

8.129 Reaction rxnY129

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

Reaction equation



Reactant

Table 252: Properties of each reactant.

Id	Name	SBO
APCCYCdk2Y010YCdk2Y012YInt		

Products

Table 253: Properties of each product.

Id	Name	SBO
Cdk2Y010		
APCC		

Kinetic Law

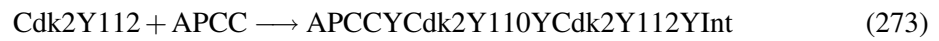
Derived unit contains undeclared units

$$v_{129} = \text{vol}(X) \cdot \text{kudYAPCCYYCyclinA} \cdot [\text{APCCYCdk2Y010YCdk2Y012YInt}] \quad (272)$$

8.130 Reaction rxnY130

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

Reaction equation



Reactants

Table 254: Properties of each reactant.

Id	Name	SBO
Cdk2Y112		
APCC		

Product

Table 255: Properties of each product.

Id	Name	SBO
APCCYCdk2Y110YCdk2Y112YInt		

Kinetic Law

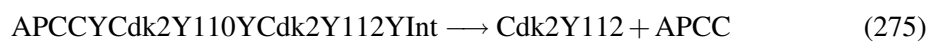
Derived unit contains undeclared units

$$v_{130} = \text{vol}(X) \cdot \text{kbYAPCCYYCyclinA} \cdot [\text{Cdk2Y112}] \cdot [\text{APCC}] \quad (274)$$

8.131 Reaction rxnY131

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

Reaction equation



Reactant

Table 256: Properties of each reactant.

Id	Name	SBO
APCCYCdk2Y110YCdk2Y112YInt		

Products

Table 257: Properties of each product.

Id	Name	SBO
Cdk2Y112		
APCC		

Kinetic Law

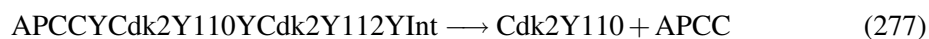
Derived unit contains undeclared units

$$v_{131} = \text{vol}(X) \cdot k_{\text{uYAPCCYYCyclinA}} \cdot [\text{APCCYCdk2Y110YCdk2Y112YInt}] \quad (276)$$

8.132 Reaction rxnY132

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

Reaction equation



Reactant

Table 258: Properties of each reactant.

Id	Name	SBO
APCCYCdk2Y110YCdk2Y112YInt		

Products

Table 259: Properties of each product.

Id	Name	SBO
Cdk2Y110		
APCC		

Kinetic Law

Derived unit contains undeclared units

$$v_{132} = \text{vol}(X) \cdot \text{kudYAPCCYYCyclinA} \cdot [\text{APCCYCdk2Y110YCdk2Y112YInt}] \quad (278)$$

8.133 Reaction rxnY133

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

Reaction equation



Reactants

Table 260: Properties of each reactant.

Id	Name	SBO
Cdk1Y01		
APCC		

Product

Table 261: Properties of each product.

Id	Name	SBO
APCCYCdk1Y00YCdk1Y01YInt		

Kinetic Law

Derived unit contains undeclared units

$$v_{133} = \text{vol}(X) \cdot \text{kbYAPCCYYCyclinA} \cdot [\text{Cdk1Y01}] \cdot [\text{APCC}] \quad (280)$$

8.134 Reaction rxnY134

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

Reaction equation



Reactants

Table 262: Properties of each reactant.

Id	Name	SBO
APCCYCdk1Y00YCdk1Y01YInt		
APCC		

Product

Table 263: Properties of each product.

Id	Name	SBO
Cdk1Y01		

Kinetic Law

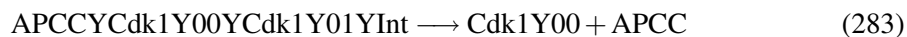
Derived unit contains undeclared units

$$v_{134} = \text{vol}(X) \cdot k_u \text{YAPCCYCYCyclinA} \cdot [\text{APCCYCdk1Y00YCdk1Y01YInt}] \quad (282)$$

8.135 Reaction rxnY135

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

Reaction equation



Reactant

Table 264: Properties of each reactant.

Id	Name	SBO
APCCYCdk1Y00YCdk1Y01YInt		

Products

Table 265: Properties of each product.

