Dougherty Valley HS AP Chemistry
Electrochemistry – Electrolysis

WORKSHEET #5

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

Show all work

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

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 electrochemical 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° will be deposited?