Faraday’s Law

1. In the Hall-Herlout process, molten aluminium oxide (Al2O3(l)) is used to produce aluminium metal (Al(s)).

A current of \_\_\_\_\_\_\_\_ A must run for 24.0 h to produce 4.00 kg of aluminium at the cathode

|  |  |
| --- | --- |
| a | 497 |
| b | 166 |
| c | 2.98 x 103 |
| d | 1.78 x 106 |

1. Mattie and Stephanie weigh the anode of a cell and find the initial mass to be 8.53 g. They then run a current of 2.50 A for 2.00 h. If the final mass of the anode is 3.32 g, then the anode is made of \_\_\_\_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| a | Zinc |
| b | Copper |
| c | Magnesium |
| d | Iron |

1. Nic and Jordan weigh the anode of a cell and find the initial mass to be 20.8 g. They run a current of 4.00 A for a time of 2.50 h. When they disconnect and weigh again, the final mass of the anode is 9.90 g. Based on these observations; the boys conclude that the anode is made of \_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| a | Tin |
| b | Nickel |
| c | Zinc |
| d | Cobalt |

1. The amount of time that it will take to plate out all the copper from 25 mL of 0.10  copper (II) nitrate will be \_\_\_\_\_\_ min. Assume the current used is 1.5 A.

|  |  |
| --- | --- |
| a | 5.4 |
| b | 2.7 |
| c | 11 |
| d | 3.2 x 102 |

1. The time to produce 5.40 g of Al(s) from molten bauxite ( Al2O3(l) ) using a current of 5.00 A will be \_\_\_\_\_ h

|  |  |
| --- | --- |
| a | 1.07 |
| b | 193 |
| c | 3.22 |
| d | 9.66 |

1. Silver plating of ornaments or utensils is done by electrolysis of a soluble silver compound. The object to be plated is placed at the cathode. If 10.8 g of silver are to be deposited, how long will it take to plate the object using a current of 0.500 A?

|  |  |
| --- | --- |
| a | 2.68 h |
| b | 5.37 h |
| c | 3.22 x 102 h |
| d | 1.93 x 104 h |

1. The time required to plate out 10.0 g of chromium metal from a 0.10  solution of chromium(II) nitrate in an electrolytic cell is dependent mainly upon \_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | Surface area of the anode in the cell |
| b | initial mass of the cathode in the cell |
| c | amount of current supplied to the cell |
| d | charge of the nitrate ions in the solution |

1. An electrolytic cell contains 2.00 NiCl2(aq) and operates at 0.500 A. To plate out 5.87 g of Ni(s) , the cell will function for \_\_\_\_\_\_\_ s

|  |  |
| --- | --- |
| a | 1.93 x 104 |
| b | 3.86 x 104 |
| c | 7.72 x 104 |
| d | 1.52 x 105 |

1. What mass of aluminum is deposited during the electrolysis of molten aluminum bromide if 30.0 A flow through the cell for 4.85 h?

|  |  |
| --- | --- |
| a | 146 g |
| b | 48.8 g |
| c | 1.46 g |
| d | 0.0351 g |

1. Ian and Crystal set up an electrochemical cell where 1.5 g of Zn(s) is removed from the anode. If the cell has run for a total of 1.0 hours, then the cell will need a minimum current of \_\_\_ A

|  |  |
| --- | --- |
| a | 1.2 |
| b | 2.4 |
| c | 0.60 |
| d | 12 |

1. Anne and Carly set up an electrochemical cell where 0.250 mol of Cu2+(aq) is formed from Cu(s). If the cell has run for 45.0 minutes, the cell will need a minimum current of \_\_\_\_ A.

|  |  |
| --- | --- |
| a | 8.94 |
| b | 3.36 |
| c | 17.9 |
| d | 0.298 |

1. Bill and Wayne are asked to collect evidence to support the theoretical value of Faraday’s constant. They collect the following data using **aluminium** at the anode.

|  |  |  |  |
| --- | --- | --- | --- |
| Initial mass of anode | Final mass of anode | Amperage of cell | Time the cell operates |
| 15.0 g | 10.9 g | 6.80 A | 105 min |

Based on this information, the experimental value of Faraday’s constant is \_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 1.57 x 104 |
| b | 9.40 x 104 |
| c | 5.64 x 106 |
| d | 3.13 x 104 |

1. Theresa and Wendy are asked to collect evidence to support the theoretical value of Faraday’s constant. They collect the following data using **zinc** at the anode.

|  |  |  |  |
| --- | --- | --- | --- |
| Initial mass of anode | Final mass of anode | Amperage of cell | Time the cell operates |
| 31.5 | 13.5 g | 9.00 A | 1.50 h |

Based on this information, the experimental value of Faraday’s constant is \_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 4.42 x 104 |
| b | 2.40 x 104 |
| c | 1.77 x 105 |
| d | 8.83 x 104 |

1. **Numerical response question:** Left justify your answer in the boxes provided.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| A mass of 0.175 g of gold is plated on a ring in 10.0 min according to the half reaction given below  **Au3+(aq) + 3e- 🡪 Au(s)**  The current required to do this is a.bc x 10-d amps. | | | | | |
|  | | | | | |
|  | | | | | |

Solutions:

1. A
2. D
3. B
4. A
5. C
6. B
7. C
8. B
9. B
10. A
11. C
12. B
13. D
14. 4291