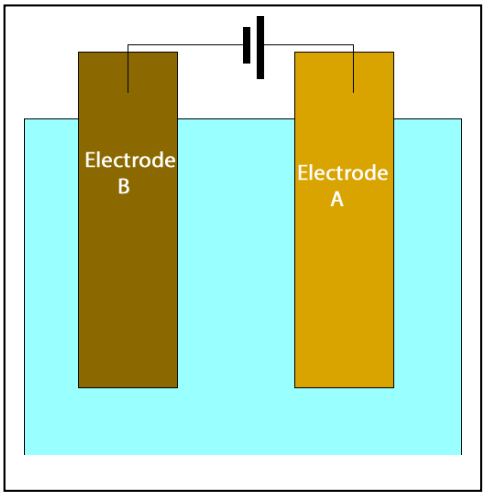
Video worksheet – Voltage

1. Blister copper (impure copper) is purified by electrolysis using a current of 2.50 A for 3.0 hours in an electrolyte containing Cu^{2+} ions.



(a) Identify the electrode that the blister copper is attached to and
electrode where the pure copper is formed.

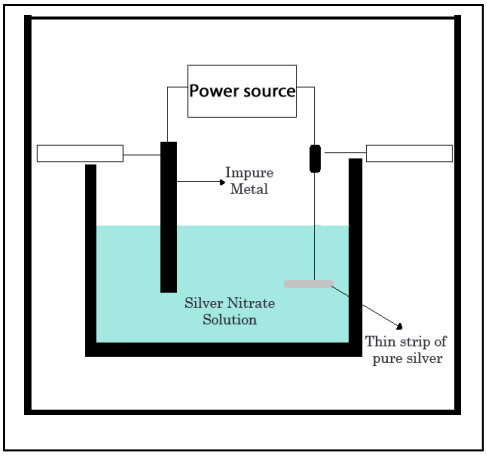
(b) Circle the correct voltage that should be used.

3.94 V, 4.90 V, 0.30 V, 0.50V

(b) Calculate the mass of pure copper deposited at the cathode.

Assume 100% efficiency. (Molar mass of Cu = 63.55 g/mol, Faraday's constant = 96,500 C/mol e^-

2. Impure silver is purified by electrolysis using a current of 1.50 A for 2.0 hours in an $AgNO_3$ electrolyte .



(a) On the diagram provided, label the:

i. anode and cathode

ii. polarity of the power source terminals

(b) A sludge of undissolved impurities forms just beneath the

impure silver. Which of the four metals will most likely be found in the sludge? Explain

Lead, copper, gold, zinc

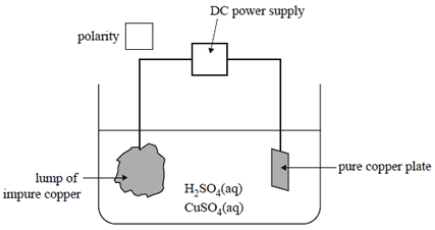
(c) Which of the metals above will be oxidized and found in the electrolyte after the process is complete? Justify your answer.

(d) Circle the correct voltage that should be used.

0.79 V, 0.90 V, 8.30 V, 0.40V

(e) Calculate the mass, in grams, of pure silver deposited, assuming the cell is 85% efficient in converting electrical energy into chemical energy. (Molar mass of Ag = 108 g/mol)

3. In a trial experiment, a sample of impure copper is purified using an electrolytic cell with an acidified copper sulfate solution. The impure copper is attached to one of the electrodes of the power source whilst the other electrode is connected to a pure sample of copper metal. The impure copper and the pure copper electrodes were weighed before and after electrolysis. The results are provided in the table on the right.



	Mass of lump of impure copper	Mass of pure copper
before electrolysis	10.50 kg	1.60 kg
after electrolysis	0.8000 kg	9.90 kg

a. What is the polarity of the electrode that the impure copper sample is attached?

b. Give the equation to the reaction taking place at the electrode connected to the pure copper sample.

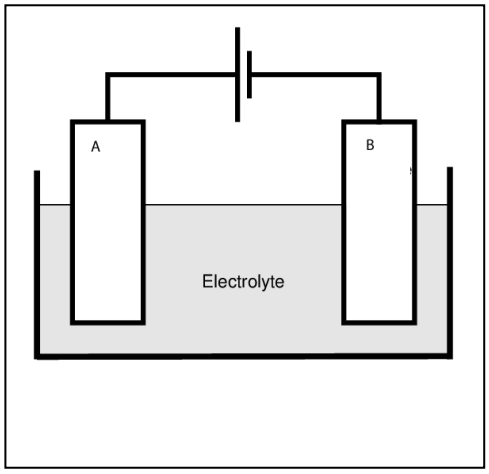
On the basis of these results:

c. calculate a percentage purity of the lump of impure copper

d. indicate one factor that may affect the accuracy of these results.

4. An electrolyte solution containing Zn^{2+}, Ag^{+}, Cu^{2+} , Pb^{2+} and Mg^{2+} ions, all at a concentration of 1.0 M was used in an electrolytic cell that delivered a current at 2.00 volts. The cell is shown below.

a. Several layers of different metals were deposited at one of the electrodes.



i. At which electrode were the metal layers deposited.

ii. Give the order in which the metals were deposited from first to last.

b. A gas was seen to form at one of the electrodes.
Identify the gas and the electrode at which it formed. Explain why this gas formed.