Measuring Current in Corrosion Cells with Different Electrolyte Concentrations.

**Project Description:**

In this lab you will directly measure the electric current flowing in an electrochemical cell. Measurements will be made on electrolytes with different amounts of dissolved salts starting with distilled water. You will tabulate the data and then graph the results.

**Equipment Needed:**

For this experiment you will need the following items:

1) Two metal electrodes (use different metals)

2) Small plastic containers for your electrolyte solutions.

3) Four standard electrolyte solutions prepared by your instructor.

4) Small alligator clips

5) Digital multimeter and test leads

**Procedure:**

Step 1) Select a pair of metals to use in your electrochemical cell. (You should make your selection using two metals with the largest difference in electric potential.)

Step 2) Fill a plastic container, three-quarters full, with the distilled water provided by your instructor.

Step 3) Attach the test leads to the DVM and set the DVM to measure dc voltage on the most sensitive scale available. Record the data as described in the Data Collection section. (Note: the measurement is slightly sensitive to the position of the electrodes in the cell so make sure you clamp the electrodes into the same position for each electrolyte.)

Step 4) Attach the test leads to the DVM and set the DVM to measure dc current on the most sensitive scale available. Record the data as described in the Data Collection section.

Step 5) Repeat these measurements for each of the standard electrolytes provided by the instructor. Remember to record the data in the tables provided in the next section.

**Data Collection:**

1) Record the measured current for each of the standard electrolyte solutions in Table 1.

Data Table 1: Measured current for different electrolyte solutions.

|  |  |  |
| --- | --- | --- |
| Electrolyte Salt Concentration(mg/l) | 1/concentration(l/mg) | MeasuredCurrent (mA) |
| 0 |  |  |
| 25 |  |  |
| 50 |  |  |
| 75 |  |  |
| 100 |  |  |

2) Repeat the experiment with two other metal electrode combinations and record the results in Table 2 and Table 3.

Data Table 2: Measured current for different electrolyte solutions.

|  |  |  |
| --- | --- | --- |
| Electrolyte Salt Concentration(mg/l) | 1/concentration(l/mg) | MeasuredCurrent (mA) |
| 0 |  |  |
| 25 |  |  |
| 50 |  |  |
| 75 |  |  |
| 100 |  |  |

**Analysis and Questions:**

Graph the measured current against concentration for each of the two data sets in the space below. Don’t forget to label the axes and to define the units.

1) Which of the salt concentrations yielded the highest measured current? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2) Explain why this was the case?

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3) What is the slope of the graph you obtained from your first pair of electrodes? (Slope = rise/run for the best line through your data)

$$slope= \frac{rise}{run}= \frac{\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_}{\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_}=\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_$$

4) What is the slope of the graph you obtained from your second pair of electrodes? (Slope = rise/run for the best line through your data)

$$slope= \frac{rise}{run}= \frac{\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_}{\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_}=\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_$$

5) Explain what causes the difference between the two electrodes?

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