

Chemistry-4311
November 16, 2007

Quiz #7

Name Key

1. Matching (Use a letter only once)

The relation between ΔG_r° and E° for an electrochemical cell, is e.

The citric acid cycle and terminal respiratory chain consist of a series of g reactions.

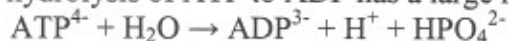
For an electrochemical cell at equilibrium, ΔG_r equals h.

In the reaction $2H^+ + 2e^- + O_2(g) \rightarrow H_2O_2(aq)$, the O-atom is f.

ΔS_r° for an electrochemical cell is found from the expression c.

- a. oxidized
- b. hydrolysis
- c. $vF(\Delta E^\circ/\Delta T)$
- d. $-RT \ln K$
- e. $\Delta G_r^\circ = -vFE^\circ$
- f. reduced
- g. oxidation-reduction
- h. zero
- i. $\Delta G_r^\circ = vFE^\circ$
- j. $E^\circ - (RT/vF) \ln Q$

2. Give two reasons why the hydrolysis of ATP to ADP has a large negative ΔG_r°

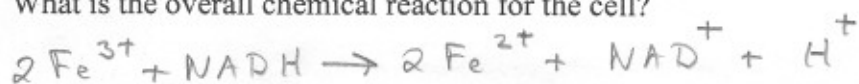


1. ADP^{3-} has less electrostatic repulsion than ATP^{4-}
2. ADP^{3-} and HPO_4^{2-} have multiple resonance structures

3. Consider an electrochemical cell with the following half-cell reactions at pH = 7.



a. What is the overall chemical reaction for the cell?



b. What is E° for the cell?

$$0.574 \text{ V}$$

c. What is ΔG_r° for the cell?

$$\begin{aligned} \Delta G_r^\circ &= -vFE^\circ = -2 \times 96,485 \times 0.574 \\ &= -110,765 \text{ J} = -110.8 \text{ kJ} \end{aligned}$$