



CHEMISTRY 365 BIOCHEMISTRY
SOME CHAPTER 4 PRACTICE

- 1) a) Calculate the values of K_{eq} at 37°C for reactions with G° equal to -10.0, -1.0 and +5.0 kcal/mol.
b) Calculate the values of G° at 37°C for reactions with K_{eq} equal to 10^{-2} , 5.0 and 10^3 .
- 2) Calculate the overall G° for the following coupled processes:
a) Form a thioester linkage from the hydrolysis of ATP to AMP and 2 P_i
b) Form a phosphoester linkage from the hydrolysis of ATP to ADP and P_i
- 3) Calculate the number of moles of ATP that could be formed from ADP if energy transfer is 100% efficient and using the energy available from: (use G° 's)
a) Combustion of one mole of glucose
b) Combustion of one mole of palmitic acid
c) $NADH/H^+ + 1/2 O_2 \rightarrow NAD^+ + H_2O$
- 4) Calculate G at 37.0°C for the hydrolysis of ATP to ADP under the following nonstandard conditions:
a) $[P_i] = 1.0 \times 10^{-3} M$; $[ADP]/[ATP] = 1.0 \times 10^{-3}$
b) $[P_i] = 1.0 \times 10^{-3} M$; $[ADP]/[ATP] = 1.0 \times 10^6$
- 5) Calculate the standard electrical potentials for the following oxidation half reactions:
a) $NADH/H^+ \rightarrow NAD^+ + 2H^+ + 2e^-$ $G^{\circ\prime} = -15$ kcal/mole
b) $FADH_2 \rightarrow FAD + 2H^+ + 2e^-$ $G^{\circ\prime} = -10$ kcal/mole

Answers:

- 1) a) 1.12e+7, 5.07, 2.98e-4
b) 2.84, -0.991, -4.26 kcal/mol
- 2) a) -8.2 kcal/mol
b) -4.0 kcal/mol
- 3) a) 94 moles b) 320 moles c) 7.3 moles
- 4) a) -15.8 kcal/mol b) -3.0 kcal/mol
- 5) a) 0.325 V b) 0.217 V