

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Block: \_\_\_\_\_

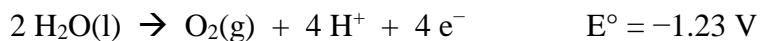
## Chapter 5 – Electrochemistry: Electrolytic Cells and Electroplating

### Super Problem

An electric current is applied to two separate solutions for 30 minutes, under the same conditions using inert electrodes. Observations are noted in the table below.

Solution A – 1.0 M K <sub>2</sub> SO <sub>4</sub>	Solution B – 1.0 M CuSO <sub>4</sub>
Anode: gas bubbles	Anode: gas bubbles
Cathode: gas bubbles	Cathode: dark flakes formed on the electrode

In both reactions, water is oxidized according to the following oxidation half-reaction.



(a) Write the balanced equation for the half-reaction that occurs at the *cathode* in

(i) Solution A

(ii) Solution B

(b) For Solution A, is the reaction thermodynamically favorable or not thermodynamically favorable? Justify your answer.

(c) In the electrolysis of the  $\text{K}_2\text{SO}_4$  solution, identify the gas produced and describe a test that can be used to identify the gas at the

(i) anode

(ii) cathode

(d) Describe in the box below, what observations, if any, would be noted if a couple of drops of phenolphthalein indicator were added around the cathode of **both** solutions.  
Phenolphthalein indicator is colorless in acidic solutions and turns pink in basic solutions.

Justify your observations.

Solution A – 1.0 M $\text{K}_2\text{SO}_4$	Solution B – 1.0 M $\text{CuSO}_4$

(e) The dark flakes formed on the electrode in the electrolysis of Solution B were collected and dried. The mass of these flakes was determined to be 1.019 grams.

(i) Identify the flakes.

(ii) Calculate the amount of current that was passed through Solution B.