Id	Name	SBO
Cdk1Y00		
APCC		

Kinetic Law

Derived unit contains undeclared units

$$v_{135} = \text{vol}(X) \cdot \text{kudYAPCCYYCyclinA} \cdot [\text{APCCYCdk1Y00YCdk1Y01YInt}] \quad (284)$$

8.136 Reaction rxnY136

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

Reaction equation



Reactants

Table 266: Properties of each reactant.

Id	Name	SBO
Cdk1Y11		
APCC		

Product

Table 267: Properties of each product.

Id	Name	SBO
APCCYCdk1Y10YCdk1Y11YInt		

Kinetic Law

Derived unit contains undeclared units

$$v_{136} = \text{vol}(X) \cdot \text{kbYAPCCYYCyclinA} \cdot [\text{Cdk1Y11}] \cdot [\text{APCC}] \quad (286)$$

8.137 Reaction rxnY137

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

Reaction equation



Reactants

Table 268: Properties of each reactant.

Id	Name	SBO
APCCYCdk1Y10YCdk1Y11YInt		
APCC		

Product

Table 269: Properties of each product.

Id	Name	SBO
Cdk1Y11		

Kinetic Law

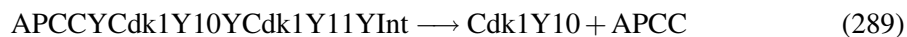
Derived unit contains undeclared units

$$v_{137} = \text{vol}(X) \cdot k_{\text{uYAPCCYYCyclinA}} \cdot [\text{APCCYCdk1Y10YCdk1Y11YInt}] \quad (288)$$

8.138 Reaction rxnY138

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

Reaction equation



Reactant

Table 270: Properties of each reactant.

Id	Name	SBO
APCCYCdk1Y10YCdk1Y11YInt		

Products

Table 271: Properties of each product.

Id	Name	SBO
Cdk1Y10		
APCC		

Kinetic Law

Derived unit contains undeclared units

$$v_{138} = \text{vol}(\text{X}) \cdot \text{kudYAPCCYYCyclinA} \cdot [\text{APCCYCdk1Y10YCdk1Y11YInt}] \quad (290)$$

9 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.

9.1 Species APCC

Initial amount 24582.9 item

This species takes part in 24 reactions (as a reactant in `rxnY116`, `rxnY118`, `rxnY121`, `rxnY124`, `rxnY127`, `rxnY130`, `rxnY133`, `rxnY134`, `rxnY136`, `rxnY137` and as a product in `rxnY036`, `rxnY117`, `rxnY119`, `rxnY120`, `rxnY122`, `rxnY123`, `rxnY125`, `rxnY126`, `rxnY128`, `rxnY129`, `rxnY131`, `rxnY132`, `rxnY135`, `rxnY138`).

$$\begin{aligned} \frac{d}{dt}\text{APCC} = & v_{36} + v_{117} + v_{119} + v_{120} + v_{122} + v_{123} + v_{125} + v_{126} \\ & + v_{128} + v_{129} + v_{131} + v_{132} + v_{135} + v_{138} - v_{116} - v_{118} \\ & - v_{121} - v_{124} - v_{127} - v_{130} - v_{133} - v_{134} - v_{136} - v_{137} \end{aligned} \quad (291)$$

9.2 Species APCCYCdk1Y00YCdk1Y01YInt

Initial amount 104.388 item

This species takes part in three reactions (as a reactant in rxnY134, rxnY135 and as a product in rxnY133).

$$\frac{d}{dt} \text{APCCYCdk1Y00YCdk1Y01YInt} = v_{133} - v_{134} - v_{135} \quad (292)$$

9.3 Species APCCYCdk1Y10YCdk1Y11YInt

Initial amount 0 item

This species takes part in three reactions (as a reactant in rxnY137, rxnY138 and as a product in rxnY136).

$$\frac{d}{dt} \text{APCCYCdk1Y10YCdk1Y11YInt} = v_{136} - v_{137} - v_{138} \quad (293)$$

9.4 Species APCCYCdk2Y000YCdk2Y002YInt

Initial amount 52.8191 item

This species takes part in three reactions (as a reactant in rxnY122, rxnY123 and as a product in rxnY121).

$$\frac{d}{dt} \text{APCCYCdk2Y000YCdk2Y002YInt} = v_{121} - v_{122} - v_{123} \quad (294)$$

9.5 Species APCCYCdk2Y010YCdk2Y012YInt

Initial amount 0 item

This species takes part in three reactions (as a reactant in rxnY128, rxnY129 and as a product in rxnY127).

