Culver City H.S. • AP Chemistry

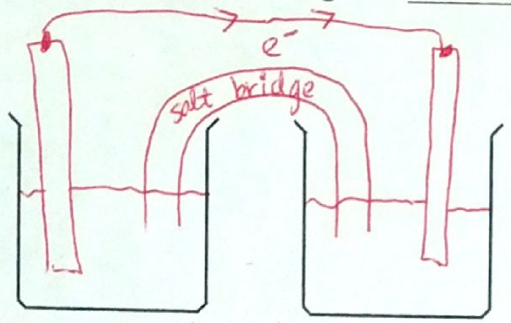
Name KEY
Period ___ Date ___/___/___

18 • Electrochemistry

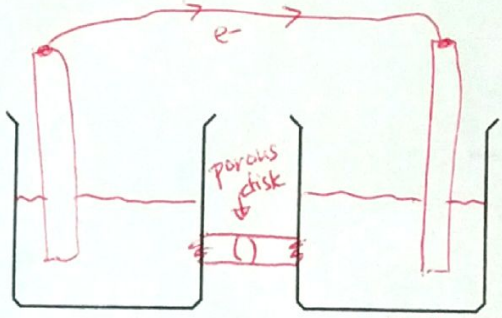
ELECTROCHEMICAL CELL NOTES

Oxidation is a loss loss/gain of electrons. The substance oxidized is called the reducing agent.
Reduction is a gain loss/gain of electrons. The substance reduced is called the oxidizing agent.

Redox reactions can be used to generate a current by constructing a galvanic cell (*a device in which* chemical *energy is changed to* electrical *energy*):



Anode (oxidation occurs) Cathode (reduction occurs)



The "pull," or driving force, on the electrons is called the cell potential (E_{cell}), or the *electromotive force* (emf) of the cell. The unit of electrical potential is the Volts (V).

Standard reduction potentials (1 atm, 25°C; gain e⁻) can be found based on the assignment of 0 V to the process $2H^+ + 2e^- \rightarrow H_2$
See Table 18.1 on page 845 or Appendix 5.5.

$E°_{cell} = E°_{cathode} - E°_{anode}$ (reduction potentials) OR $E°_{cell} = E°_{reduction} + E°_{oxidation}$ (reverse the reduction potential and the sign)

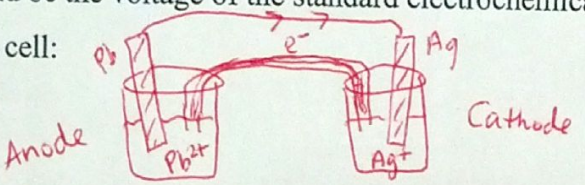
Line Notation:

X | X⁺ || Y⁺ | Y
(Anode) (Cathode)

Find and copy the reduction equations for $Ag^+ \rightarrow Ag°$ and $Pb^{2+} \rightarrow Pb°$.

$Ag^+ + e^- \rightarrow Ag$ $E° = 0.80$ V
$Pb^{2+} + 2e^- \rightarrow Pb$ $E° = -.13$ V

1. Which metal ion has the greater reduction potential? Ag (larger E° value) * greater reduction potential
2. If these two metals (and their solutions) were used to create a galvanic cell, which metal would be the anode? Pb (smaller E° value)
3. Write the reaction at the anode: $Pb \rightarrow Pb^{2+} + 2e^-$ $E° = .13V$
4. Write the reaction at the cathode: $2(Ag^+ + e^- \rightarrow Ag)$ $E° = .80V$
5. What is the overall reaction? $2Ag^+ + Pb \rightarrow 2Ag + Pb^{2+}$
6. What would be the voltage of the standard electrochemical cell? $E°_{cell} = E°_{cathode} - E°_{anode} = (.80V) - (-.13V) =$ .93V (must be positive)
7. Sketch the cell:



8. Write the cell notation for the cell: Pb | Pb^{2+} || Ag^+ | Ag
9. How many moles of electrons are involved in this reaction? n = 2