$$\text{system} + \mathrm{R}_1 + \cdots \underset{r_\mathrm{b}}{\overset{r_\mathrm{f}}{\rightleftharpoons}} \text{changed system} + \mathrm{P}_1 + \cdots$$

$$\frac{r_\mathrm{f}}{r_\mathrm{b}} = \exp((\Delta\epsilon + \mu_{\mathrm{R}_1} + \cdots - \mu_{\mathrm{P}_1} - \cdots)/\mathrm{kT})$$

$$\mathrm{ATP} \rightleftharpoons \mathrm{ADP}$$

$$\mathrm{P} \rightleftharpoons \emptyset$$

$$0 \quad \epsilon_\mathrm{t} \quad \Delta\epsilon_\mathrm{r} \quad \epsilon_\mathrm{t} - \Delta\epsilon_\mathrm{r} \quad \epsilon_\mathrm{p}$$

$$r_1 \frac{c_\mathrm{P} e^{\frac{\Delta\epsilon}{\mathrm{kT}}}}{c_\mathrm{P} e^{\frac{\Delta\epsilon}{\mathrm{kT}}} + 1} + r_2 \frac{c_\mathrm{R} e^{\frac{\Delta\epsilon}{\mathrm{kT}}}}{c_\mathrm{R} e^{\frac{\Delta\epsilon}{\mathrm{kT}}} + 1} \quad \text{with} \quad c_\mathrm{R} = \frac{c_\mathrm{ATP}}{c_\mathrm{ADP}}$$

$$c_\mathrm{P} = c_\mathrm{R}$$

$$\text{enzyme E} + \overline{\cdots \mathrm{i0j} \cdots} \underset{r_{\mathrm{E},1\to 0,ij}}{\overset{r_{\mathrm{E},0\to 1,ij}}{\rightleftharpoons}} \text{changed E} + \overline{\cdots \mathrm{i1j} \cdots}$$

$$r_{\mathrm{E},0\to1,ij} = K_{\mathrm{E},ij}\frac{\exp(\beta\mu_{\mathrm{E}})}{\exp(\beta\mu_{\mathrm{E}})+1}$$
$$r_{\mathrm{E},1\to0,ij} = K_{\mathrm{E},ij}\frac{1}{\exp(\beta\mu_{\mathrm{E}})+1}$$

$\mu \quad +\infty \quad -\infty$

$\underline{\underline{K}}$

$\left\{ \vphantom{\begin{matrix} a \\ b \\ c \end{matrix}} \right.$