## Phosphate carrier[[1]](#footnote-20)

Follows equilibrium random Bi:Bi reaction kinetics

| Parameter | Value | Unit | Desc. |
| --- | --- | --- | --- |
|  | 11.06 | mM | Extra-matrix Pi binding constant |
|  | 11.06 | mM | Mitochondrial matrix Pi binding constant |
|  | 4.08E-5 | mM | Extra-matrix OH- binding constant |
|  | 4.08E-5 | mM | Mitochondrial matrix OH- binding constant |
|  | 1.5 | Hz | Forward rate |
|  | 4.9 | mM | PiC activity |
|  | 1 | - | Equilibrium constant of PiC |

## Mitochondrial Sodium-hydrogen exchanger (mNHE)[[2]](#footnote-23)

Following Smith and Crampin’s model of counterpart on the plasma membrane

| Parameter | Value | Unit | Desc. |
| --- | --- | --- | --- |
|  | 0.00785 | mM | NHE concentration |
|  | 24 | mM | Na Dissociation constant |
|  | 158.5E-6 | mM | H Dissociation constant |
|  | 3.02E-6 | mM | Proton binding constant |
|  | 3 | - | Hill coefficient for H+ binding |
|  | 25.2 | Hz | NHE forward rate constant |
|  | 42.9 | Hz | NHE backward rate constant |
|  | 160 | Hz | NHE forward rate constant |
|  | 1 | - | Equilibrium constant of NHE |

## Adenine Nucleotide translocator (ANT) [[3]](#footnote-25)

| Parameter | Value | Unit | Desc. |
| --- | --- | --- | --- |
|  | 3150 | mM \* Hz | Maximal rate |
|  | 0.5 | - | Fraction of dpsi |

## Mitochondrial calcium uniporter (MCU)[[4]](#footnote-27)

| Parameter | Value | Unit | Desc. |
| --- | --- | --- | --- |
|  | 4.46 | mM \* Hz | Maximal rate |
|  | 91 | mV | Offset potential |
|  | 3.8E-4 | mM | Activation constant for calcium |
|  | 0.019 | mM | Dissociation constant for calcium |
| n | -2.8 | - | Activation cooperativity |
| L | 110 | - | Keq for conformational transitions |

## Mitochondrial sodium-calcium exchanger (NCLX)[[5]](#footnote-29)

| Parameter | Value | Unit | Desc. |
| --- | --- | --- | --- |
|  | 0.183 | mM \* Hz | Maximal rate |
| b | 0.5 | - | Ffraction of |
|  | 9.4 | mM | Dissociation constant for sodium |
|  | 3.75E-4 | mM | Dissociation constant for calcium |
|  | 3 |  |  |

Mitochondrial proton leak

| Parameter | Value | Unit | Desc. |
| --- | --- | --- | --- |
|  | 2 | mM / (V \* s) | Ionic conductance of the inner membrane |

## Mitochondrial hydrogen flux balance[[6]](#footnote-31)

* : Proton influx to mitochondrial matrix by pumps / transporters
* : Proton flux due to enzyme stoichiometry
* : Proton flux due to ligand binding / unbinding

## ODEs for mitochondrial ions

1. Wei AC, Aon MA, O’Rourke B, Winslow RL, Cortassa S. Mitochondrial energetics, pH regulation, and ion dynamics: a computational-experimental approach. Biophys J. 2011;100(12):2894-903. [PMC3123977](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3123977/) [↑](#footnote-ref-20)
2. Wei AC, Aon MA, O’Rourke B, Winslow RL, Cortassa S. Mitochondrial energetics, pH regulation, and ion dynamics: a computational-experimental approach. Biophys J. 2011;100(12):2894-903. [PMC3123977](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3123977/) [↑](#footnote-ref-23)
3. Wei AC, Aon MA, O’Rourke B, Winslow RL, Cortassa S. Mitochondrial energetics, pH regulation, and ion dynamics: a computational-experimental approach. Biophys J. 2011;100(12):2894-903. [PMC3123977](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3123977/) [↑](#footnote-ref-25)
4. Wei AC, Aon MA, O’Rourke B, Winslow RL, Cortassa S. Mitochondrial energetics, pH regulation, and ion dynamics: a computational-experimental approach. Biophys J. 2011;100(12):2894-903. [PMC3123977](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3123977/) [↑](#footnote-ref-27)
5. Wei AC, Aon MA, O’Rourke B, Winslow RL, Cortassa S. Mitochondrial energetics, pH regulation, and ion dynamics: a computational-experimental approach. Biophys J. 2011;100(12):2894-903. [PMC3123977](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3123977/) [↑](#footnote-ref-29)
6. Wei AC, Aon MA, O’Rourke B, Winslow RL, Cortassa S. Mitochondrial energetics, pH regulation, and ion dynamics: a computational-experimental approach. Biophys J. 2011;100(12):2894-903. [PMC3123977](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3123977/) [↑](#footnote-ref-31)