SBML Model Report

Model name: "Guyton1972_PulmonaryOxygenIntake"

May 6, 2016

1 General Overview

This is a document in SBML Level 2 Version 3 format. 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	0
events	0	constraints	0
reactions	0	function definitions	0
global parameters	24	unit definitions	21
rules	15	initial assignments	0

Model Notes

This a model from the article:
Circulation: overall regulation.
Guyton AC, Coleman TG, Granger HJ. Annu Rev Physiol 1972;34:13-46 4334846 ,
Abstract:
No abstract available
This model was taken from the CellML repository and automatically converted to SBML.
The original model was: **Guyton AC, Coleman TG, Granger HJ. (2008) - version02**
The original CellML model was created by:

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2 Unit Definitions

This is an overview of 25 unit definitions of which four are predefined by SBML and not mentioned in the model.

2.1 Unit `minute`

Name minute

Definition 60 s

2.2 Unit `per_minute`

Name per_minute

Definition $(60\ \mathrm{s})^{-1}$

2.3 Unit `mmHg`

Name mmHg

Definition $133.322\ \mathrm{N \cdot m^{-2}}$

2.4 Unit per_mmHg

Name per_mmHg

Definition $(133.322\ \mathrm{N})^{-1} \cdot \mathrm{m}^2$

2.5 Unit mmHg_per_mL

Name mmHg_per_mL

Definition $133.322\ \mathrm{N} \cdot \mathrm{m}^{-2} \cdot \mathrm{ml}^{-1}$

2.6 Unit per_mmHg2

Name per_mmHg2

Definition $(133.322\ \mathrm{N})^{-2} \cdot \mathrm{m}^4$

2.7 Unit mmHg3

Name mmHg3

Definition $(133.322\ \mathrm{N})^{3} \cdot \mathrm{m}^{-6}$

2.8 Unit monovalent_mEq

Name monovalent_mEq

Definition mmol

2.9 Unit monovalent_mEq_per_minute

Name monovalent_mEq_per_minute

Definition $\mathrm{mmol} \cdot (60\ \mathrm{s})^{-1}$

2.10 Unit monovalent_mEq_per_litre

Name monovalent_mEq_per_litre

Definition $\mathrm{mmol} \cdot \mathrm{l}^{-1}$

2.11 Unit monovalent_mEq_per_litre_per_minute

Name monovalent_mEq_per_litre_per_minute

Definition $\mathrm{mmol} \cdot \mathrm{l}^{-1} \cdot (60\ \mathrm{s})^{-1}$

2.12 Unit litre2_per_monovalent_mEq_per_minute

Name litre2_per_monovalent_mEq_per_minute

Definition $\mathrm{l}^2 \cdot \mathrm{mmol}^{-1} \cdot (60\ \mathrm{s})^{-1}$

2.13 Unit L_per_minute

Name L_per_minute

Definition $\mathrm{l} \cdot (60\ \mathrm{s})^{-1}$

2.14 Unit mL

Name mL

Definition ml

2.15 Unit mL_per_L

Name mL_per_L

Definition $\mathrm{l}^{-1} \cdot \mathrm{ml}$

2.16 Unit mL_per_L_per_minute

Name mL_per_L_per_minute

Definition $\mathrm{l}^{-1} \cdot \mathrm{ml} \cdot (60\ \mathrm{s})^{-1}$

2.17 Unit mL_per_minute_per_mmHg

Name mL_per_minute_per_mmHg

Definition $\mathrm{ml} \cdot (60\ \mathrm{s})^{-1} \cdot (133.322\ \mathrm{N})^{-1} \cdot \mathrm{m}^2$

2.18 Unit L_mL_per_minute_per_mmHg

Name L_mL_per_minute_per_mmHg

Definition $\mathrm{dl}^2 \cdot (60\ \mathrm{s})^{-1} \cdot (133.322\ \mathrm{N})^{-1} \cdot \mathrm{m}^2$

2.19 Unit mL_per_minute

Name mL_per_minute

Definition $\mathrm{ml} \cdot (60\ \mathrm{s})^{-1}$

2.20 Unit L_per_minute_per_mmHg

Name L_per_minute_per_mmHg

Definition $1 \cdot (60\ \mathrm{s})^{-1} \cdot (133.322\ \mathrm{N})^{-1} \cdot \mathrm{m}^2$

2.21 Unit time

Name time

Definition 60 s

2.22 Unit substance

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

Definition mol

2.23 Unit volume

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

Definition l

2.24 Unit area

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

Definition m^2

2.25 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
Compartment			3	1		☑	

3.1 Compartment `Compartment`

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

4 Parameters

This model contains 24 global parameters.