$$\frac{d}{dt} \text{APCCYCdk2Y010YCdk2Y012YInt} = v_{127} - v_{128} - v_{129} \quad (295)$$

9.6 Species APCCYCdk2Y100YCdk2Y102YInt

Initial amount 90.5091 item

This species takes part in three reactions (as a reactant in rxnY125, rxnY126 and as a product in rxnY124).

$$\frac{d}{dt} \text{APCCYCdk2Y100YCdk2Y102YInt} = v_{124} - v_{125} - v_{126} \quad (296)$$

9.7 Species APCCYCdk2Y110YCdk2Y112YInt

Initial amount 0 item

This species takes part in three reactions (as a reactant in [rxnY131](#), [rxnY132](#) and as a product in [rxnY130](#)).

$$\frac{d}{dt} \text{APCCYCdk2Y110YCdk2Y112YInt} = v_{130} - v_{131} - v_{132} \quad (297)$$

9.8 Species APCCYCyclinAYInt

Initial amount 8.79462 item

This species takes part in three reactions (as a reactant in [rxnY119](#), [rxnY120](#) and as a product in [rxnY118](#)).

$$\frac{d}{dt} \text{APCCYCyclinAYInt} = v_{118} - v_{119} - v_{120} \quad (298)$$

9.9 Species APCCYEmi1

Initial amount 5160.61 item

This species takes part in three reactions (as a reactant in [rxnY036](#), [rxnY117](#) and as a product in [rxnY116](#)).

$$\frac{d}{dt} \text{APCCYEmi1} = v_{116} - v_{36} - v_{117} \quad (299)$$

9.10 Species Cdk1Y00

Initial amount 98550.6 item

This species takes part in five reactions (as a reactant in [rxnY079](#), [rxnY081](#) and as a product in [rxnY023](#), [rxnY082](#), [rxnY135](#)).

$$\frac{d}{dt} \text{Cdk1Y00} = v_{23} + v_{82} + v_{135} - v_{79} - v_{81} \quad (300)$$

9.11 Species Cdk1Y01

Initial amount 1345.01 item

This species takes part in six reactions (as a reactant in [rxnY023](#), [rxnY080](#), [rxnY082](#), [rxnY133](#) and as a product in [rxnY081](#), [rxnY134](#)).

$$\frac{d}{dt} \text{Cdk1Y01} = v_{81} + v_{134} - v_{23} - v_{80} - v_{82} - v_{133} \quad (301)$$

9.12 Species Cdk1Y10

Initial amount 0 item

This species takes part in five reactions (as a reactant in rxnY083 and as a product in rxnY024, rxnY079, rxnY084, rxnY138).

$$\frac{d}{dt}\text{Cdk1Y10} = v_{24} + v_{79} + v_{84} + v_{138} - v_{83} \quad (302)$$

9.13 Species Cdk1Y11

Initial amount 0 item

This species takes part in twelve reactions (as a reactant in rxnY024, rxnY084, rxnY103, rxnY106, rxnY136 and as a product in rxnY080, rxnY083, rxnY104, rxnY105, rxnY107, rxnY108, rxnY137).

$$\begin{aligned} \frac{d}{dt}\text{Cdk1Y11} = & v_{80} + v_{83} + v_{104} + v_{105} + v_{107} + v_{108} \\ & + v_{137} - v_{24} - v_{84} - v_{103} - v_{106} - v_{136} \end{aligned} \quad (303)$$

9.14 Species Cdk1Y11YpRbY10YpRbY20YInt

Initial amount 0 item

This species takes part in three reactions (as a reactant in rxnY104, rxnY105 and as a product in rxnY103).

$$\frac{d}{dt}\text{Cdk1Y11YpRbY10YpRbY20YInt} = v_{103} - v_{104} - v_{105} \quad (304)$$

9.15 Species Cdk1Y11YpRbY11YpRbY21YInt

Initial amount 0 item

This species takes part in three reactions (as a reactant in rxnY107, rxnY108 and as a product in rxnY106).

$$\frac{d}{dt}\text{Cdk1Y11YpRbY11YpRbY21YInt} = v_{106} - v_{107} - v_{108} \quad (305)$$

9.16 Species Cdk2Y000

Initial amount 33942 item

This species takes part in eleven reactions (as a reactant in rxnY045, rxnY057, rxnY063, rxnY071 and as a product in rxnY009, rxnY017, rxnY025, rxnY046, rxnY064, rxnY072, rxnY123).

