2023.03.29 Electrochemistry Online Class Student Activity

Student Number, Name

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Q1. Please explain the redox reaction in the lithium-ion battery when it is charged.

When lithium ion battery is charged, a redox reaction takes place which then do the transfer of electrons between the electrodes and electrolyte.

Q2. The Battery A has C rate = 2, Battery B C rate = 3. If the capacity (Ah) of the batteries are the same, what battery has the higher current flow?

Battery B has higher current flow.

Q3. Explain the redox reaction of this reaction.

$$Zn(s) \rightarrow Zn^{2+} + 2e^{-}$$

In this reaction the Zinc atoms lose two electrons, and they are oxidized. Also, they are positively charged.

Q4. In the process of the ionization of Zn metals in Copper Sulfate solution (Slide #24), the surface electrons are removed. Then how the electroneutrality of the whole reactions are preserved?

For electroneutrality to be preserved total number of electrons lost must be equal to the total number of electrons gained.

Q5. Explain the electroneutrality of chemical reaction in below diagram (Slide #26-28)

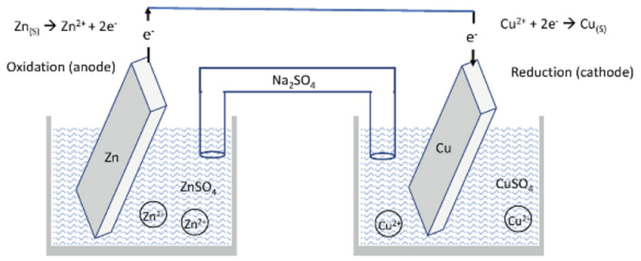

Fig. 7 Electrochemical cell with a salt bridge

Q6. How can you measure electrode potential? (slide #36)

Q7. If the electrode potential is higher than 0V, then reduction tendency is (greater / lesser).
If the electrode potential is lower than 0V, then reduction tendency is (greater / lesser).

Q8. See the standard reduction potentials (in V) of the reactions below.

$Ag^{+} + e^{-} \rightarrow Ag \qquad +0.80$

$2H^{+} + 2e^{-} \rightarrow H_2 \qquad 0$

$Li^{+} + e^{-} \rightarrow Li \qquad -3.04$

Compare (1) Ionization tendency (2) Reduction tendency of Ag, Li .

Ionization tendency of Li is the highest
Ionization tendency of Ag is lowest

Reduction tendency of Ag is highest
Reduction tendency of Li is lowest

Q9. What is the first law of thermodynamics in electrochemistry (Write the equation, too)

It is the principle of conservation of energy, energy can not be created or destroyed, only transferred from one form to another form.

(delta) U = q + w

Q10. What is the enthalpy of thermodynamics in electrochemistry (Write the equation, too)

Enthalpy is the total heat of a system when there is a constant pressure. It represents energy changes during reactions.

Q11.

Exercise: Predict entropy change for the following reactions:

- $2NH_4NO_{3(s)} \rightarrow 2\ N_{2(g)} + 4H_2O_{(g)} + O_{2(g)}$
- $2SO_{2(g)} + O_{2(g)} \rightarrow 2SO_{3(g)}$
- $C_{12}H_{22}O_{11(aq)} \rightarrow C_{12}H_{22}O_{11(s)}$