

$$\frac{d\left([cL\_m] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( q1 \cdot L \cdot [cP] \cdot gml + \frac{n1 \cdot g1^2}{g1^2 + ([cP9] + [cP7] + [cP5] + [cT])^2} \cdot gml - (m1 \cdot L + m2 \cdot (1 - L)) \cdot [cL\_m] \right)$$

$$\frac{d\left([cL] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( \frac{(p2 + p1 \cdot L) \cdot [cL\_m]}{gml} - m3 \cdot [cL] - \frac{p3 \cdot [cL]^2}{[cL]^2 + g3^2} \right)$$

$$\frac{d\left([cLmod] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( \frac{p3 \cdot [cL]^2}{[cL]^2 + g3^2} - m3 \cdot [cLmod] \right)$$

$$\frac{d\left([cP] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot (p7 \cdot (1 - L) \cdot (1 - [cP]) - m11 \cdot [cP] \cdot L)$$

$$\frac{d\left([cP9\_m] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( L \cdot q3 \cdot [cP] \cdot gm9 + \frac{g8}{g8 + [cEC]} \cdot \left( n4 + \frac{n7 \cdot [cL]^2}{[cL]^2 + g9^2} \right) \cdot gm9 - m12 \cdot [cP9\_m] \right)$$

$$\frac{d\left([cP9] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( \frac{p8 \cdot [cP9\_m]}{gm9} - (m13 + m22 \cdot (1 - L)) \cdot [cP9] \right)$$

$$\frac{d\left([cP7\_m] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( \frac{n8 \cdot ([cL] + [cLmod])^2}{g10^2 + ([cL] + [cLmod])^2} \cdot gm7 + \frac{n9 \cdot [cP9]^2}{g11^2 + [cP9]^2} \cdot gm7 - m14 \cdot [cP7\_m] \right)$$

$$\frac{d\left([cP7] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( \frac{p9 \cdot [cP7\_m]}{gm7} - (m15 + m23 \cdot (1 - L)) \cdot [cP7] \right)$$

$$\frac{d\left([cP5\_m] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( \frac{n10 \cdot [cLmod]^2}{g12^2 + [cLmod]^2} \cdot gm5 + \frac{n11 \cdot [cP7]^2}{g13^2 + [cP7]^2} \cdot gm5 - m16 \cdot [cP5\_m] \right)$$

$$\frac{d\left([cP5] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( \frac{p10 \cdot [cP5\_m]}{gm5} - (m17 + m24 \cdot (1 - L)) \cdot [cP5] \right)$$

$$\frac{d\left([cT\_m] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( \frac{n2 \cdot g4}{g4 + [cEC]} \cdot \frac{g5^2}{g5^2 + [cL]^2} \cdot gmt - m5 \cdot [cT\_m] \right)$$

$$\frac{d\left([cT] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( \frac{p4 \cdot [cT\_m]}{gmt} - (m6 + m7 \cdot (1 - L)) \cdot [cT] \cdot ([cZTL] \cdot p5 + [cZG]) - m8 \cdot [cT] \right)$$

$$\frac{d\left([cE4\_m] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( \frac{n13 \cdot g2}{g2 + [cEC]} \cdot \frac{g6^2}{g6^2 + [cL]^2} \cdot gm4 - m34 \cdot [cE4\_m] \right)$$

$$\frac{d\left([cE4] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( \frac{p23 \cdot [cE4\_m]}{gm4} - m35 \cdot [cE4] - p25 \cdot [cE4] \cdot [cE3n] + p21 \cdot [cE34] \right)$$

$$\frac{d\left([cE3\_m] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( \frac{n3 \cdot g16^2}{g16^2 + [cL]^2} \cdot gm3 - m26 \cdot [cE3\_m] \right)$$

$$\frac{d\left([cE3c] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( \frac{p16 \cdot [cE3\_m]}{gm3} - m9 \cdot [cE3c] \cdot [cCOP1c] - p17 \cdot [cE3c] \cdot [cGc] - p19 \cdot [cE3c] + p20 \cdot [cE3n] \right)$$