Table 3: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
VPF	VPF		0.012	l	☑
DOB	DOB		163.508	$\mathrm{ml} \cdot (60\ \mathrm{s})^{-1}$	☑
QRO	QRO		4.978	$\mathrm{l} \cdot (60\ \mathrm{s})^{-1}$	☑
RMO	RMO		56.806	$\mathrm{ml} \cdot (60\ \mathrm{s})^{-1}$	☑
HM	HM		40.038	dimensionless	☑
O2UTIL	O2UTIL		0.000	$\mathrm{ml} \cdot (60\ \mathrm{s})^{-1}$	☐
ALVENT	ALVENT		0.000	$\mathrm{l} \cdot (60\ \mathrm{s})^{-1}$	☐
PO2ALV	PO2ALV		0.000	$133.322\ \mathrm{N} \cdot \mathrm{m}^{-2}$	☐
O2DFS	O2DFS		0.000	$\mathrm{ml} \cdot (60\ \mathrm{s})^{-1}$	☐
RSPDFC	RSPDFC		0.000	$\mathrm{ml} \cdot (60\ \mathrm{s})^{-1} \cdot (133.322\ \mathrm{N})^{-1} \cdot \mathrm{m}^2$	☐
OVA	OVA		204.497	$\mathrm{l}^{-1} \cdot \mathrm{ml}$	☐
DOVA	DOVA		0.000	$\mathrm{l}^{-1} \cdot \mathrm{ml} \cdot (60\ \mathrm{s})^{-1}$	☐
PO2ART	PO2ART		0.000	$133.322\ \mathrm{N} \cdot \mathrm{m}^{-2}$	☐
OSA	OSA		0.000	dimensionless	☐
O2VTS2	O2VTS2		0.000	dimensionless	☐
O2VTST	O2VTST		0.000	dimensionless	☐
O2VTST1	O2VTST1		0.000	dimensionless	☐
O2VAD2	O2VAD2		0.000	dimensionless	☐
DO2VAD	DO2VAD		0.000	$(60\ \mathrm{s})^{-1}$	☐
O2VAD1	O2VAD1		$2.368 \cdot 10^{-7}$	dimensionless	☐
PO2AMB	PO2AMB		150.000	$133.322\ \mathrm{N} \cdot \mathrm{m}^{-2}$	☑
PL2	PL2		1.800	$\mathrm{dl}^2 \cdot (60\ \mathrm{s})^{-1} \cdot (133.322\ \mathrm{N})^{-1} \cdot \mathrm{m}^2$	☑
VPTISS	VPTISS		0.018	l	☑
VNTSTM	VNTSTM		1.000	dimensionless	☑

5 Rules

This is an overview of 15 rules.

5.1 Rule OVA

Rule OVA is a rate rule for parameter OVA:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{OVA} = \mathrm{DOVA} \tag{1}$$

Derived unit $(60\ \mathrm{s})^{-1}$

5.2 Rule O2VAD1

Rule O2VAD1 is a rate rule for parameter O2VAD1:

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{O2VAD1} = \mathrm{DO2VAD} \tag{2}$$

