Table S3. Ordinary Differential Equations for each of the kinetic reaction used in four models.

$$\frac{d([Met]\cdot V_{cell})}{dt} = -V_{cell}\cdot\left(\frac{V_{(SAMsyn)}\cdot[Met]^{h_{(SAMsyn)}}}{Shalve_{(SAMsyn)}^{h_{(SAMsyn)}} + [Met]^{h_{(SAMsyn)}}}\right)$$

$$\frac{d([SAM]\cdot V_{cell})}{dt} = +V_{cell}\cdot\left(\frac{V_{(SAMsyn)}\cdot[Met]^{h_{(SAMsyn)}}}{Shalve_{(SAMsyn)}^{h_{(SAMsyn)}} + [Met]^{h_{(SAMsyn)}}}\right) - V_{cell}\cdot\left(\frac{V_{(SAMdc)}\cdot[SAM]}{Km_{(SAMdc)} + [SAM]}\right)$$

$$\frac{d([dcSAM]\cdot V_{cell})}{dt} = +V_{cell}\cdot\left(\frac{V_{(SAMdc)}\cdot[SAM]}{Km_{(SAMdc)} + [SAM]}\right) - V_{cell}\cdot\left(\frac{VmPut_{(SpdS)}\cdot[Put]\cdot[dcSAM]}{KmdcSAM_{(SpdS)}\cdot[Put] + KmPut_{(SpdS)}\cdot[dcSAM] + [Put]\cdot[dcSAM] + KddcSAM_{(SpdS)}\cdot KmPut_{(SpdS)}}\right)$$

$$\frac{d([Arg]\cdot V_{cell})}{dt} = -V_{cell}\cdot\left(\frac{V_{(Arginase)}\cdot[Arg]}{Km_{(Arginase)} + [Arg]}\right)$$

$$\frac{d([Orn]\cdot V_{cell})}{dt} = +V_{cell}\cdot\left(\frac{V_{(Arginase)}\cdot[Arg]}{Km_{(Arginase)} + [Arg]}\right) - V_{cell}\cdot\left(\frac{V_{(ODC)}\cdot[Orn]}{Km_{(ODC)} + [Orn]}\right)$$

$$\frac{d([Put]\cdot V_{cell})}{dt} = +V_{cell}\cdot\left(\frac{V_{(ODC)}\cdot[Orn]}{Km_{(ODC)} + [Orn]}\right) - V_{cell}\cdot\left(\frac{VmPut_{(SpdS)}\cdot[Put]\cdot[dcSAM]}{KmdcSAM_{(SpdS)}\cdot[Put] + KmPut_{(SpdS)}\cdot[dcSAM] + [Put]\cdot[dcSAM] + KddcSAM_{(SpdS)}\cdot KmPut_{(SpdS)}}\right)$$

$$\frac{d([Spd]\cdot V_{cell})}{dt} = +V_{cell}\cdot\left(\frac{VmPut_{(SpdS)}\cdot[Put]\cdot[dcSAM]}{KmdcSAM_{(SpdS)}\cdot[Put] + KmPut_{(SpdS)}\cdot[dcSAM] + [Put]\cdot[dcSAM] + KddcSAM_{(SpdS)}\cdot KmPut_{(SpdS)}}\right) - V_{cell}\cdot\left(\frac{vmax_{(TryS1)}\cdot[Spd]\cdot[GSH]}{Kma_{(TryS1)}\cdot Kmb_{(TryS1)} + [Spd]\cdot Kmb_{(TryS1)} + [GSH]\cdot Kma_{(TryS1)} + [Spd]\cdot[GSH]}\right)$$

$$\frac{d([Cys]\cdot V_{cell})}{dt} = -V_{cell}\cdot\left(\frac{Vm_{(yECS)}\cdot[Cys]\cdot[Glu]}{Km2_{(yECS)}\cdot[Cys] + Km1_{(yECS)}\cdot[Glu] + [Cys]\cdot[Glu] + kd1_{(yECS)}\cdot Km2_{(yECS)}}\right)$$

