~~31~~ 29

Multiple Choice Practice!

$$Fe(s) + Cu^{2+}(aq) \rightarrow Fe^{2+}(aq) + Cu(s)$$

4. An electrolytic cell based on the reaction represented above was constructed from iron and copper half-cells. The observed voltage was found to be 0.59 volt instead of the standard cell potential, E°, of 0.78 volts. Which of the following could correctly account for this observation?

$E_{cell} < E^\circ_{cell}$

A. The copper electrode was larger than the iron electrode.
B. The solutions in the half-cells had different volumes.
C. The Cu^{2+} solution was more concentrated than the Fe^{2+} solution.
(D.) The Fe^{2+} solution was more concentrated than the Cu^{2+} solution.

$$H_2O(s) \rightarrow H_2O(l)$$

5 ~~1~~. When ice is placed into warm water at room temperature, which of the following is true for the phase change shown above?

a. $Q > K$ b. ΔG is positive c. ΔH is negative (d.) ΔS is positive

$$2\ Al(s) + 3\ Mn^{2+}(aq) \rightarrow 2\ Al^{3+}(aq) + 3\ Mn(s)$$

6 ~~5~~. A thermodynamically favorable cell, utilizing the reaction shown above, ran for 45 minutes. What happens to the measured voltage and why?

(A.) The measured voltage decreases over time because deviations in concentration that bring the cell closer to equilibrium will decrease the magnitude of the cell potential.
B. The measured voltage increases over time because deviations in concentration that bring the cell closer to equilibrium will increase the magnitude of the cell potential.
C. The measured voltage increases over time because $[Zn^{2+}]$ increases as the cell runs.
D. The measured voltage remains constant because E°_{cell} is an intensive property.

7 ~~6~~. Which of the following statements is true about the reaction below?

$$2\ Ag(s) + Cu^{2+}(aq) \rightleftharpoons 2\ Ag^{+}(aq) + Cu(s) \qquad K_{eq} = 2.7 \times 10^{-16}$$

$K << 1$

a. E° and ΔG° are both positive.
b. E° and ΔG° are both negative.
c. E° is positive and ΔG° is negative.
(d.) E° is negative and ΔG° is positive.

8 ~~7~~. Calculate the standard free energy of the following reaction at 25°C.

$$Fe^{2+}(aq) + Mg(s) \rightarrow Fe(s) + Mg^{2+}(aq) \qquad E^\circ_{cell} = 1.92\ V$$

a. 3.7×10^5 J
b. 1.6×10^3 J
(c.) -3.7×10^5 J
d -1.6×10^3 J

$$\Delta G = -nF E^\circ_{cell} = -(2\ mol\ e^-)\left(100{,}000 \frac{C}{mol\ e^-}\right)\left(2 \frac{J}{C}\right)$$

$$= -400{,}000\ J$$

~~32~~ 30

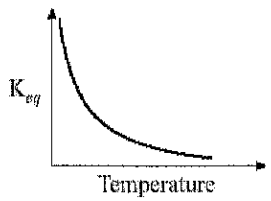
8. Which of the following would cause an increase in the potential of the voltaic cell described by the reaction below?

$$2\ Ag^{+}(aq) + Fe(s) \rightarrow 2\ Ag(s) + Fe^{2+}(aq)$$

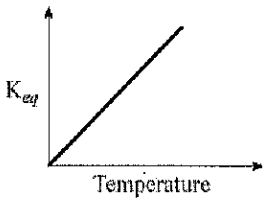
a. Increasing $[Fe^{2+}]$
b. Adding more Fe(s)
(c.) Decreasing $[Fe^{2+}]$
c. Removing some Fe(s)

9. The relationship between K_{eq} and temperature for an exothermic reaction is represented by $A \rightarrow B + heat$

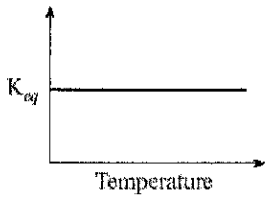
(A.)



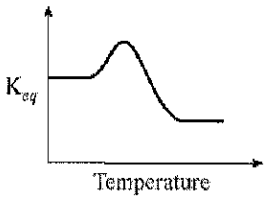
B.



C.



D.



10. Consider the following equilibrium:

$$2\ CO(g) + O_2(g) \rightleftarrows 2\ CO_2(g) \qquad K_c = 4.0 \times 10^{-10}$$

What is the value of K_c for $2\ CO_2(g) \rightleftarrows 2CO(g) + O_2(g)$? Reversed!

a. 4.0×10^{10} b. 2.0×10^{-5} c. 2.0×10^{5} (d.) 2.5×10^{9}

$$K_{new} = \frac{1}{K} = \frac{1}{4E-10} = \frac{1}{4} \times 10^{10} = 0.25\ E\ 10 = 2.5\ E\ 9$$

$$2\ NO(g) + Cl_2(g) \rightarrow 2\ NOCl(g) \qquad \Delta H = -77\ kJ/mol_{rxn},\ \Delta S = -$$

11. Which of the following statements accurately describes the above reaction?

a. The entropy of the products exceeds that of the reactants.
b. NO(g) will always be the limiting reagent.
c. K will be greater than 1 at all temperatures.
(d.) The temperature of the surroundings will increase as this reaction progresses.