$$\frac{d}{dt}\text{Cdk2Y000} = v_9 + v_{17} + v_{25} + v_{46} + v_{64} + v_{72} + v_{123} - v_{45} - v_{57} - v_{63} - v_{71} \quad (306)$$

9.17 Species Cdk2Y001

Initial amount 2176.46 item

This species takes part in seven reactions (as a reactant in rxnY017, rxnY047, rxnY059, rxnY064 and as a product in rxnY010, rxnY048, rxnY063).

$$\frac{d}{dt}\text{Cdk2Y001} = v_{10} + v_{48} + v_{63} - v_{17} - v_{47} - v_{59} - v_{64} \quad (307)$$

9.18 Species Cdk2Y002

Initial amount 680.557 item

This species takes part in nine reactions (as a reactant in rxnY025, rxnY049, rxnY061, rxnY072, rxnY121 and as a product in rxnY011, rxnY050, rxnY071, rxnY122).

$$\frac{d}{dt}\text{Cdk2Y002} = v_{11} + v_{50} + v_{71} + v_{122} - v_{25} - v_{49} - v_{61} - v_{72} - v_{121} \quad (308)$$

9.19 Species Cdk2Y010

Initial amount 0 item

This species takes part in eleven reactions (as a reactant in rxnY051, rxnY067, rxnY075 and as a product in rxnY012, rxnY019, rxnY027, rxnY052, rxnY057, rxnY068, rxnY076, rxnY129).

$$\frac{d}{dt}\text{Cdk2Y010} = v_{12} + v_{19} + v_{27} + v_{52} + v_{57} + v_{68} + v_{76} + v_{129} - v_{51} - v_{67} - v_{75} \quad (309)$$

9.20 Species Cdk2Y011

Initial amount 0 item

This species takes part in 13 reactions (as a reactant in rxnY019, rxnY053, rxnY068, rxnY091, rxnY094 and as a product in rxnY013, rxnY054, rxnY059, rxnY067, rxnY092, rxnY093, rxnY095, rxnY096).

$$\begin{aligned} \frac{d}{dt}\text{Cdk2Y011} = & v_{13} + v_{54} + v_{59} + v_{67} + v_{92} + v_{93} + v_{95} \\ & + v_{96} - v_{19} - v_{53} - v_{68} - v_{91} - v_{94} \end{aligned} \quad (310)$$

9.21 Species Cdk2Y011YpRbY10YpRbY20YInt

Initial amount 0 item

This species takes part in three reactions (as a reactant in rxnY092, rxnY093 and as a product in rxnY091).

$$\frac{d}{dt}\text{Cdk2Y011YpRbY10YpRbY20YInt} = v_{91} - v_{92} - v_{93} \quad (311)$$

9.22 Species Cdk2Y011YpRbY11YpRbY21YInt

Initial amount 0 item

This species takes part in three reactions (as a reactant in rxnY095, rxnY096 and as a product in rxnY094).

$$\frac{d}{dt}\text{Cdk2Y011YpRbY11YpRbY21YInt} = v_{94} - v_{95} - v_{96} \quad (312)$$

9.23 Species Cdk2Y012

Initial amount 0 item

This species takes part in 15 reactions (as a reactant in rxnY027, rxnY055, rxnY076, rxnY097, rxnY100, rxnY127 and as a product in rxnY014, rxnY056, rxnY061, rxnY075, rxnY098, rxnY099, rxnY101, rxnY102, rxnY128).

$$\begin{aligned} \frac{d}{dt}\text{Cdk2Y012} = & v_{14} + v_{56} + v_{61} + v_{75} + v_{98} + v_{99} + v_{101} + v_{102} \\ & + v_{128} - v_{27} - v_{55} - v_{76} - v_{97} - v_{100} - v_{127} \end{aligned} \quad (313)$$

9.24 Species Cdk2Y012YpRbY10YpRbY20YInt

Initial amount 0 item

This species takes part in three reactions (as a reactant in rxnY098, rxnY099 and as a product in rxnY097).

$$\frac{d}{dt}\text{Cdk2Y012YpRbY10YpRbY20YInt} = v_{97} - v_{98} - v_{99} \quad (314)$$

9.25 Species Cdk2Y012YpRbY11YpRbY21YInt

Initial amount 0 item

This species takes part in three reactions (as a reactant in rxnY101, rxnY102 and as a product in rxnY100).