$$\frac{d([Glu]\cdot V_{cell})}{dt} = -V_{cell}\cdot\left(\frac{Vm_{(yECS)}\cdot[Cys]\cdot[Glu]}{Km2_{(yECS)}\cdot[Cys] + Km1_{(yECS)}\cdot[Glu] + [Cys]\cdot[Glu] + kd1_{(yECS)}\cdot Km2_{(yECS)}}\right)$$

$$\frac{d([GluCys]\cdot V_{cell})}{dt} = +V_{cell}\cdot\left(\frac{Vm_{(yECS)}\cdot[Cys]\cdot[Glu]}{Km2_{(yECS)}\cdot[Cys] + Km1_{(yECS)}\cdot[Glu] + [Cys]\cdot[Glu] + kd1_{(yECS)}\cdot Km2_{(yECS)}}\right) - V_{cell}\cdot\left(\frac{Vm_{(GS)}\cdot[Gly]\cdot[GluCys]}{Km2_{(GS)}\cdot[Gly] + Km1_{(GS)}\cdot[GluCys] + [Gly]\cdot[GluCys] + kd1_{(GS)}\cdot Km2_{(GS)}}\right)$$

$$
\begin{aligned}
& & & - V_{cell} \cdot \left(\frac{Vm_{(GS)} \cdot [Gly] \cdot [GluCys]}{Km2_{(GS)} \cdot [Gly] + Km1_{(GS)} \cdot [GluCys] + [Gly] \cdot [GluCys] + kd1_{(GS)} \cdot Km2_{(GS)}} \right) \\
\frac{d([GSH] \cdot V_{cell})}{dt} & = & & + V_{cell} \cdot \left(\frac{Vm_{(GS)} \cdot [Gly] \cdot [GluCys]}{Km2_{(GS)} \cdot [Gly] + Km1_{(GS)} \cdot [GluCys] + [Gly] \cdot [GluCys] + kd1_{(GS)} \cdot Km2_{(GS)}} \right) \\
& & & - V_{cell} \cdot \left(\frac{vmax_{(TryS1)} \cdot [Spd] \cdot [GSH]}{Kma_{(TryS1)} \cdot Kmb_{(TryS1)} + [Spd] \cdot Kmb_{(TryS1)} + [GSH] \cdot Kma_{(TryS1)} + [Spd] \cdot [GSH]} \right) \\
& & & - V_{cell} \cdot \left(\frac{vmax_{(TryS2)} \cdot [Gspd] \cdot [GSH]}{Kma_{(TryS2)} \cdot Kmb_{(TryS2)} + [Gspd] \cdot Kmb_{(TryS2)} + [GSH] \cdot Kma_{(TryS2)} + [Gspd] \cdot [GSH]} \right) \\
\frac{d([Gly] \cdot V_{cell})}{dt} & = & & - V_{cell} \cdot \left(\frac{Vm_{(GS)} \cdot [Gly] \cdot [GluCys]}{Km2_{(GS)} \cdot [Gly] + Km1_{(GS)} \cdot [GluCys] + [Gly] \cdot [GluCys] + kd1_{(GS)} \cdot Km2_{(GS)}} \right) \\
\frac{d([Gspd] \cdot V_{cell})}{dt} & = & & + V_{cell} \cdot \left(\frac{vmax_{(TryS1)} \cdot [Spd] \cdot [GSH]}{Kma_{(TryS1)} \cdot Kmb_{(TryS1)} + [Spd] \cdot Kmb_{(TryS1)} + [GSH] \cdot Kma_{(TryS1)} + [Spd] \cdot [GSH]} \right) \\
& & & - V_{cell} \cdot \left(\frac{vmax_{(TryS2)} \cdot [Gspd] \cdot [GSH]}{Kma_{(TryS2)} \cdot Kmb_{(TryS2)} + [Gspd] \cdot Kmb_{(TryS2)} + [GSH] \cdot Kma_{(TryS2)} + [Gspd] \cdot [GSH]} \right) \\
\frac{d([TS2] \cdot V_{cell})}{dt} & = & & + V_{cell} \cdot (k1_{(\text{"TXNo Reduction"})} \cdot [T[SH]2] \cdot [TXNo]) \\
& & & + V_{cell} \cdot (k1_{(\text{"Grx1 reduction"})} \cdot [Grx1] \cdot [T[SH]2]) \\
& & & + V_{cell} \cdot (k1_{(\text{"Grx2 reduction"})} \cdot [Grx2] \cdot [T[SH]2]) \\
& & & - V_{cell} \cdot \left(\frac{V_{(TR)} \cdot [TS2] \cdot [NADPH]}{KmA_{(TR)} \cdot KmB_{(TR)} + KmB_{(TR)} \cdot [TS2] + KmA_{(TR)} \cdot [NADPH]} \right) \\
\frac{d([T[SH]2] \cdot V_{cell})}{dt} & = & & - V_{cell} \cdot (k1_{(\text{"TXNo Reduction"})} \cdot [T[SH]2] \cdot [TXNo]) \\
& & & - V_{cell} \cdot (k1_{(\text{"Grx1 reduction"})} \cdot [Grx1] \cdot [T[SH]2]) \\
& & & - V_{cell} \cdot (k1_{(\text{"Grx2 reduction"})} \cdot [Grx2] \cdot [T[SH]2]) \\
& & & + V_{cell} \cdot \left(\frac{vmax_{(TryS2)} \cdot [Gspd] \cdot [GSH]}{Kma_{(TryS2)} \cdot Kmb_{(TryS2)} + [Gspd] \cdot Kmb_{(TryS2)} + [GSH] \cdot Kma_{(TryS2)} + [Gspd] \cdot [GSH]} \right) \\
& & & + V_{cell} \cdot \left(\frac{V_{(TR)} \cdot [TS2] \cdot [NADPH]}{KmA_{(TR)} \cdot KmB_{(TR)} + KmB_{(TR)} \cdot [TS2] + KmA_{(TR)} \cdot [NADPH]} \right) \\
\frac{d([CO2] \cdot V_{cell})}{dt} & = & & + V_{cell} \cdot \left(\frac{V_{(ODC)} \cdot [Orn]}{Km_{(ODC)} + [Orn]} \right)
\end{aligned}
$$

