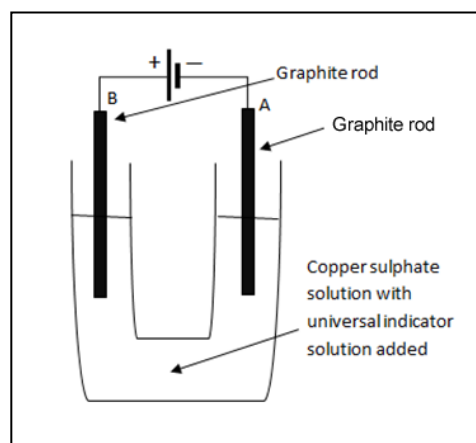**Electrolysis worksheet 10**

1) Consider the electrolysis of a 0.100 M $CuSO_4$ solution using the apparatus shown below.
A current of 1.50 amperes is applied for 1.50 minutes.
The colour of Universal Indicator is shown at various pH values in the table below.

Colour	pink	yellow	green	blue	Violet
pH	3.0	5.0	7.0	9.0	11.0

(a) Write a balanced half-equation for the reaction occurring at **the:**
Anode –$2H_2O(l) => 4e + 4H^+(aq) + O_2(g)$

Cathode – $Cu^{2+}(aq) + 2e => Cu(s)$
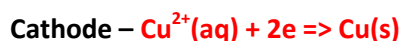
(b) Assuming the solution is very dilute, what colour change(s), if any, would be expected at electrode A and electrode B. Briefly explain your answer.
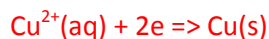At the anode we have H^+ been produced colour change should indicate this. Eg yellow to pink or green to yellow, or green to pink
At the cathode now change to the pH of the surrounding water is noticed
(c)   Which electrode will increase in mass during the electrolysis?
negative = cathode

(d) Calculate the mass change of the electrode given as an answer to b) above.
$Cu^{2+}(aq) + 2e => Cu(s)$
  Step 1 find the charge delivered
=> Q = It = 1.50 X 1.50 X 60 = 135 C
Step 2 calculate the mol of electrons
=> n_e = 135 /96500 = $1.40X 10^{-3}$
Step 3 calculate the mol of Cu
=> ½ X 1.40 10^{-3} = $7.00 X 10^{-4}$.
Step 4 calculate the mass of Cu
=> 63.5 X 7.00 X 10^{-4} = $4.44 X 10^{-2}$ grams

2) Draw a galvanic cell represented by the two half cells below.
Cl_2 / Cl^- and Zn/Zn^{2+}
a) Indicate the :
- an appropriate substance for the salt bridge
- anode and cathode and their polarity as well as the equations to the reactions occurring at each electrode.
- direction of positive and negative ion flow as well as electron flow.
- The EMF of the cell