$$\frac{d}{dt}\text{Cdk2Y012YpRbY11YpRbY21YInt} = v_{100} - v_{101} - v_{102} \quad (315)$$

9.26 Species Cdk2Y100

Initial amount 58162 item

This species takes part in eleven reactions (as a reactant in rxnY009, rxnY046, rxnY058, rxnY065, rxnY073 and as a product in rxnY018, rxnY026, rxnY045, rxnY066, rxnY074, rxnY126).

$$\frac{d}{dt}\text{Cdk2Y100} = v_{18} + v_{26} + v_{45} + v_{66} + v_{74} + v_{126} - v_9 - v_{46} - v_{58} - v_{65} - v_{73} \quad (316)$$

9.27 Species Cdk2Y101

Initial amount 3729.51 item

This species takes part in seven reactions (as a reactant in [rxnY010](#), [rxnY018](#), [rxnY048](#), [rxnY060](#), [rxnY066](#) and as a product in [rxnY047](#), [rxnY065](#)).

$$\frac{d}{dt}\text{Cdk2Y101} = v_{47} + v_{65} - v_{10} - v_{18} - v_{48} - v_{60} - v_{66} \quad (317)$$

9.28 Species Cdk2Y102

Initial amount 1166.18 item

This species takes part in ten reactions (as a reactant in [rxnY011](#), [rxnY026](#), [rxnY050](#), [rxnY062](#), [rxnY074](#), [rxnY124](#) and as a product in [rxnY049](#), [rxnY073](#), [rxnY125](#) and as a modifier in [rxnY127](#)).

$$\frac{d}{dt}\text{Cdk2Y102} = v_{49} + v_{73} + v_{125} - v_{11} - v_{26} - v_{50} - v_{62} - v_{74} - v_{124} \quad (318)$$

9.29 Species Cdk2Y110

Initial amount 0 item

This species takes part in eleven reactions (as a reactant in [rxnY012](#), [rxnY052](#), [rxnY069](#), [rxnY077](#) and as a product in [rxnY020](#), [rxnY028](#), [rxnY051](#), [rxnY058](#), [rxnY070](#), [rxnY078](#), [rxnY132](#)).

$$\frac{d}{dt}\text{Cdk2Y110} = v_{20} + v_{28} + v_{51} + v_{58} + v_{70} + v_{78} + v_{132} - v_{12} - v_{52} - v_{69} - v_{77} \quad (319)$$

9.30 Species Cdk2Y111

Initial amount 0 item

This species takes part in seven reactions (as a reactant in [rxnY013](#), [rxnY020](#), [rxnY054](#), [rxnY070](#) and as a product in [rxnY053](#), [rxnY060](#), [rxnY069](#)).

$$\frac{d}{dt}\text{Cdk2Y111} = v_{53} + v_{60} + v_{69} - v_{13} - v_{20} - v_{54} - v_{70} \quad (320)$$

9.31 Species Cdk2Y112

Initial amount 0 item

This species takes part in nine reactions (as a reactant in [rxnY014](#), [rxnY028](#), [rxnY056](#), [rxnY078](#), [rxnY130](#) and as a product in [rxnY055](#), [rxnY062](#), [rxnY077](#), [rxnY131](#)).

$$\frac{d}{dt}\text{Cdk2Y112} = v_{55} + v_{62} + v_{77} + v_{131} - v_{14} - v_{28} - v_{56} - v_{78} - v_{130} \quad (321)$$

9.32 Species Cdk4Y00

Initial amount 46551.9 item

This species takes part in six reactions (as a reactant in rxnY037, rxnY041 and as a product in rxnY003, rxnY007, rxnY038, rxnY042).

$$\frac{d}{dt}\text{Cdk4Y00} = v_3 + v_7 + v_{38} + v_{42} - v_{37} - v_{41} \quad (322)$$

9.33 Species Cdk4Y01

Initial amount 6547.64 item

This species takes part in twelve reactions (as a reactant in rxnY003, rxnY038, rxnY043, rxnY085, rxnY088 and as a product in rxnY008, rxnY037, rxnY044, rxnY086, rxnY087, rxnY089, rxnY090).

$$\frac{d}{dt}\text{Cdk4Y01} = v_8 + v_{37} + v_{44} + v_{86} + v_{87} + v_{89} + v_{90} - v_3 - v_{38} - v_{43} - v_{85} - v_{88} \quad (323)$$

