**Electrolysis Question**

Copper metal and chlorine gas can be extracted from a solution of copper chloride, CuCl2.

(a) Explain what is meant by the term “electrolysis”.

(b) For both the anode and the cathode of the electrolytic cell:

* describe what will be observed
* write half equations for the reaction at each electrode
* describe the reaction as oxidation or reduction and link your answer to changes in oxidation number.

(c) Link the oxidation-reduction reactions occurring at each electrode to the movement of electrons within the cell. Justify your answer by considering the spontaneity of the reaction and the calculated electrode potential for the cell reaction.

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| **Standard Reduction Potentials *E° /V*** |
| Cl2/Cl– | +1.36 |
| Cu2+/Cu | +0.34 |

**Electrochemistry Question**

The following electrochemical cell was set up.

Electrode B

Solution B

Electrode A

Solution A

Electrode A: Pb Electrode B: Pt

Solution A: Pb2+ Solution B: MnO4-, Mn2+

Use the standard reduction potentials to answer the following questions.

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| **Standard Reduction Potentials *E° /V*** |
| MnO4-/Mn2+ | +1.49 |
| Pb2+/Pb | -0.13 |
| Fe2+/Fe | -0.44 |

* Write half equations for each half cell
* Write a balanced equation for the overall cell reaction
* Identify and explain which half cell is undergoing oxidation and which half cell is undergoing reduction using loss or gain or electrons or change in oxidation number
* Write the cell diagram notation
* Calculate the E0cell
* Determine the direction of the electron flow (from A to B or from B to A)
* Describe any observations that will occur in the cell when the voltmeter is replaced by a wire

Determine whether a reaction will be observed when a piece of lead (Pb) is placed into a solution of FeCl2. Give a reason for your answer.