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| **Chemistry 12**  **Electrochemistry** | Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

1. Consider the electrolysis of pure, molten CuCl2.
2. Draw the electrolytic cell for this particular reaction. Label all parts of the cell, including the type of electrode used.
3. What are the substances produced at the anode and cathode?

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| Cathode | Cu2+ + 2 e- 🡪 Cu(s) | Eo = 0.34 V |
| Anode | 2 Cl- 🡪 Cl2(g) + 2 e- | Eo = -1.36 V |
|  | Cu2+ + 2 Cl- 🡪 Cu(s) + Cl2(g) | E0cell = -1.36 V |

1. What is the minimum voltage which must be applied to the cell?

Must apply at least +1.36 V before the cell will operate.

1. An aqueous solution of NiSO4 was electrolyzed using inert electrodes.
2. Draw the electrolytic cell for this particular reaction. Label all parts of the cell, including the type of electrode used.
3. What substance was produced at each of the electrodes?

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| Cathode | Ni2+ + 2 e- 🡪 Ni(s) | Eo = -0.23 V |
| Anode | H2O 🡪 ½ 02(g) + 2 H+ + 2 e- | Eo = -0.82 V |
|  | Ni2+ + H2O 🡪 Ni(s) + ½ 02(g) + 2 H+ | E0cell = -1.05 V |

1. What is the minimum voltage which must be applied to the cell?

Must apply at least +1.05 V before the cell will operate.

1. Explain why aluminum metal cannot be produced by electrolysis of AlCl3(aq).

AlCl3 🡪 Al3+ + 3 Cl-

Since H2O has a higher tendency than Al3+ to reduce, even under basic conditions, Al3+ will never be able to reduce as long as there is water present.

1. Design a cell to silver plate an iron spoon. Include in your design:
2. What ions will be in solution and the direction of ion flow.

NO3- (towards anode)

Ag+(towards cathode)

1. What substances will be used for the anode and cathode

Cathode: iron spoon

Anode: Ag(s)

1. The direction of electron flow when we connect our cell to a DC power source.

Electrons will flow from anode to cathode