$$\frac{d([TXNo]\cdot V_{cell})}{dt} = -V_{cell}\cdot(k1_{("TXNo\ Reduction")}\cdot[T[SH]2]\cdot[TXNo]) + V_{cell}\cdot\left(\frac{Kcat_{(TDPx)}\cdot[TDPx]\cdot[H2O2]\cdot[TXNr]}{Kb_{(TDPx)}\cdot[H2O2]+Ka_{(TDPx)}\cdot[TXNr]+[H2O2]\cdot[TXNr]}\right) + V_{cell}\cdot\left(\frac{Kcat_{(TryP)}\cdot[TryP]\cdot[H2O2]\cdot[TXNr]}{Kb_{(TryP)}\cdot[H2O2]+Ka_{(TryP)}\cdot[TXNr]+[H2O2]\cdot[TXNr]}\right)$$

$$\frac{d([TXNr]\cdot V_{cell})}{dt} = +V_{cell}\cdot(k1_{("TXNo\ Reduction")}\cdot[T[SH]2]\cdot[TXNo]) - V_{cell}\cdot\left(\frac{Kcat_{(TDPx)}\cdot[TDPx]\cdot[H2O2]\cdot[TXNr]}{Kb_{(TDPx)}\cdot[H2O2]+Ka_{(TDPx)}\cdot[TXNr]+[H2O2]\cdot[TXNr]}\right) - V_{cell}\cdot\left(\frac{Kcat_{(TryP)}\cdot[TryP]\cdot[H2O2]\cdot[TXNr]}{Kb_{(TryP)}\cdot[H2O2]+Ka_{(TryP)}\cdot[TXNr]+[H2O2]\cdot[TXNr]}\right)$$