9.34 Species Cdk4Y01YpRbY00YpRbY10YInt

Initial amount 0 item

This species takes part in three reactions (as a reactant in rxnY086, rxnY087 and as a product in rxnY085).

$$\frac{d}{dt}\text{Cdk4Y01YpRbY00YpRbY10YInt} = v_{85} - v_{86} - v_{87} \quad (324)$$

9.35 Species Cdk4Y01YpRbY01YpRbY11YInt

Initial amount 0 item

This species takes part in three reactions (as a reactant in rxnY089, rxnY090 and as a product in rxnY088).

$$\frac{d}{dt}\text{Cdk4Y01YpRbY01YpRbY11YInt} = v_{88} - v_{89} - v_{90} \quad (325)$$

9.36 Species Cdk4Y10

Initial amount 41117.2 item

This species takes part in six reactions (as a reactant in rxnY007, rxnY039, rxnY042 and as a product in rxnY004, rxnY040, rxnY041).

$$\frac{d}{dt}\text{Cdk4Y10} = v_4 + v_{40} + v_{41} - v_7 - v_{39} - v_{42} \quad (326)$$

9.37 Species Cdk4Y11

Initial amount 5783.23 item

This species takes part in six reactions (as a reactant in rxnY004, rxnY008, rxnY040, rxnY044 and as a product in rxnY039, rxnY043).

$$\frac{d}{dt}\text{Cdk4Y11} = v_{39} + v_{43} - v_4 - v_8 - v_{40} - v_{44} \quad (327)$$

9.38 Species CyclinA

Initial amount 113.316 item

This species takes part in 16 reactions (as a reactant in rxnY022, rxnY071, rxnY073, rxnY075, rxnY077, rxnY081, rxnY083, rxnY118 and as a product in rxnY021, rxnY072, rxnY074, rxnY076, rxnY078, rxnY082, rxnY084, rxnY119).

$$\begin{aligned} \frac{d}{dt}\text{CyclinA} = & v_{21} + v_{72} + v_{74} + v_{76} + v_{78} + v_{82} + v_{84} + v_{119} \\ & - v_{22} - v_{71} - v_{73} - v_{75} - v_{77} - v_{81} - v_{83} - v_{118} \end{aligned} \quad (328)$$

9.39 Species CyclinD

Initial amount 14753.7 item

This species takes part in six reactions (as a reactant in rxnY002, rxnY037, rxnY039 and as a product in rxnY001, rxnY038, rxnY040).

$$\frac{d}{dt}\text{CyclinD} = v_1 + v_{38} + v_{40} - v_2 - v_{37} - v_{39} \quad (329)$$

9.40 Species CyclinE

Initial amount 191.985 item

This species takes part in ten reactions (as a reactant in rxnY016, rxnY063, rxnY065, rxnY067, rxnY069 and as a product in rxnY015, rxnY064, rxnY066, rxnY068, rxnY070).

$$\frac{d}{dt}\text{CyclinE} = v_{15} + v_{64} + v_{66} + v_{68} + v_{70} - v_{16} - v_{63} - v_{65} - v_{67} - v_{69} \quad (330)$$

9.41 Species E2F

Initial amount 546.211 item

This species takes part in seven reactions (as a reactant in rxnY030, rxnY111, rxnY113 and as a product in rxnY029, rxnY112, rxnY114, rxnY115).

$$\frac{d}{dt}\text{E2F} = v_{29} + v_{112} + v_{114} + v_{115} - v_{30} - v_{111} - v_{113} \quad (331)$$

9.42 Species Emi1

Initial amount 248.046 item

This species takes part in four reactions (as a reactant in [rxnY035](#), [rxnY116](#) and as a product in [rxnY034](#), [rxnY117](#)).

$$\frac{d}{dt}\text{Emi1} = v_{34} + v_{117} - v_{35} - v_{116} \quad (332)$$

9.43 Species p27

Initial amount 14150.9 item

This species takes part in 18 reactions (as a reactant in [rxnY006](#), [rxnY041](#), [rxnY043](#), [rxnY045](#), [rxnY047](#), [rxnY049](#), [rxnY051](#), [rxnY053](#), [rxnY055](#) and as a product in [rxnY005](#), [rxnY042](#), [rxnY044](#), [rxnY046](#), [rxnY048](#), [rxnY050](#), [rxnY052](#), [rxnY054](#), [rxnY056](#)).

