

Name: _____

Period: _____

Seat#: _____

Directions: Show all work when applicable.

FILL IN THE BLANKS:

Standard Reduction Potential	E° (volts)
$\text{Cl}_2(\text{g}) + 2\text{e}^- \rightarrow 2\text{Cl}^-(\text{aq})$	+1.36
$\text{O}_2(\text{g}) + 4\text{H}^+(\text{aq}) + 4\text{e}^- \rightarrow 2\text{H}_2\text{O}(\text{l})$	+1.23
$\text{Ag}^+(\text{aq}) + \text{e}^- \rightarrow \text{Ag}(\text{s})$	+0.80
$\text{I}_2(\text{s}) + 2\text{e}^- \rightarrow 2\text{I}^-(\text{aq})$	+0.535
$\text{Cu}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Cu}(\text{s})$	+0.337
$\text{SO}_4^{2-}(\text{aq}) + 4\text{H}^+(\text{aq}) + 2\text{e}^- \rightarrow \text{SO}_2(\text{g}) + 2\text{H}_2\text{O}$	+0.20
$2\text{H}^+(\text{aq}) + 2\text{e}^- \rightarrow \text{H}_2(\text{g})$ (reference electrode)	0.00
$2\text{H}_2\text{O}(\text{l}) + 2\text{e}^- \rightarrow \text{H}_2(\text{g}) + 2\text{OH}^-(\text{aq})$	-0.828
$\text{Na}^+(\text{aq}) + \text{e}^- \rightarrow \text{Na}(\text{s})$	-2.714
$\text{K}^+(\text{aq}) + \text{e}^- \rightarrow \text{K}(\text{s})$	-2.93

- All of the equations in the chart above are written as _____ (oxidations/reductions).
- 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).
- 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).
- In an electrolytic cell, the (–) electrode is negative because it 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).
- Write the change that water goes through at the (–) electrode. _____
- In an electrochemical cell, the (+) electrode is positive because it 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).
- Write the change that water goes through at the (+) electrode. _____
- Add these two reactions together (make certain the electrons cancel) and write the overall reaction for the electrolysis of water. _____
- 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? _____
- Both the SO_4^{2-} and H_2O will be near the (+) electrode. Which chemical will be oxidized? _____

Dougherty Valley HS Chemistry - AP Electrochemistry – Electrolysis

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 $\text{CuSO}_4(\text{aq})$

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 $1 \text{ amp}\cdot\text{sec} = 1 \text{ Coulomb}$ and $96,500 \text{ Coulombs} = 1 \text{ mole e}^-$'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?

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