$$\frac{d([H2O]\cdot V_{cell})}{dt} = +V_{cell}\cdot\left(\frac{Kcat_{(TDPx)}\cdot[TDPx]\cdot[H2O2]\cdot[TXNr]}{Kb_{(TDPx)}\cdot[H2O2]+Ka_{(TDPx)}\cdot[TXNr]+[H2O2]\cdot[TXNr]}\right) + V_{cell}\cdot\left(\frac{Kcat_{(TryP)}\cdot[TryP]\cdot[H2O2]\cdot[TXNr]}{Kb_{(TryP)}\cdot[H2O2]+Ka_{(TryP)}\cdot[TXNr]+[H2O2]\cdot[TXNr]}\right)$$

$$\frac{d([H2O2]\cdot V_{cell})}{dt} = -V_{cell}\cdot\left(\frac{Kcat_{(TDPx)}\cdot[TDPx]\cdot[H2O2]\cdot[TXNr]}{Kb_{(TDPx)}\cdot[H2O2]+Ka_{(TDPx)}\cdot[TXNr]+[H2O2]\cdot[TXNr]}\right) - V_{cell}\cdot\left(\frac{Kcat_{(TryP)}\cdot[TryP]\cdot[H2O2]\cdot[TXNr]}{Kb_{(TryP)}\cdot[H2O2]+Ka_{(TryP)}\cdot[TXNr]+[H2O2]\cdot[TXNr]}\right) + V_{cell}\cdot(k1_{("Aconitase\_O2.-")}\cdot["O2.-"]\cdot["aconitase[4Fe-4S]"]) + V_{cell}\cdot(k1_{("Fumarase\ O2.-")}\cdot["O2.-"]\cdot["fumarase[4Fe-4S]"]) - V_{cell}\cdot(k1_{("Fenton\ reaction")}\cdot[H2O2]\cdot["Fe+3"])$$

$$\frac{d([\text{aconitase}]\cdot V_{cell})}{dt} = -V_{cell}\cdot\left(\frac{V_{(Aco\_activation\_grx1)}\cdot[\text{aconitase}]\cdot[\text{"ISC-Grx1r[4Fe-4S]"}]}{KmA_{(Aco\_activation\_grx1)}\cdot KmB_{(Aco\_activation\_grx1)} + KmB_{(Aco\_activation\_grx1)}\cdot[\text{aconitase}] + KmA_{(Aco\_activation\_grx1)}\cdot[\text{"ISC-Grx1r[4Fe-4S]"}]}\right)$$
$$-V_{cell}\cdot\left(\frac{V_{(Aco\_activation\_grx2)}\cdot[\text{aconitase}]\cdot[\text{"ISC-Grx2r[4Fe-4S]"}]}{KmA_{(Aco\_activation\_grx2)}\cdot KmB_{(Aco\_activation\_grx2)} + KmB_{(Aco\_activation\_grx2)}\cdot[\text{aconitase}] + KmA_{(Aco\_activation\_grx2)}\cdot[\text{"ISC-Grx2r[4Fe-4S]"}]}\right)$$

