a

Enzymatic rate law and enzyme cost in a single reaction

Simple rate law for respiration reaction

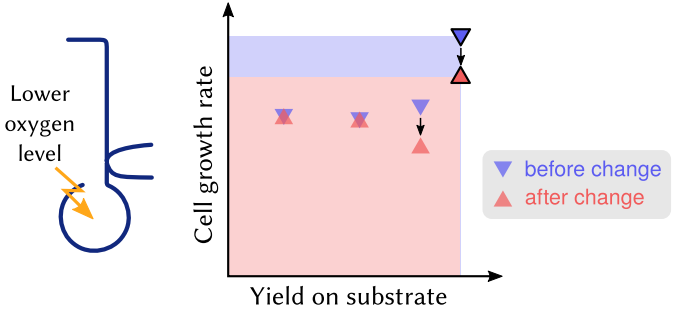
$$v = E \frac{k_{\mathrm{cat}} [O_2]}{[O_2] + K_{\mathrm{M}}}$$

Enzyme cost in respiration reaction

$$q = \frac{h\ v}{k_{\mathrm{cat}}} \left(1 + \frac{K_{\mathrm{M}}}{[O_2]}\right)$$

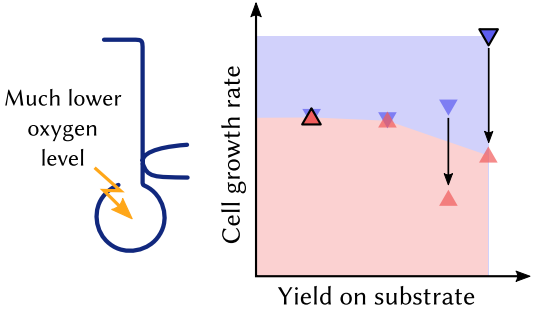
b

Decreased oxygen level



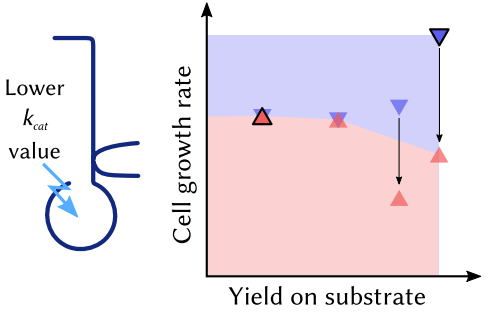
c

Strongly decreased oxygen



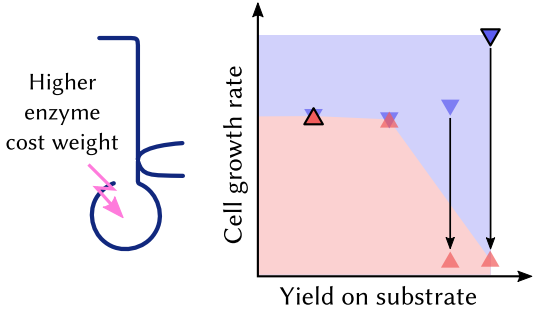
d

Decreased k_{cat} value



e

Much higher enzyme cost weight



f

Enzyme knockout