Free Energy Change Under Nonstandard Conditions

$\Delta G = \Delta G^\circ + RT \ln(Q)$

Ex. phosphocreatine + ADP $\rightleftharpoons$ creatine + ATP

concent. (mM)	25	4.0	13	0.013

$\Delta G = \Delta G^\circ RT \ln(Q) = -12.6\ kJ/mol + (8.315 \times 10^{-3}\ kJ/mol\,k)\,310k \cdot \ln Q$

$Q = \frac{(0.013 \times 10^{-3})(13 \times 10^{-3})}{(25 \times 10^{-3})(4.0 \times 10^{-3})}$

$\Delta G = -29\ kJ/mol$

after recovery: $\Delta G = 12.6\ kJ/mol$: creatine + ATP $\rightleftharpoons$ phosphocreatine + ADP

(mM)	35	4.1	29	.16

$Q = \frac{[PC][ADP]}{[creatine][ATP]}$

ΔG° and k: at equilibrium, $Q = k$ and $\Delta G = 0$

Equation becomes $0 = \Delta G^\circ + RT \ln(k) \rightarrow \Delta G^\circ = -RT \ln k$