$$\frac{d([\text{"fumarase[4Fe-4S]"}]\cdot V_{cell})}{dt} = +V_{cell}\cdot\left(\frac{V_{(Fum\_activation\_grx1)}\cdot[\text{Fumarase}]\cdot[\text{"ISC-Grx1r[4Fe-4S]"}]}{KmA_{(Fum\_activation\_grx1)}\cdot KmB_{(Fum\_activation\_grx1)} + KmB_{(Fum\_activation\_grx1)}\cdot[\text{Fumarase}] + KmA_{(Fum\_activation\_grx1)}\cdot[\text{"ISC-Grx1r[4Fe-4S]"}]}\right)$$
$$+V_{cell}\cdot\left(\frac{V_{(Fum\_activation\_grx2)}\cdot[\text{Fumarase}]\cdot[\text{"ISC-Grx2r[4Fe-4S]"}]}{KmA_{(Fum\_activation\_grx2)}\cdot KmB_{(Fum\_activation\_grx2)} + KmB_{(Fum\_activation\_grx2)}\cdot[\text{Fumarase}] + KmA_{(Fum\_activation\_grx2)}\cdot[\text{"ISC-Grx2r[4Fe-4S]"}]}\right)$$
$$-V_{cell}\cdot(k1_{(\text{"Fumarase O2.-"})}\cdot[\text{"O2.-"}]\cdot[\text{"fumarase[4Fe-4S]"}])$$
$$+V_{cell}\cdot(k1_{(\text{"Fum\_activation\_Fe+2"})}\cdot[\text{"fumarase[3Fe-4S]+"}]\cdot[\text{"Fe+2"}])$$
$$-V_{cell}\cdot(k1_{(\text{"Fum\_ONOO-"})}\cdot[\text{"fumarase[4Fe-4S]"}]\cdot[\text{"ONOO-"}])$$

$$\frac{d([\text{Fumarase}]\cdot V_{cell})}{dt} = -V_{cell}\cdot\left(\frac{V_{(Fum\_activation\_grx1)}\cdot[\text{Fumarase}]\cdot[\text{"ISC-Grx1r[4Fe-4S]"}]}{KmA_{(Fum\_activation\_grx1)}\cdot KmB_{(Fum\_activation\_grx1)} + KmB_{(Fum\_activation\_grx1)}\cdot[\text{Fumarase}] + KmA_{(Fum\_activation\_grx1)}\cdot[\text{"ISC-Grx1r[4Fe-4S]"}]}\right)$$
$$-V_{cell}\cdot\left(\frac{V_{(Fum\_activation\_grx2)}\cdot[\text{Fumarase}]\cdot[\text{"ISC-Grx2r[4Fe-4S]"}]}{KmA_{(Fum\_activation\_grx2)}\cdot KmB_{(Fum\_activation\_grx2)} + KmB_{(Fum\_activation\_grx2)}\cdot[\text{Fumarase}] + KmA_{(Fum\_activation\_grx2)}\cdot[\text{"ISC-Grx2r[4Fe-4S]"}]}\right)$$

$$\frac{d([\text{Grx1}]\cdot V_{cell})}{dt} = -V_{cell}\cdot(k1_{(\text{"Grx1 reduction"})}\cdot[\text{Grx1}]\cdot[\text{T[SH]2}])$$

$$\frac{d([\text{Grx1r}]\cdot V_{cell})}{dt} = +V_{cell}\cdot(k1_{(\text{"Grx1 reduction"})}\cdot[\text{Grx1}]\cdot[\text{T[SH]2}])$$
$$-V_{cell}\cdot(k1_{(\text{"ISCU-grx1 complex"})}\cdot[\text{"ISCU[2Fe-2S]"}]\cdot[\text{Grx1r}])$$

$$\frac{d([\text{Grx2}]\cdot V_{cell})}{dt} = -V_{cell}\cdot(k1_{(\text{"Grx2 reduction"})}\cdot[\text{Grx2}]\cdot[\text{T[SH]2}])$$

$$\frac{d([Grx2]\cdot V_{cell})}{dt} = -V_{cell}\cdot(k1_{("Grx2\ reduction")}\cdot[Grx2]\cdot[T[SH]2])$$

$$\frac{d([Grx2r]\cdot V_{cell})}{dt} = +V_{cell}\cdot(k1_{("Grx2\ reduction")}\cdot[Grx2]\cdot[T[SH]2])$$
$$-V_{cell}\cdot(k1_{("ISCU\text{-}grx2\ complex")}\cdot["ISCU[2Fe\text{-}2S]"]\cdot[Grx2r])$$