Derived unit $(60\ \mathrm{s})^{-1}$

5.3 Rule O2UTIL

Rule O2UTIL is an assignment rule for parameter O2UTIL:

$$\mathrm{O2UTIL} = \mathrm{DOB} + \mathrm{RMO} \tag{3}$$

Derived unit $\mathrm{ml} \cdot (60\ \mathrm{s})^{-1}$

5.4 Rule OSA

Rule OSA is an assignment rule for parameter OSA:

$$\mathrm{OSA} = \frac{\frac{\mathrm{OVA}}{\mathrm{HM}}}{5.25} \tag{4}$$

5.5 Rule PO2ART

Rule PO2ART is an assignment rule for parameter PO2ART:

$$\mathrm{PO2ART} = \begin{cases} 114 + (\mathrm{OSA} - 1) \cdot 6667 & \text{if } \mathrm{OSA} > 1 \\ 74 + (\mathrm{OSA} - 0.936) \cdot 625 & \text{if } (\mathrm{OSA} > 0.936) \wedge (\mathrm{OSA} \leq 1) \\ 46 + (\mathrm{OSA} - 0.8) \cdot 205.882 & \text{if } (\mathrm{OSA} > 0.8) \wedge (\mathrm{OSA} \leq 0.936) \\ \mathrm{OSA} \cdot 57.5 & \text{otherwise} \end{cases} \tag{5}$$

5.6 Rule O2VTST1

Rule O2VTST1 is an assignment rule for parameter O2VTST1:

$$\mathrm{O2VTST1} = \frac{\mathrm{PO2ART} - 67}{30} \tag{6}$$

5.7 Rule O2VTST

Rule O2VTST is an assignment rule for parameter O2VTST:

$$\mathrm{O2VTST} = \begin{cases} 1 & \text{if } \mathrm{O2VTST1} > 1 \\ 0.6 & \text{if } \mathrm{O2VTST1} < 0.6 \\ \mathrm{O2VTST1} & \text{otherwise} \end{cases} \tag{7}$$

5.8 Rule O2VTS2

Rule O2VTS2 is an assignment rule for parameter O2VTS2:

$$\mathrm{O2VTS2} = \frac{1}{\mathrm{O2VTST}} \tag{8}$$

5.9 Rule DO2VAD

Rule DO2VAD is an assignment rule for parameter DO2VAD:

$$\mathrm{DO2VAD} = ((\mathrm{O2VTS2} - 1) \cdot 3 - \mathrm{O2VAD1}) \cdot 5 \cdot 10^{-4} \tag{9}$$

5.10 Rule O2VAD2

Rule O2VAD2 is an assignment rule for parameter O2VAD2:

$$\mathrm{O2VAD2} = \mathrm{O2VAD1} + 1 \tag{10}$$

5.11 Rule ALVENT

Rule ALVENT is an assignment rule for parameter ALVENT:

$$\mathrm{ALVENT} = \mathrm{O2UTIL} \cdot \mathrm{VNTSTM} \cdot 0.026667 \cdot \mathrm{O2VTS2} \cdot \mathrm{O2VAD2} \tag{11}$$

5.12 Rule PO2ALV

Rule PO2ALV is an assignment rule for parameter PO2ALV:

$$\mathrm{PO2ALV} = \mathrm{PO2AMB} - \frac{\frac{\mathrm{O2UTIL}}{\mathrm{ALVENT}}}{0.761} \tag{12}$$

5.13 Rule RSPDFC

Rule RSPDFC is an assignment rule for parameter RSPDFC:

$$\mathrm{RSPDFC} = \frac{\mathrm{PL2}}{\mathrm{VPTISS} + \mathrm{VPF}} \tag{13}$$

Derived unit $0.0100000000000000002\,\mathrm{l} \cdot (60\,\mathrm{s})^{-1} \cdot (133.322\,\mathrm{N})^{-1} \cdot \mathrm{m}^2$

5.14 Rule O2DFS

Rule O2DFS is an assignment rule for parameter O2DFS:

$$\mathrm{O2DFS} = (\mathrm{PO2ALV} - \mathrm{PO2ART}) \cdot \mathrm{RSPDFC} \tag{14}$$

Derived unit $\mathrm{ml} \cdot (60\ \mathrm{s})^{-1}$

5.15 Rule DOVA

Rule DOVA is an assignment rule for parameter DOVA:

$$\mathrm{DOVA} = \frac{\mathrm{O2DFS} - \mathrm{O2UTIL}}{\mathrm{QRO} \cdot 1} \tag{15}$$

SBML2LaTeX 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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