

## 1 “environment” component

This component has no equations.

## 2 “G\_o” component

This component has no equations.

## 3 “G” component

$$\frac{d(G)}{d(time)} = (V_{IN} - V_{HK})$$

## 4 “G6P” component

$$\frac{d(G6P)}{d(time)} = (V_{HK} - (V_{PFK} + V_{G6PDH}))$$

## 5 “FDP” component

$$\frac{d(FDP)}{d(time)} = (V_{PFK} - V_{ALD})$$

## 6 “G3P” component

$$\frac{d(G3P)}{d(time)} = (2.0 * V_{ALD} - V_{GAPDH})$$

## 7 “DPG” component

$$\frac{d(DPG)}{d(time)} = (V\_GAPDH - V\_PGK)$$

## 8 “PEP” component

$$\frac{d(PEP)}{d(time)} = (V\_PGK - V\_PK)$$

## 9 “Py” component

$$\frac{d(Py)}{d(time)} = (V\_PK - (V\_TCA + V\_ADH))$$

## 10 “ATP” component

$$\frac{d(ATP)}{d(time)} = ((V\_PGK + V\_PK + PO * V\_TCA) - (V\_HK + V\_PFK + V\_ATPase))$$

## 11 “ADP” component

This component has no equations.

## 12 “AMP” component

This component has no equations.

## 13 “Cn” component

Cn calculation

$$Cn = (ATP + ADP + AMP)$$

## 14 “GTP” component

This component has no equations.

## 15 “GDP” component

This component has no equations.

## 16 “H” component

This component has no equations.

## 17 “NADP” component

This component has no equations.

## 18 “NADH” component

This component has no equations.

## 19 “NAD” component

This component has no equations.

## 20 “CD” component

This component has no equations.

## 21 “CT” component

$$\frac{d(CT)}{d(time)} = -((k_{pol} * CT * (CP)^{2.0} + k_f * CD + k_b * CT * GDP))$$

## 22 “CP” component

$$\frac{d(CP)}{d(time)} = (k_{pol} * CT * (CP)^{2.0} - k_{dp} * CP)$$

## 23 “CMTP” component

CMTP\_calculation

$$CMTP = (CD + CT + CP)$$

## 24 “PKp” component

$$\frac{d(PKp)}{d(time)} = (0.1 * k_{p2} * PKt * CP - (k_{p3} * PKp + k_4 * PKp * GTP))$$

## 25 “PKt” component

This component has no equations.

## 26 “C\_PK” component

C\_PK\_calculation

$$C\_PK = (PKt + PKp)$$

## 27 “V\_IN” component

V\_IN\_calculation

$$V\_IN = \left( V\_IN\_max * \frac{G_o}{(KG\_in + G_o) * \left(1.0 + \frac{G6P}{Ke\_in}\right)} - \frac{G}{(KG\_in + G) * \left(1.0 + \frac{G6P}{Ke\_in}\right)} \right)$$

## 28 “V\_HK” component

V\_HK\_calculation

$$V\_HK = V\_HK\_max * \frac{1.0}{\left(1.0 + \frac{KG\_s * KATP\_m}{G * ATP} + \frac{KG\_m}{G} + \frac{KATP\_m}{ATP}\right)}$$

## 29 “V\_PFK” component

V\_PFK\_calculation

$$V_{PFK} = V_{PFK\_max} * \frac{gr * \frac{G6P}{KG6P\_r} * \frac{ATP}{KATP\_r} * \left( \left( 1.0 + \frac{G6P}{KG6P\_r} + \frac{ATP}{KATP\_r} + gr * \frac{G6P}{KG6P\_r} * \frac{ATP}{KATP\_r} \right) \right)^{(n1-1.0)}}{\left( \left( 1.0 + \frac{G6P}{KG6P\_r} + \frac{ATP}{KATP\_r} + gr * \frac{G6P}{KG6P\_r} * \frac{ATP}{KATP\_r} \right) \right)^{n1} + Lo * \left( \frac{(1.0 + \frac{cAMP * AMP}{KAMP\_r})}{(1.0 + \frac{AMP}{KAMP\_r})} \right)^{n1} * \left( 1.0 + \frac{cG6P * G6P}{KG6P\_r} + \frac{cATP * ATP}{KATP\_r} + gr * \frac{cG6P * G6P}{KG6P\_r} * \frac{cATP * ATP}{KATP\_r} \right)}$$