$$\frac{d(["aconitase[4Fe\text{-}4S]"]\cdot V_{cell})}{dt} = +V_{cell}\cdot\left(\frac{V_{(Aco\_activation\_grx1)}\cdot[aconitase]\cdot["ISC\text{-}Grx1r[4Fe\text{-}4S]"]}{KmA_{(Aco\_activation\_grx1)}\cdot KmB_{(Aco\_activation\_grx1)}+KmB_{(Aco\_activation\_grx1)}\cdot[aconitase]+KmA_{(Aco\_activation\_grx1)}\cdot["ISC\text{-}Grx1r[4Fe\text{-}4S]"]}\right)$$
$$+V_{cell}\cdot\left(\frac{V_{(Aco\_activation\_grx2)}\cdot[aconitase]\cdot["ISC\text{-}Grx2r[4Fe\text{-}4S]"]}{KmA_{(Aco\_activation\_grx2)}\cdot KmB_{(Aco\_activation\_grx2)}+KmB_{(Aco\_activation\_grx2)}\cdot[aconitase]+KmA_{(Aco\_activation\_grx2)}\cdot["ISC\text{-}Grx2r[4Fe\text{-}4S]"]}\right)$$
$$-V_{cell}\cdot(k1_{("Aconitase\_O2.-")}\cdot["O2.-"]\cdot["aconitase[4Fe\text{-}4S]"])$$
$$+V_{cell}\cdot(k1_{("Aco\_activation\_Fe+2")}\cdot["aconitase[3Fe\text{-}4S]+"]\cdot["Fe+2"])$$
$$-V_{cell}\cdot(k1_{("Aco\_ONOO\text{-}")}\cdot["aconitase[4Fe\text{-}4S]"]\cdot["ONOO-"])$$

$$\frac{d([ISCU]\cdot V_{cell})}{dt} = +V_{cell}\cdot\left(\frac{V_{(Aco\_activation\_grx1)}\cdot[aconitase]\cdot["ISC\text{-}Grx1r[4Fe\text{-}4S]"]}{KmA_{(Aco\_activation\_grx1)}\cdot KmB_{(Aco\_activation\_grx1)}+KmB_{(Aco\_activation\_grx1)}\cdot[aconitase]+KmA_{(Aco\_activation\_grx1)}\cdot["ISC\text{-}Grx1r[4Fe\text{-}4S]"]}\right)$$
$$+V_{cell}\cdot\left(\frac{V_{(Fum\_activation\_grx1)}\cdot[Fumarase]\cdot["ISC\text{-}Grx1r[4Fe\text{-}4S]"]}{KmA_{(Fum\_activation\_grx1)}\cdot KmB_{(Fum\_activation\_grx1)}+KmB_{(Fum\_activation\_grx1)}\cdot[Fumarase]+KmA_{(Fum\_activation\_grx1)}\cdot["ISC\text{-}Grx1r[4Fe\text{-}4S]"]}\right)$$
$$+V_{cell}\cdot\left(\frac{V_{(Aco\_activation\_grx2)}\cdot[aconitase]\cdot["ISC\text{-}Grx2r[4Fe\text{-}4S]"]}{KmA_{(Aco\_activation\_grx2)}\cdot KmB_{(Aco\_activation\_grx2)}+KmB_{(Aco\_activation\_grx2)}\cdot[aconitase]+KmA_{(Aco\_activation\_grx2)}\cdot["ISC\text{-}Grx2r[4Fe\text{-}4S]"]}\right)$$
$$+V_{cell}\cdot\left(\frac{V_{(Fum\_activation\_grx2)}\cdot[Fumarase]\cdot["ISC\text{-}Grx2r[4Fe\text{-}4S]"]}{KmA_{(Fum\_activation\_grx2)}\cdot KmB_{(Fum\_activation\_grx2)}+KmB_{(Fum\_activation\_grx2)}\cdot[Fumarase]+KmA_{(Fum\_activation\_grx2)}\cdot["ISC\text{-}Grx2r[4Fe\text{-}4S]"]}\right)$$

