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Electroplating with Copper

Pre-Lab Activity

1. A thin layer of copper will deposit on the key during the electroplating process. What is the source of this copper?

2. What is the purpose of the power supply in the electroplating reaction?

3. Write the reduction half-reaction for the electroplating reaction. Where will this reaction occur?

4. What ions will form at the anode? Write the oxidation half-reaction for the electroplating reaction. Where will this reaction occur?

5. Explain the relevance of the Law of Conservation of Matter to this lab activity.

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Electroplating with Copper

Data and Calculations Table

Data Table	*Trial 1*	*Trial 2 (Optional)*
Initial mass of key (g)		
Final mass of key (g)		
Change in mass of key (g)		
Initial mass of copper electrode (g)		
Final mass of copper electrode (g)		
Change in mass of copper electrode (g)		
Current (A or $\frac{C}{sec}$)		
Time of electrolysis (min)		
Time of electrolysis (sec)		
Calculations Table	*Trial 1*	*Trial 2 (Optional)*
Coulombs transferred (C)		
Faradays transferred (F)		
Moles e^- transferred		
Moles Cu deposited on key		
Moles Cu lost by strip		
Moles e^- transferred per mole Cu deposited on key		
Moles e^- transferred per mole Cu lost by strip		

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Calculations and Post-Lab Questions

Complete the following calculations and questions, showing all work on a separate sheet of paper. Fill in the results in the appropriate spaces in the Calculations Table.

1. What observations suggest that a chemical reaction occurred?
2. Calculate the change in mass of the key and of the copper electrode. Record in the Data Table. Compare the change in mass of the two electrodes. Explain your observations.
3. Calculate the number of coulombs (C), the number of Faradays (F), and the number of moles of electrons (moles e^-) transferred by the power supply. Record in the Calculations Table.
4. Use the mass of copper deposited on the key (negative electrode) to determine the moles of copper ions deposited at this electrode (the cathode). Record in the Calculations Table.
5. Use the mass of copper lost by the copper strip (positive electrode) to determine the moles of copper atoms lost at this electrode (the anode). Record in the Calculations Table.
6. What is the ratio between the moles of electrons transferred by the power supply and the moles of copper ions deposited at the cathode (key)? Record in the Calculations Table.
7. Use the result from Question 6 to determine the charge on a copper ion.
8. Write the reduction half-reaction that occurred at the cathode. Relate this reaction to your answer for Question 6.
9. What is the ratio between the moles of electrons transferred and the moles of copper atoms lost by the anode (copper strip)? Record in the Calculations Table.
10. Use the result from Question 9 to write the oxidation half-reaction that occurred at the anode.

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