HL Questions on Electrochemical cells (2) - Electrolysis

1. Electricity was passed through two different electrolytic cells connected in series. One of the cells contained dilute sulfuric acid solution and 250 cm^3 of oxygen (measured at STP) was evolved at the positive electrode (anode). The second cell contained molten lead bromide. (I mole of gas occupies 22.7 dm^3 at STP).

i. Deduce the volume of hydrogen that was released (measured at STP) at the negative electrode (cathode) in the first cell.

ii. Deduce the mass of lead that was formed in the second cell.

iii. During the electrolysis the current was supposed to have been kept constant at 0.500 A but in fact it fluctuated to give an average reading of 0.450 A. Describe how this would affect the answer to part **ii**.

2. i. Explain how substituting copper electrodes in place of graphite electrodes affects the products produced during the electrolysis of aqueous copper(II) sulfate solution.

ii. Describe and explain what will happen to the colour of the solution in the above two cases.

3. Describe how you could cover a piece of steel with a thin layer of silver using a solution of silver nitrate.

4. State the relevant half-equations to explain what happens at the two electrodes when electricity is passed through **i.** a very dilute aqueous solution of sodium chloride and **ii.** a much more concentrated aqueous solution of sodium chloride.

5. Explain why both the electrolysis of dilute aqueous sodium hydroxide solution and the electrolysis of dilute aqueous sulfuric acid are both sometimes known as the electrolysis of 'water'.