

Electrochemistry

Electrochemical Processes in Batteries



a right compartment with a lead electrode in contact with 1×10^{-3} M Pb(NO₃)₂(aq). The relevant reduction potentials are: $Pb^{2+} + 2e^{-x} Pb$ $E^{\circ} = -0.13 V$ $Sn^{2+} + 2e^{-x} Sn$ $E^{\circ} = -0.14 V$ When this cell is allowed to discharge

spontaneously at 25°C, which of the following statements is true? 1) Electrons will flow from left to right through

- Electrons will flow from left to right through the wire.
 Pb²⁺ ions will be reduced to Pb metal.
 The concentration of Sn²⁺ ions in the left compartment will increase.
 The tin electrode will be the cathode.
 No noticeable change will occur, because the cell is at equilibrium.







Chemistry of Batteries

Mercury and Silver (Button) Batteries

 $\begin{array}{l} \text{Anode (oxidation):}\\ \text{Zn}_{(s)}+2 \text{ OH}^-_{(aq)} \longrightarrow \text{ZnO}_{(s)}+\text{H}_2\text{O}_{(l)}\\ \text{Cathode (reduction) (mercury):}\\ \text{HgO}_{(s)}+\text{H}_2\text{O}_{(l)}+2 \text{ e}^- \longrightarrow \text{Hg}_{(l)}+2 \text{ OH}^-_{(aq)}\\ \text{Cathode (reduction) (silver):}\\ \text{Ag}_2\text{O}_{(s)}+\text{H}_2\text{O}_{(l)}+2 \text{ e}^- \longrightarrow 2 \text{ Ag}_{(s)}+2 \text{ OH}^-_{(aq)}\\ \text{Overall (cell) reaction (mercury):}\\ \text{Zn}_{(s)}+\text{HgO}_{(s)} \longrightarrow \text{ZnO}_{(s)}+\text{Hg}_{(l)}; \quad E_{cell}=1.3 \text{ V}\\ \text{Overall (cell) reaction (silver):}\\ \text{Zn}_{(s)}+\text{Ag}_2\text{O}_{(s)} \longrightarrow \text{ZnO}_{(s)}+2 \text{ Ag}_{(s)}; \quad E_{cell}=1.6 \text{ V}\\ \end{array}$





































QUESTION

Which of the following statements about batteries is false?

- 1) A battery is a group of galvanic cells connected in series.
- in series.
 2) Lead storage batteries contain lead at the anode and lead coated with lead dioxide at the cathode.
 3) The alkaline dry cell battery can last longer than a nickel-cadmium battery.
 4) A fuel cell is a galvanic cell for which the reactants are continuously supplied.
 5) Dry cell batteries are used in tape players and portable radios.