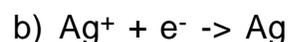


Electrochemistry : Quiz-130

1) Answer the following questions about the $\text{Cr}|\text{Cr}^{3+}||\text{Sn}^{2+}|\text{Sn}$ salt bridge electrochemical cell.

- a) The anode is _____
- b) The cathode half-reaction is _____
- c) Find the cell voltage _____
- d) Find the balanced redox reaction _____
- e) If the current is 0.50 amps, find how much mass the anode loses in one hour. _____ (1.0 coulomb = 1.0×10^{-5} moles)

2) Find the reduction potential.



3) Which is the stronger oxidizing agent; Cu^+ , or Cu^{2+} ?

4) Is the reaction; $\text{Pb} + \text{Fe}^{2+} \rightarrow \text{Pb}^{2+} + \text{Fe}$ spontaneous or non-spontaneous?

5)a) Give an advantage of the Alkaline cell over the Leclanche cell.

b) Give an advantage of the lead-acid storage battery.

c) The two reactions that occur in the hydrogen-oxygen fuel cell are; 1) $2\text{H}_2 + 4\text{OH}^- \rightarrow 4\text{H}_2\text{O} + 4\text{e}^-$, and 2) $\text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^- \rightarrow 4\text{OH}^-$. Which is the cathode reaction?

6) What is electrolysis?

7) Give the anode and cathode half-reactions for the following electrolytic cells using inert electrodes.

a) NaI (molten)

b) MgBr_2 (aqueous)

c) Na_2SO_4 (aqueous)

8) Draw an electrochemical cell below that will plate silver onto iron. Show the anode and cathode. Give a suitable salt for the solution. Give the anode and cathode reactions. What is voltage required to operate the cell?

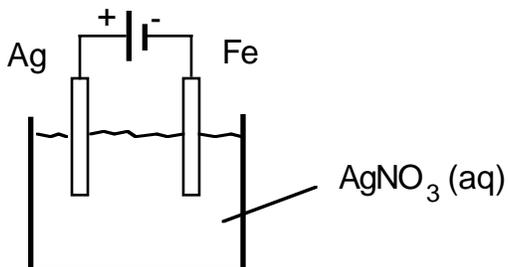
9)a) What is corrosion?

b) Aluminum doesn't corrode readily, even though it has a high reduction potential. Explain why.

c) Explain why galvanized iron resists corrosion so well.

10) Explain briefly how would you protect an aluminum hulled boat from rusting, without using paint.

Answers: 1)a) Cr, b) $\text{Sn}^{2+} + 2\text{e}^- \rightarrow \text{Sn}$, c) 0.60 volts, d) $3\text{Sn}^{2+} + 2\text{Cr} \rightarrow 2\text{Cr}^{3+} + 3\text{Sn}$, e) 0.31 g, 2)a) +0.26 volts, b) + 0.80 volts, 3) Cu^+ , 4) n.s., 5)a) longer shelf-life, increased capacity, b) rechargeable, produces large current, c) 2, 6) It is a process in which a non-spontaneous redox reaction occurs when electrical energy is supplied., 7)a) anode: $2\text{I}^- \rightarrow \text{I}_2 + 2\text{e}^-$, cathode: $\text{Na}^+ + \text{e}^- \rightarrow \text{Na}$, b) anode: $2\text{Br}^- \rightarrow \text{Br}_2 + 2\text{e}^-$, cathode: $2\text{H}_2\text{O} + 2\text{e}^- \rightarrow \text{H}_2 + 2\text{OH}^-$, c) anode: $2\text{H}_2\text{O} \rightarrow \text{O}_2 + 4\text{H}^+ + 4\text{e}^-$, cathode: $2\text{H}_2\text{O} + 2\text{e}^- \rightarrow \text{H}_2 + 2\text{OH}^-$, 8)



anode reaction: $\text{Ag} \rightarrow \text{Ag}^+ + \text{e}^-$, cathode reaction: $\text{Ag}^+ + \text{e}^- \rightarrow \text{Ag}$,
voltage = 0.0 volts (actually the voltage is a bit greater than zero)

9)a) It is the oxidation of a metal., b) It has an oxide coating that protects it from further oxidation., c) The zinc coating keeps oxygen and water away from the steel of the can. The zinc also acts as a sacrificial anode which will corrode instead of the steel., 10)

Magnesium can be attached to the aluminum hull of the ship. The Mg would be the sacrificial anode as it is more easily oxidized than the aluminum.