`py[xlr8r]` / `Cellerator` Arrow Comparison [1]

`Cellerator` Form	`py[xlr8r] format`	Biochemical or ODE	Note
$\{\mathtt{S} \rightarrow \mathtt{P}, \mathtt{k}\}$	$[\mathtt{S}- > \mathtt{P}, \mathtt{rates}[\mathtt{k}]]$	$S \xrightarrow{k} P$	a,f
$\{\mathtt{S} \xrightarrow{\mathtt{X}} \mathtt{P}, \mathtt{k}\}$	$[\mathtt{S} - - > \mathtt{P}, \mathtt{mod}[\mathtt{X}], \mathtt{rates}[\mathtt{k}]]$	$S + X \xrightarrow{k} P + X$	a,b,f
$\{\mathtt{S} \rightleftarrows \mathtt{P}, \mathtt{k1}, \mathtt{k2}\}$	$[\mathtt{S} < - > \mathtt{P}, \mathtt{rates}[\mathtt{k1}, \mathtt{k2}]]$	$S \underset{k2}{\overset{k1}{\rightleftarrows}} P$	f
$\{\mathtt{S} \overset{\mathtt{X}}{\rightleftarrows} \mathtt{P}, \mathtt{k1}, \mathtt{k2}, \mathtt{k3}\}$	$[\mathtt{S} => \mathtt{P}, \mathtt{mod}[\mathtt{X}], \mathtt{rates}[\mathtt{k1}, \mathtt{k2}, \mathtt{k3}]]$	$X + S \underset{k2}{\overset{k1}{\rightleftarrows}} XS \xrightarrow{k3} X + P$	b,f
$\{\mathtt{S} \overset{\mathtt{X}}{\rightleftarrows} \mathtt{P}, \mathtt{k1}, \mathtt{k2}, \mathtt{k3}, \mathtt{k4}\}$	$[\mathtt{S} => \mathtt{P}, \mathtt{mod}[\mathtt{X}], \mathtt{rates}[\mathtt{k1}, \mathtt{k2}, \mathtt{k3}, \mathtt{k4}]]$	$X + S \underset{k2}{\overset{k1}{\rightleftarrows}} XS \underset{k4}{\overset{k3}{\rightleftarrows}} X + P$	b,f
$\{\mathtt{S} \underset{\mathtt{Y}}{\overset{\mathtt{X}}{\rightleftarrows}} \mathtt{P}, \mathtt{k1}, \mathtt{k2}, \ldots, \mathtt{k8}\}$	$[\mathtt{S} <=> \mathtt{P}, \mathtt{mod}[\mathtt{X}, \mathtt{Y}], \mathtt{rates}[\mathtt{k1}, \mathtt{k2}, \ldots, \mathtt{k8}]]$	$X + S \underset{k2}{\overset{k1}{\rightleftarrows}} XS \underset{k4}{\overset{k3}{\rightleftarrows}} X + P$ $Y + P \underset{k6}{\overset{k5}{\rightleftarrows}} YP \underset{k8}{\overset{k7}{\rightleftarrows}} X + S$	f
$\{\mathtt{S} \overset{\mathtt{X}}{\rightleftharpoons} \mathtt{P}, \mathtt{k1}, \mathtt{k2}, \ldots, \mathtt{k6}\}$	$[\mathtt{S} :=> \mathtt{P}, \mathtt{mod}[\mathtt{X}], \mathtt{rates}[\mathtt{k1}, \mathtt{k2}, \ldots, \mathtt{k6}]]$	$X + S \underset{k2}{\overset{k1}{\rightleftarrows}} XS \underset{k4}{\overset{k3}{\rightleftarrows}} XP \underset{k6}{\overset{k5}{\rightleftarrows}} X + P$	b,f
$\{\mathtt{X} \mapsto \mathtt{Y}, \boldsymbol{\mathtt{type}}[\mathtt{a1}, \mathtt{a2}, \ldots, \mathtt{an}]\}$	$[\mathtt{X}\vert- > \mathtt{Y}, \boldsymbol{\mathtt{type}}[\mathtt{a1}, \mathtt{a2}, \ldots, \mathtt{an}]]$	$\boldsymbol{\mathtt{type}} \in \{$ `Hill`, `GRN`, `SSystem`, `NHCA`, `USER` $\}$	e
