

Energy

- First law of thermodynamics
- Second law of thermodynamics

Free energy

- ΔG
- $\Delta G = \Delta H - T \Delta S$

What happens to the probability of a spontaneous reaction occurring

- If temperature increases?
- If ΔH increases?
- If ΔS increases

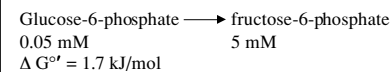
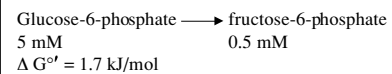
Free energy

- Respiration: $\Delta G = \text{_____ kJ/mole}$
- Photosynthesis: $\Delta G = \text{_____ kJ/mole}$
- Sucrose \rightarrow glucose + fructose:
 $\Delta G = \text{_____ kJ/mole}$
- Glucose 6 phosphate \rightarrow fructose 6 phosphate:
 $\Delta G = \text{_____ J/mole}$

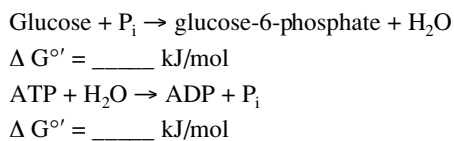
Standard Free Energy (ΔG°)

$$\Delta G' = \Delta G^{\circ} + 894 \ln \frac{[\text{product}]}{[\text{reactant}]}$$

$$= 1715 + 894 \ln \frac{[14 \times 10^{-6}]}{[83 \times 10^{-6}]}$$



Metabolism



Problem

1. At 37°C, what is the value for ΔG° ?
2. 38 mol ATP are produced from ADP. What is the free energy change?
3. What is the efficiency of the process?