Dougherty Valley HS Chemistry - AP
Electrochemistry – Electrolysis

Worksheet #5

Name: **Period:** **Seat#:**

Directions: Show all work when applicable.

Standard Reduction Potential	E° (volts)
$Cl_2(g) + 2e^- \rightarrow 2Cl^-(aq)$	+1.36
$O_2(g) + 4H^+(aq) + 4e^- \rightarrow 2H_2O(l)$	+1.23
$Ag^+(aq) + e^- \rightarrow Ag(s)$	+0.80
$I_2(s) + 2e^- \rightarrow 2I^-(aq)$	+0.535
$Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)$	+0.337
$SO_4^{2-}(aq) + 4\ H^+(aq) + 2e^- \rightarrow SO_2(g) + 2\ H_2O$	+0.20
$2\ H^+(aq) + 2\ e^- \rightarrow H_2(g)$ (reference electrode)	0.00
$2H_2O(l) + 2e^- \rightarrow H_2(g) + 2OH^-(aq)$	-0.828
$Na^+(aq) + e^- \rightarrow Na(s)$	-2.714
$K^+(aq) + e^- \rightarrow K(s)$	-2.93

FILL IN THE BLANKS:

1) All of the equations in the chart above are written as ______________________ *(oxidations/reductions)*.

2) The chemicals at the upper left (Cl_2 and O_2) are the most likely to be ______________________ *(oxidized/reduced)* and therefore the best __________________________ *(oxidizing agents/reducing agents)*.

3) The chemicals at the lower right (Na and K) are the most likely to be ______________________ *(oxidized/reduced)* and therefore the best __________________________ *(oxidizing agents/reducing agents)*.

4) In an electrolytic cell, the (–) electrode is negative because is has __________________ *(too many/too few)* electrons. Chemicals that come into contact with the (–) electrode will __________________ *(gain/lose)* electrons and be ______________________ *(oxidized/reduced).* The (–) electrode in electrolysis is called the ______________________ *(cathode/anode)*.

5) Write the change that water goes through at the (–) electrode. ______________________________

6) In an electrolytic cell, the (+) electrode is positive because is has ________________ *(too many/too few)* electrons. Chemicals that come into contact with the (+) electrode will ____________ *(gain/lose)* electrons and be ___________________ *(oxidized/reduced).* The (+) electrode in electrolysis is called the __________________ *(cathode/anode).*

7) Write the change that water goes through at the (+) electrode. ____________________________

8) Add these two reactions together (make certain the electrons cancel) and write the overall reaction for the electrolysis of water. __________________________________

9) We will perform this electrolysis using an aqueous solution of sodium sulfate. Both the Na^+ and H_2O will be near the (–) electrode. Which chemical is more likely to be reduced? ____________

10) Both the SO_4^{2-} and H_2O will be near the (+) electrode. Which chemical will be oxidized? __________

11) In the electrolysis of KI(aq)

Both the K^+ and H_2O will be near the (–) electrode. Which chemical is more likely to be reduced? ______

Both the I^- and H_2O will be near the (+) electrode. Which chemical is more likely to be oxidized? _______

Write the reactions at each electrode and the overall reaction:

Cathode	Anode
Overall	

12) In the electrolysis of $CuSO_4$(aq)

Both the Cu^{2+} and H_2O will be near the (-) electrode. Which chemical will be reduced? ________

Both the SO_4^{2-} and H_2O will be near the (+) electrode. Which chemical will be oxidized? ________

Write the reactions at each electrode and the overall reaction:

Cathode	Anode
Overall	

13) Silver plating occurs when electrolysis of a Ag_2SO_4 solution is used because silver metal is formed at the

_____________________ *(cathode/anode).* This is the _________ *(+ / -)* electrode. The reaction at this

electrode is: _______________________.

Recall that 1 amp•sec = 1 Coulomb and 96,500 Coulombs = 1 mole e-'s (Faraday's constant).
If a cell is run for 200. Seconds with a current of 0.250 amps, how many grams of Ag^0 will be deposited?