

J. ΔG Under Standard Conditions

1. $\Delta G = \Delta G^\circ + RT \ln Q$

↳ Allows for ΔG calculation when concentrations are not standard

2. Usain Bolt

↳ Phosphocreatin reacts with ADP to replenish ATP

↳ $\Delta G^\circ = -12.6 \text{ kJ/mol}$

a. For Q , reactants/products must be in moles

↳ $\Delta G = -12.6 \text{ kJ/mol} + (310 \text{ K})(8.315 \cdot 10^{-3} \text{ kJ/mol}) \ln Q$

↳ $Q = \frac{(0.013 \cdot 10^{-3} \text{ m})(13 \cdot 10^{-3} \text{ m})}{(25 \cdot 10^{-3} \text{ m})(40 \cdot 10^{-3} \text{ m})}$, $\Delta G = -29 \text{ kJ/mol}$

K. Equilibrium

1. At equilibrium, $Q = K$ and $\Delta G = 0$, so $\Delta G^\circ = -RT \ln K$

↳ $K < 1$, $\Delta G > 0$, reaction is not spontaneous

2. $\Delta G^\circ = -12.6 \text{ kJ/mol}$, $e^{-12.6/RT} = 1.3 \cdot 10^{-2} = K$

↳ $K > 1$, $\Delta G < 0$, reaction is spontaneous