Spring 2009 CH 302: Practice Quiz 4

1. In which of the following polyatomic ions does the chromium atom have an even oxidation state?

   I. CrO_4^{2-}

   II. CrO_2^{-}

   III. CrO_2^{2+}

   1. I only
   2. II only
   3. III only
   4. I and II
   5. I and III
   6. II and III
   7. I, II and III

2. How many electrons are required to balance the half reaction below?

   $H_2O_2 + \_\_e^- \rightarrow 2\ OH^-$

   1. 1
   2. 2
   3. 3
   4. 4

3. Consider the half reactions below:

   $Br_2 + 2e^- \rightarrow 2Br^-$ $E° = +1.07$

   $Fe^{3+} + 3e^- \rightarrow Fe$ $E° = -0.04$

   $Co^{3+} + e^- \rightarrow Co^{2+}$ $E° = +1.80$

   $Zn^{2+} + 2e^- \rightarrow Zn$ $E° = -0.76$

Which species is the weakest **oxidizing** agent?

   1. Zn^{2+}
   2. Br^-
   3. Fe^{3+}
   4. Co^{2+}

4. How many moles of of metallic Tin (Sn) could be produced from Sn^{4+} at a current of 0.2 amperes for 964,853 seconds?

   1. 20 moles Sn
   2. 2 moles Sn
   3. 5 moles Sn
   4. 0.5 moles Sn

5. What is the standard cell potential of a battery made from the following two half reactions?

   $Ag^+ + e^- \rightarrow Ag$ $E° = +0.80$

   $Al^{3+} + 3e^- \rightarrow Al$ $E° = -1.66$

   1. 2.46
   2. -2.46
   3. 0.86
   4. -0.86

6. Iron can be produced by electrolysis of molten hematite (Fe_2O_3). What species are produced at the cathode and anode respectively?

   1. $O_2(g)$, Fe(s)
   2. $Fe^{3+}(aq)$, $O^{2-}(aq)$
   3. Fe(l), $O_2(g)$
   4. Fe(s), $O_2(g)$
   5. $O^{2-}(aq)$, $Fe^{3+}(aq)$

7. In electrochemical cells, the positive terminal is (always/sometimes/never) the cathode and is (always/sometimes/never) the site of reduction.
   1. sometimes, never
   2. always, never
   3. always, always
   4. never, sometimes
   5. sometimes, sometimes
   6. sometimes, always
   7. never, never

8. The values of E and K are (linearly/exponentially) proportional and (directly/inversely) proportional.
   1. linearly, inversely
   2. linearly, directly
   3. exponentially, inversely
   4. exponentially, directly