Electrolysis design internal assessment

Electrolysis design internal assessment Introduction to experiment Electrolysis Is a method using a direct electric current to drive a non-spontaneous chemical reaction. It Involves the stage In the separation of elements from naturally occurring sources such as ores. In this experiment, methods to alter rate of electrolysis will be attempted to be discovered. Although many contributing factors could affect the rate of electrolysis which could include internal energy within the electrolyte or surrounding temperature, these factors are hard to be controlled and changed systematically.

Voltage supplied to the electrodes however can be easily changed and adjusted. Thus this experiment will attempt to find the relationship between Voltage applied to the electrodes and the rate of electrolysis. What Is the relationship between Voltage supplied and rate of electrolysis? Variables and definitions The rate of electrolysis is defined as mass of Actions of the electrolyte produced at the cathode per unit of time. Independent variable – Voltage supplied to the electrodes (V) Dependent variable – Rate of Action production in the cathode (gas-l)

Controlled variables: Variable Method of control Reason to control Electrolyte use Zinc Sulfate Different electrolyte Actions have different reactivity rates. Rate of Action production can alter. *See hypothesis for more info. Concentration of Electrolyte 1 mold-3 Zinc Sulfate A highly concentrated substance can undergo electrolysis easier *see hypothesis Amount of charge supplied Maintain 2. 1 Amps (standard current in HOCK DC plugs) Ohm’s law suggests V= IR, a current with an non-constant value could affect the voltage supplied Direction of current

Positive to negative DC Current An AC current will constantly switch the polarity of the electrodes Time Allowed Time 60 seconds Different timing will affect the rate of Actions produced Mass of Electrode Only use egg Determining the gain in mass after electrolysis will be the mass of the Action produced. Hypothesis When voltage of a current has increased, it suggests that more energy is applied per coulomb of charge as Voltage is defined as Joules per coulomb. Giving more energy per charged particles will enable a stronger electrostatic attraction from the electrodes and to the ions in the electrolyte.

Actions thus are likely going to move to the Cathode more quickly and thus a higher rate of reaction. Using Faraday Laws of electrolysis 1st law – " The mass of a substance altered at an electrode during electrolysis is directly proportional to the quantity of electricity transferred at that electrode. Quantity of electricity refers to the quantity of electrical charge, typically measured in coulomb. " 1 This theorem can be summarized from the following equation. 2 Where: m is the mass of the substance liberated at an electrode

Q is the total electric charge passed through the substance F = 96485 C mol-l is the Faraday constant M is the molar mass of the substance z is the valence number of ions of the substances that rate of change of Q is the flow of current as it refers to number of charges passed through per unit of time. Thus finding the rate of change of the dependent and independent variables m and Q respectively (Thus: According to Ohm's law: Therefore, by substituting current into the previous equation, we obtain: What can be seen

in this equation is the gain in Action mass per unit time is directly reapportion to Voltage supplied to the electrodes.

Therefore it is possible to estimate that an increase in Voltage will increase rate of electrolysis. Voltage is directly proportional to rate of electrolysis Experimental setup Apparatus: Copper electrodes Power Pack Beakers Wires with crocodile clips Steps 1 . Connect the crocodile clips to the power pack and clip the crocodile clips to the electrodes. 2. Pour CACM Zinc Sulfate too beaker. 3. Turn on the power pack where the voltage applied is IV. 4. After 60 seconds, measure the new mass of the cathode.

The increase in mass tepee 3 onwards increasing the value of the voltage by 1 every time. *ensure to use a scale that could read at least EDP to ensure higher degrees of precision. Weaknesses to consider One of the major weaknesses from measuring the mass of the Cathode is that Actions are forced to be converted back to neutral atoms. From here, it is very likely when the experimenter attempts to weight the electrode, he or she is very likely going to drop some of the Zinc produced. This return will affect the change in mass of the electrode from its true value.

Secondly, while the values of M, F and z can be easily maintained as they are Just the matter of using Faraday law and the chemical properties of Zinc sulfate, it is however uncertain whenever resistance is possible to be maintained at constant value. Thus the suggested altering variables are only and and the values that are maintained constant are cannot be guaranteed that it would be remained constant. Although the predicted outcome of the relationship between Voltage and rate of electrolysis are directly

proportional, these two factors can possibly create a non-linear trend between Voltage and rate of electrolysis.