$\{\mathtt{X} \overset{\mathtt{E}}{\mapsto} \mathtt{Y}, \boldsymbol{\mathtt{type}}[\mathtt{a1}, \mathtt{a2}, \ldots, \mathtt{an}]\}$	$[\mathtt{X}\vert - - > \mathtt{Y}, \mathtt{mod}[\mathtt{E}], \boldsymbol{\mathtt{type}}[\mathtt{a1}, \mathtt{a2}, \ldots, \mathtt{an}]]$		
$\{\mathtt{X} \Longrightarrow \mathtt{Y}, \mathtt{MM}[parameters]\}$	$[\mathtt{X} : - > \mathtt{Y}, \mathtt{MMH}[parameters]]$	MMH Equations, $\frac{S\mathcal{E}v_{\max}}{K_M+S}$	c
$\{\mathtt{X} \overset{\mathtt{E}}{\Longrightarrow} \mathtt{Y}, \mathtt{MM}[parameters]\}$	$[\mathtt{X} : -- > \mathtt{Y}, \mathtt{mod}[\mathtt{E}], \mathtt{MMH}[parameters]]$		
$\left\{\mathtt{S} \overset{\mathtt{E}}{\Longrightarrow} \mathtt{P}, \mathtt{MWC}[parameters]\right\}$	$[\mathtt{S} ==> \mathtt{P}, \mathtt{mod}[\mathtt{E}], \mathtt{MWC}[parameters]]$	MWC: $\frac{k\mathcal{E}\left(cLs(cs+1)^{n-1}+s(s+1)^{n-1}\right)}{L(cs+1)^n+(s+1)^n}$	d
$\left\{\mathtt{S} \underset{\{\mathtt{A,I}\}}{\overset{\mathtt{E}}{\Longrightarrow}} \mathtt{P}, \mathtt{MWC}[parameters]\right\}$	$[\mathtt{S} ==> \mathtt{P}, \mathtt{mod}[\mathtt{E}, [\mathtt{A}, \mathtt{I}]], \mathtt{MWC}[parameters]]$	$\frac{k\mathcal{E}\left(s(a+1)^n(s+1)^{n-1}+cLs(i+1)^n(cs+1)^{n-1}\right)}{(a+1)^n(s+1)^n+L(i+1)^n(cs+1)^n}$	
$\{\{\{\mathtt{A}, \mathtt{B}, \mathtt{C}\}, \{\mathtt{P}, \mathtt{Q}, \mathtt{R}\}\} \Longrightarrow \mathtt{S}, \mathtt{rational}[..]\}$	$[[[\mathtt{A}, \mathtt{B}, \mathtt{C}], [\mathtt{P}, \mathtt{Q}, \mathtt{R}]] ==> \mathtt{rational}[[\mathtt{a}_0, ..], [\mathtt{d}_0, ..], [\mathtt{m}_1, ,], [\mathtt{n}_1, ..]]$	$\frac{dS}{dt} = \frac{a_0+a_1A^{n_1}+B^{n_2}+\cdots}{d_0+d_1P^{m_1}+d_2P^{m_2}+\cdots}$	

Notes: (a) When only a single rate constant is expected the `rates` keyword may be omitted. (b) When only a single modifier is expected the `mod` keyword may be omitted. (c) MMH = Michaelis-Menten-Henri. (d) MWC = Monod-Wyman-Changeaux. In the shorthand version, `A` and `I` are lists of zero or more species delimited by commas and enclosed by square brackets as in `[A1,A2,A3]`; an empty list would be `[ ]`. (e). `Hill`: $\frac{v\mathcal{E}(\sum T_iX_i+\alpha)^n}{+K^n+(\sum T_iX_i+\alpha)^n}$; `GRN`: $\frac{v}{1+\exp\left(-h-\sum \beta_i X_i^{n_i}\right)}$; `SSystem`: $\frac{\left(k_+\prod X_i^{C_{i,+}}-k_-\prod X_i^{C_{i,-}}\right)}{\tau}$; `NHCA`: $\frac{v(1+T_+X^n)^m}{k(1+T_-X^n)^m+(1+T_+X^n)^m}$; `USER`: $vf(h+\sum T_iA_i^{n_i})$ (f) Uses mass-action kinetics

[1] Version 6, March 26, 2012, BES