$$\begin{aligned} \frac{d}{dt}\text{p27} = & v_5 + v_{42} + v_{44} + v_{46} + v_{48} + v_{50} + v_{52} + v_{54} + v_{56} \\ & - v_6 - v_{41} - v_{43} - v_{45} - v_{47} - v_{49} - v_{51} - v_{53} - v_{55} \end{aligned} \quad (333)$$

9.44 Species pRbY00

Initial amount 30000 item

This species takes part in six reactions (as a reactant in [rxnY085](#), [rxnY111](#) and as a product in [rxnY031](#), [rxnY086](#), [rxnY109](#), [rxnY112](#)).

$$\frac{d}{dt}\text{pRbY00} = v_{31} + v_{86} + v_{109} + v_{112} - v_{85} - v_{111} \quad (334)$$

9.45 Species pRbY01

Initial amount 0 item

This species takes part in six reactions (as a reactant in [rxnY031](#), [rxnY088](#), [rxnY112](#) and as a product in [rxnY089](#), [rxnY110](#), [rxnY111](#)).

$$\frac{d}{dt}\text{pRbY01} = v_{89} + v_{110} + v_{111} - v_{31} - v_{88} - v_{112} \quad (335)$$

9.46 Species pRbY10

Initial amount 28583.4 item

This species takes part in eleven reactions (as a reactant in [rxnY091](#), [rxnY097](#), [rxnY103](#), [rxnY113](#) and as a product in [rxnY032](#), [rxnY087](#), [rxnY092](#), [rxnY098](#), [rxnY104](#), [rxnY114](#) and as a modifier in [rxnY106](#)).

$$\frac{d}{dt}\text{pRbY10} = v_{32} + v_{87} + v_{92} + v_{98} + v_{104} + v_{114} - v_{91} - v_{97} - v_{103} - v_{113} \quad (336)$$

9.47 Species pRbY11

Initial amount 1416.59 item

This species takes part in ten reactions (as a reactant in rxnY032, rxnY094, rxnY100, rxnY106, rxnY114 and as a product in rxnY090, rxnY095, rxnY101, rxnY107, rxnY113).

$$\frac{d}{dt}pRbY11 = v_{90} + v_{95} + v_{101} + v_{107} + v_{113} - v_{32} - v_{94} - v_{100} - v_{106} - v_{114} \quad (337)$$

9.48 Species pRbY20

Initial amount 0 item

This species takes part in six reactions (as a reactant in rxnY109 and as a product in rxnY033, rxnY093, rxnY099, rxnY105, rxnY115).

$$\frac{d}{dt}pRbY20 = v_{33} + v_{93} + v_{99} + v_{105} + v_{115} - v_{109} \quad (338)$$

9.49 Species pRbY21

Initial amount 0 item

This species takes part in six reactions (as a reactant in rxnY033, rxnY110, rxnY115 and as a product in rxnY096, rxnY102, rxnY108).

$$\frac{d}{dt}pRbY21 = v_{96} + v_{102} + v_{108} - v_{33} - v_{110} - v_{115} \quad (339)$$

9.50 Species totalYCyclinYD

Involved in rule totalYCyclinYD

One rule which determines this species' quantity.

9.51 Species totalYCyclinYE

Involved in rule totalYCyclinYE

One rule which determines this species' quantity.

9.52 Species totalYCyclinYA

Involved in rule totalYCyclinYA

One rule which determines this species' quantity.

9.53 Species `totalYp27`

Involved in rule `totalYp27`

One rule which determines this species' quantity.

9.54 Species `hypophosphorylatedYpRb`

Involved in rule `hypophosphorylatedYpRb`

One rule which determines this species' quantity.

9.55 Species `hyperphosphorylatedYpRb`

Involved in rule `hyperphosphorylatedYpRb`

One rule which determines this species' quantity.

9.56 Species `totalYEmi1`

Involved in rule `totalYEmi1`

One rule which determines this species' quantity.

9.57 Species `activeYCdk2`

Involved in rule `activeYCdk2`

One rule which determines this species' quantity.

SBML²TeX was developed by Andreas Dräger^a, Hannes Planatscher^a, Dieudonné M Wouamba^a, Adrian Schröder^a, Michael Hucka^b, Lukas Endler^c, Martin Golebiewski^d and Andreas Zell^a. Please see <http://www.ra.cs.uni-tuebingen.de/software/SBML2LaTeX> for more information.

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