



## Electrochemistry Worksheet

3. An electric current is passed through an aqueous solution of lithium bromide.
- What is produced at the cathode?

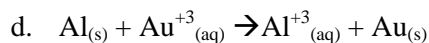
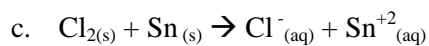
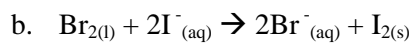
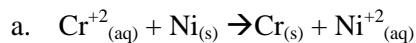
- What is produced at the anode?

4. An electric current is passed through an aqueous solution of lead(II) chloride.

- Write the half-reaction that takes place at the cathode.

- Write the half-reaction that takes place at the anode.

5. Label each reaction (as written) as spontaneous or non-spontaneous.



6. Balance this equation:  $\text{ClO}_2^{-} + \text{Br}_2 \rightarrow \text{ClO}_4^{-} + \text{Br}^{-}$

- In acidic solution

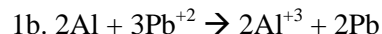
- In basic solution

7. "White gold" is plated with rhodium (Rh) in order to make it look more like silver. How many coulombs of electricity must be pumped through an rhodium(III) solution in order to plate 1 gram of solid rhodium?

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### Answers

1a. Al is on the left so it's the anode. Pb is the cathode

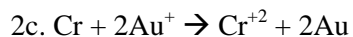


1c. 1.55 V

1d. Pb because it's not a reactant in the equation.

2a. Two beakers. One contains  $Cr^{+2}(aq)$  and a Cr electrode. The other contains  $Au^{+}$  and a Au electrode. A salt bridge connects the two beakers and a wire connects the two electrodes.

2b. In order to make a positive cell potential, Cr must be the anode and Au must be the cathode.

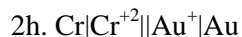


2d. According to the equation, Cr is dissolving into  $Cr^{+2}$  ions. Therefore the Cr electrode loses mass. The equation also tells us that  $Au^{+}$  ions are becoming solid Au, so the Au electrode gains mass.

2e. Toward Au. Gold ion is reduced, which means it's gaining electrons.

2f. Toward Au. As the positive gold ions are turned into neutral gold, the cations from the salt bridge must enter the gold solution to replace that lost positive charge.

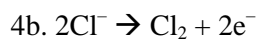
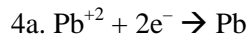
2g. 2.43 V



$$\begin{aligned} 2i. \Delta G &= -nFE \\ &= -(2)(96485)(2.59) \\ &= -500,000 \text{ J} \\ &= -500 \text{ kJ} \end{aligned}$$

3a.  $H_2$  and  $OH^-$

3b.  $Br_2$

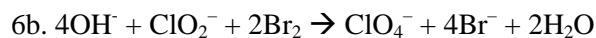
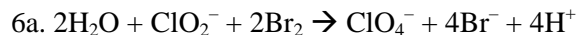


5a. non-spontaneous

5b. spontaneous

5c. spontaneous

5d. spontaneous



$$7. 1 \text{ g Rh} \times \frac{1 \text{ mol Rh}}{103 \text{ g Rh}} \times \frac{3 \text{ mol } e^-}{1 \text{ mol Rh}} \times \frac{96485 \text{ C}}{1 \text{ mol } e^-} = 2810 \text{ C}$$