$$\frac{d(["ISCU[2Fe-2S]"]\cdot V_{cell})}{dt} = +V_{cell}\cdot\left(\frac{V_{("ISCU\ activation")}\cdot["Fe+2"]\cdot["Fe+2"]}{KmA_{("ISCU\ activation")}\cdot KmB_{("ISCU\ activation")}+KmB_{("ISCU\ activation")}\cdot["Fe+2"]+KmA_{("ISCU\ activation")}\cdot["Fe+2"]}\right)$$
$$-V_{cell}\cdot(k1_{("ISCU\text{-}grx1\ complex")}\cdot["ISCU[2Fe-2S]"]\cdot[Grx1r])$$
$$-V_{cell}\cdot(k1_{("ISCU\text{-}grx2\ complex")}\cdot["ISCU[2Fe-2S]"]\cdot[Grx2r])$$

$$\frac{d([ISCU[2S]]\cdot V_{cell})}{dt} = -V_{cell}\cdot\left(\frac{V_{("ISCU\ activation")}\cdot["Fe+2"]\cdot["Fe+2"]}{KmA_{("ISCU\ activation")}\cdot KmB_{("ISCU\ activation")}+KmB_{("ISCU\ activation")}\cdot["Fe+2"]+KmA_{("ISCU\ activation")}\cdot["Fe+2"]}\right)$$

$$\frac{d(["ISC\text{-}Grx1r[4Fe\text{-}4S]"]\cdot V_{cell})}{dt} = -V_{cell}\cdot\left(\frac{V_{(Aco\_activation\_grx1)}\cdot[aconitase]\cdot["ISC\text{-}Grx1r[4Fe\text{-}4S]"]}{KmA_{(Aco\_activation\_grx1)}\cdot KmB_{(Aco\_activation\_grx1)}+KmB_{(Aco\_activation\_grx1)}\cdot[aconitase]+KmA_{(Aco\_activation\_grx1)}\cdot["ISC\text{-}Grx1r[4Fe\text{-}4S]"]}\right)$$
$$-V_{cell}\cdot\left(\frac{V_{(Fum\_activation\_grx1)}\cdot[Fumarase]\cdot["ISC\text{-}Grx1r[4Fe\text{-}4S]"]}{KmA_{(Fum\_activation\_grx1)}\cdot KmB_{(Fum\_activation\_grx1)}+KmB_{(Fum\_activation\_grx1)}\cdot[Fumarase]+KmA_{(Fum\_activation\_grx1)}\cdot["ISC\text{-}Grx1r[4Fe\text{-}4S]"]}\right)$$
$$+V_{cell}\cdot(k1_{("ISCU\text{-}grx1\ complex")}\cdot["ISCU[2Fe-2S]"]\cdot[Grx1r])$$

$$\frac{d(["ISC\text{-}Grx2r[4Fe\text{-}4S]"]\cdot V_{cell})}{dt} = +V_{cell}\cdot(k1_{("ISCU\text{-}grx2\ complex")}\cdot["ISCU[2Fe-2S]"]\cdot[Grx2r])$$
$$-V_{cell}\cdot\left(\frac{V_{(Aco\_activation\_grx2)}\cdot[aconitase]\cdot["ISC\text{-}Grx2r[4Fe\text{-}4S]"]}{KmA_{(Aco\_activation\_grx2)}\cdot KmB_{(Aco\_activation\_grx2)}+KmB_{(Aco\_activation\_grx2)}\cdot[aconitase]+KmA_{(Aco\_activation\_grx2)}\cdot["ISC\text{-}Grx2r[4Fe\text{-}4S]"]}\right)$$
$$-V_{cell}\cdot\left(\frac{V_{(Fum\_activation\_grx2)}\cdot[Fumarase]\cdot["ISC\text{-}Grx2r[4Fe\text{-}4S]"]}{KmA_{(Fum\_activation\_grx2)}\cdot KmB_{(Fum\_activation\_grx2)}+KmB_{(Fum\_activation\_grx2)}\cdot[Fumarase]+KmA_{(Fum\_activation\_grx2)}\cdot["ISC\text{-}Grx2r[4Fe\text{-}4S]"]}\right)$$

