Name:_____
Blk:_____Date:_____

Chemistry 12
Electrochem Lesson #9
STANDARD REDUCTION POTENTIALS

The tendency of _____ to flow in an electrochemical cell is called the _____ or _____ _____ to do work.

VOLTAGE is the **WORK DONE** per **ELECTRON TRANSFERRED**!

To measure the electrical potentials the _____ between two electrical potentials of two different _____ is measured.

The ZERO POINT on the voltage scale for the half-reaction of _____
Is arbitrarily set! $2H^+ + 2e$ <---> H_2 (g); $E^o = 0.00V$

E^o is the Standard REDUCTION potential (in Volts)
" ^{o} " implies a **STANDARD STATE**.
An electrochemical cell is in a **STANDARD STATE** if:
i.
ii.
iii.
iv.

Example 1. For the half-reactions:
$ClO_4^- + 8H^+ + 8e$ <---> $Cl^- + 4H_2O$; $E^o = 1.39$ V
$Cu^{2+} + 2e$ <---> Cu (s); $E^o = 0.34$ V

NOTE:
The voltages for each half-reaction is relative to the **HYDROGEN HALF-CELL**!!!

Example #2: When the following half reactions are combined:
$\boxed{Cu^{2+}} + 2e$ <---> Cu (s); $E^o = 0.34$ V
$Zn^{2+} + 2e$ <---> $\boxed{Zn(s);}$ $E^o = 0.76$ V

Note: Writing the half-reaction as an oxidation half reaction requires that you switch the sign of E^o

Cu^{2+} reacts with Zn(s) so that the resulting $E^o = 1.10$ V

Example 3: Joining the following half-reactions:

$\boxed{Hg^{2+}}$ + 2e <---> Hg (l); E^o = 0.85 V

Cu^{2+} + 2e <---> $\boxed{Cu\ (s);}$ E^o = 0.34 V

Hg^{2+} reacts with Cu (s) so that the resulting E^o = 0.51 V

Another way to calculate E^o is to use the values for each half-reaction and pluging them in (NOT CHANGING THIER SIGN) to the following equation:

E^o cell = E^o red - E^o ox

Example 4: Calculate the potential (E^o cell) of the cell Ni^{2+} + Fe ---> Ni + Fe^{2+}

1. Write out the individual half-reactions with their E^o values

2. re-Write the half-reactions according to how they are acting in the above redox equation (changing the E^o on the oxidation half-reaction)

3. Add the two E^o values together

4. **OR** use **E^o cell = E^o red - E^o ox**

Example 5: Use either of the two techniques above to calculate the potential for the cell Ni + Fe^{2+} --> Ni^{2+} + Fe

NOTICE: if the E^o value is **POSITIVE**, the reaction is **SPONTANEOUS**
If the E^o value is **NEGATIVE**, the reaction is **NON-SPONTANEOUS**

Seatwork/Homework: Read pgs 218- 224 before attempting Exercises 36- 41 (odd letters ie a,c, e etc) pg 224-225 and **PLO's U6 - U10**