## 30 “V\_G6PDH” component

V\_G6PDH\_calculation

$$V_{G6PDH} = \left( \frac{V_{G6PDH\_max}}{\left( \frac{KG6P * KNADP}{G6P * NADP} + \frac{KG6P}{G6P} + \frac{KNADP}{NADP} + 1.0 \right)} + \frac{V_{G6PDH\_max\_II}}{\left( \frac{KG6P * KNADP * KTUB}{G6P * NADP * TUB} + \frac{KG6P * KNADP}{G6P * NADP} + \frac{KNADP * KTUB}{NADP * TUB} + \frac{KG6P * KTUB}{G6P * TUB} + \frac{KTUB}{TUB} + \frac{KG6P}{G6P} + \frac{KNADP}{NADP} + 1.0 \right)} \right)$$

TUB\_calculation

$$TUB = (CT + CD)$$

## 31 “V\_ALD” component

V\_ALD\_calculation

$$V_{ALD} = \frac{(V_{ALD\_max} * \frac{FDP}{KFDP\_m} - V_{ALD\_max\_r} * \frac{G3P}{KG3P\_m})}{\left( 1.0 + \frac{FDP}{KFDP\_m} + \frac{G3P}{KG3P\_m} \right)}$$

## 32 “V\_GAPDH” component

V\_GAPDH\_calculation

$$V_{GAPDH} = \frac{V_{GAPDH\_max}}{\left( 1.0 + \frac{KG3P}{G3P} + \frac{KNAD}{NAD} * \left( 1.0 + \frac{AMP}{K1} + \frac{ADP}{K2} + \frac{ATP}{K3} \right) + \frac{KG3P * KNAD}{G3P * NAD} * \left( 1.0 + \frac{NADH}{KNADH\_i} \right) + \left( 1.0 + \frac{AMP}{K1} + \frac{ADP}{K2} + \frac{ATP}{K3} \right) \right)}$$

## 33 “V\_PGK” component

V\_PGK\_calculation

$$V_{PGK} = \frac{V_{PGK\_max} * DPG}{(KDPG\_m + DPG)}$$

### 34 “V\_PK” component

V\_PK\_calculation

$$V_{PK} = \frac{V_{PK\_max} \left( gr\_PK * \frac{PEP}{KPEP\_r} * \frac{ADP}{KADP\_r} * (R)^n + Lo\_PK * \left( \frac{(1.0 + \frac{cFDP * FDP}{KFDP\_r})}{(1.0 + \frac{FDP}{KFDP\_r})} \right)^n * \frac{FDP}{KFDP\_r} * gt\_PK * \frac{cPEP * PEP}{KPEP\_r} * \frac{cADP * ADP}{KADP\_r} * (T)^{(1.0-n)} \right)}{\left( (R)^n + Lo\_PK * \left( \frac{(1.0 + \frac{cFDP * FDP}{KFDP\_r})}{(1.0 + \frac{FDP}{KFDP\_r})} \right)^n * (T)^n \right)}$$

R\_calculation

$$R = \left( 1.0 + \frac{PEP}{KPEP\_r} + \frac{ADP}{KADP\_r} + gr\_PK * \frac{PEP}{KPEP\_r} * \frac{ADP}{KADP\_r} \right)$$

T\_calculation

$$T = \left( 1.0 + \frac{cPEP * PEP}{KPEP\_r} + \frac{cADP * ADP}{KADP\_r} + gt\_PK * \frac{cPEP * PEP}{KPEP\_r} * \frac{cADP * ADP}{KADP\_r} \right)$$

V\_PK\_max\_calculation

$$V_{PK\_max} = \left( V_{PKt\_max} + (V_{PKp\_max} - V_{PKt\_max}) * \frac{PKp}{C\_PK} \right)$$

n\_calculation

$$n = \left( 4.0 + \frac{PKp}{C\_PK} \right)$$

### 35 “V\_TCA” component

V\_TCA\_calculation

$$V_{TCA} = \frac{V_{TCA\_max} * (Py)^{2.0}}{\left( (KPy\_m)^{2.0} + (Py)^{2.0} \right)}$$

### 36 “V\_ADH” component

V\_ADH\_calculation

$$V_{ADH} = \frac{V_{ADH\_max} * Py}{(KPy\_m + Py)}$$

### 37 “V\_ATPase” component

V\_ATPase\_calculation

$$V_{ATPase} = KATP * ATP$$