$$\frac{d\left([cE3n] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot (p19 \cdot [cE3c] - p20 \cdot [cE3n] - p17 \cdot [cE3n] \cdot [cGn] - m30 \cdot [cE3n] \cdot [cCOP1d] - m29 \cdot [cE3n] \cdot [cCOP1n] + p21 \cdot [cE34] - p25 \cdot [cE4] \cdot [cE3n])$$

$$\frac{d\left([cLUX\_m] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( \frac{n13 \cdot g2}{g2 + [cEC]} \cdot \frac{g6^2}{g6^2 + [cL]^2} \cdot gm4 - m34 \cdot [cLUX\_m] \right)$$

$$\frac{d\left([cLUX] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( \frac{p27 \cdot [cLUX\_m]}{gm4} - m39 \cdot [cLUX] - p26 \cdot [cLUX] \cdot [cE34] \right)$$

$$\frac{d\left([cCOP1c] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot (n5 - p6 \cdot [cCOP1c] - m27 \cdot [cCOP1c] \cdot (1 + p15 \cdot L))$$

$$\frac{d\left([cCOP1n] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot (p6 \cdot [cCOP1c] - n6 \cdot L \cdot [cP] \cdot [cCOP1n] - n14 \cdot [cCOP1n] - m27 \cdot [cCOP1n] \cdot (1 + p15 \cdot L))$$

$$\frac{d\left([cCOP1d] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot (n14 \cdot [cCOP1n] + n6 \cdot L \cdot [cP] \cdot [cCOP1n] - m31 \cdot (1 + m33 \cdot (1 - L)) \cdot [cCOP1d])$$

$$\frac{d\left([cEGc] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot (p17 \cdot [cE3c] \cdot [cGc] - m9 \cdot [cEGc] \cdot [cCOP1c] - p18 \cdot [cEGc] + p31 \cdot [cEGn])$$

$$\frac{d\left([cEC] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( p26 \cdot [cLUX] \cdot [cE34] - m36 \cdot [cEC] \cdot [cCOP1n] - m37 \cdot [cEC] \cdot [cCOP1d] - m32 \cdot [cEC] \cdot \left( 1 + \frac{p24 \cdot L \cdot cGn\_tot^2}{g7^2 + cGn\_tot^2} \right) \right)$$

$$\frac{d\left([cZTL] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot (p14 - p12 \cdot L \cdot [cZTL] \cdot [cGc] + p13 \cdot [cZG] \cdot (1 - L) - m20 \cdot [cZTL])$$

$$\frac{d\left([cZG] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot (p12 \cdot L \cdot [cZTL] \cdot [cGc] - p13 \cdot [cZG] \cdot (1 - L) - m21 \cdot [cZG])$$

$$\frac{d\left([cG\_m] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( L \cdot q2 \cdot [cP] \cdot gmg + \frac{n12 \cdot g14}{g14 + [cEC]} \cdot \frac{g15^2}{g15^2 + [cL]^2} \cdot gmg - m18 \cdot [cG\_m] \right)$$

$$\frac{d\left([cGc] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot \left( \frac{p11 \cdot [cG\_m]}{gmg} - p12 \cdot L \cdot [cZTL] \cdot [cGc] + p13 \cdot [cZG] \cdot (1 - L) - m19 \cdot [cGc] - p17 \cdot [cE3c] \cdot [cGc] - p28 \cdot [cGc] + p29 \cdot [cGn] \right)$$

$$\frac{d\left([cGn] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot (p28 \cdot [cGc] - (p29 + m19 + p17 \cdot [cE3n]) \cdot [cGn])$$

$$\frac{d\left([cEGn] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot (p18 \cdot [cEGc] + p17 \cdot [cE3n] \cdot [cGn] - (m9 \cdot [cCOP1n] + m10 \cdot [cCOP1d] + p31) \cdot [cEGn])$$

$$\frac{d\left([cE34] \cdot V_{cell}\right)}{d\,t} = +V_{cell} \cdot (p25 \cdot [cE4] \cdot [cE3n] - (p26 \cdot [cLUX] + p21 + m37 \cdot [cCOP1d] + m36 \cdot [cCOP1n]) \cdot [cE34])$$

$$cGn\_tot = [cGn] + [cEGn]$$