$$\frac{d(["O2.-"]\cdot V_{cell})}{dt} = -V_{cell}\cdot(k1_{("Aconitase\_O2.-")}\cdot["O2.-"]\cdot["aconitase[4Fe-4S]"])$$
$$-V_{cell}\cdot(k1_{("Fumarase\ O2.-")}\cdot["O2.-"]\cdot["fumarase[4Fe-4S]"])$$

$$\frac{d([.OH]\cdot V_{cell})}{dt} = +V_{cell}\cdot(k1_{("Fenton\ reaction")}\cdot[H2O2]\cdot["Fe+3"])$$

$$\frac{d(["Fe+3"]\cdot V_{cell})}{dt} = +V_{cell}\cdot(k1_{("Aconitase\_O2.-")}\cdot["O2.-"]\cdot["aconitase[4Fe-4S]"])$$
$$+V_{cell}\cdot(k1_{("Fumarase\ O2.-")}\cdot["O2.-"]\cdot["fumarase[4Fe-4S]"])$$
$$-V_{cell}\cdot(k1_{("Fenton\ reaction")}\cdot[H2O2]\cdot["Fe+3"])$$
$$+V_{cell}\cdot(k1_{("Aco\_ONOO-")}\cdot["aconitase[4Fe-4S]"]\cdot["ONOO-"])$$
$$+V_{cell}\cdot(k1_{("Fum\_ONOO-")}\cdot["fumarase[4Fe-4S]"]\cdot["ONOO-"])$$

$$\frac{d(["OH-"]\cdot V_{cell})}{dt} = +V_{cell}\cdot(k1_{("Fenton\ reaction")}\cdot[H2O2]\cdot["Fe+3"])$$

$$\frac{d(["aconitase[3Fe-4S]+"]\cdot V_{cell})}{dt} = +V_{cell}\cdot(k1_{("Aconitase\_O2.-")}\cdot["O2.-"]\cdot["aconitase[4Fe-4S]"])$$
$$-V_{cell}\cdot(k1_{("Aco\_activation\_Fe+2")}\cdot["aconitase[3Fe-4S]+"]\cdot["Fe+2"])$$
$$+V_{cell}\cdot(k1_{("Aco\_ONOO-")}\cdot["aconitase[4Fe-4S]"]\cdot["ONOO-"])$$

$$\frac{d(["fumarase[3Fe-4S]+"]\cdot V_{cell})}{dt} = +V_{cell}\cdot(k1_{("Fumarase\ O2.-")}\cdot["O2.-"]\cdot["fumarase[4Fe-4S]"])$$
$$-V_{cell}\cdot(k1_{("Fum\_activation\_Fe+2")}\cdot["fumarase[3Fe-4S]+"]\cdot["Fe+2"])$$
$$+V_{cell}\cdot(k1_{("Fum\_ONOO-")}\cdot["fumarase[4Fe-4S]"]\cdot["ONOO-"])$$

$$\frac{d(["ONOO-"]\cdot V_{cell})}{dt} = -V_{cell}\cdot(k1_{("Aco\_ONOO-")}\cdot["aconitase[4Fe-4S]"]\cdot["ONOO-"])$$
$$-V_{cell}\cdot(k1_{("Fum\_ONOO-")}\cdot["fumarase[4Fe-4S]"]\cdot["ONOO-"])$$

$$\frac{d([NADP]\cdot V_{cell})}{dt} = +V_{cell}\cdot\left(\frac{V_{(TR)}\cdot[TS2]\cdot[NADPH]}{KmA_{(TR)}\cdot KmB_{(TR)}+KmB_{(TR)}\cdot[TS2]+KmA_{(TR)}\cdot[NADPH]}\right)$$

$$\frac{d([NADPH]\cdot V_{cell})}{dt} = -V_{cell}\cdot\left(\frac{V_{(TR)}\cdot[TS2]\cdot[NADPH]}{KmA_{(TR)}\cdot KmB_{(TR)}+KmB_{(TR)}\cdot[TS2]+KmA_{(TR)}\cdot[NADPH]}\right)$$