Chemistry galvanic cell essay sample

Science, Chemistry

Purpose of Experiment:

To determine the effect of concentration of reactants on the current produced by a galvanic cell.

Hypothesis:

The greater the concentration of solution in the two half cells reacting with the two metals to produce current, the greater the flow of current will be produced from the galvanic cell.

Independent Variable:

Concentration of both reactants (Zn2+ and Cu2+).

How the Independent Variable is changed:

Changed by diluting the 1 mol L-1 (Zn2+ and Cu2+) solution supplied with distilled water, while keeping a constant volume.

Dependent Variable:

Current flow produced by the galvanic cell.

How the Dependent Variable is Measured:

Using a multimeter, set on 2V (or lower depending on the current produced by the cell).

Other factors held Constant in the Experiment:

- Electrodes (metal strips of Zn and Cu)
- Electrolytes (both sulfate solutions)
- Volume of solutions used in the galvanic cell
- Length of saltbridge

• Saltbridge solution (0. 1 M KCl solution)

• Surface area of electrode dipping into the electrolyte solutions.

Procedure:

1. Use 2x 50 mL beakers to make up the following half cells, fill with 25 mL 1M zinc sulfate and 1M copper sulfate solution in each beaker.

2. Use one 50 mL beaker, fill with 30 mL of 0. 1M potassium chloride.

3. Soak filter paper strip in the potassium chloride (Keep the salt bridge same length for each repeated experiment).

4. Place zinc metal into the 25 mL zinc sulfate and the copper metal into 25 mL of copper sulfate in the two 50 mL beakers.

5. Connect the two half cells using the soaked filter paper strip (salt bridge).

6. Complete the circuit using wires and connected to the digital voltmeter and record voltage reading.

7. Discard used salt bridge and half cell contents, rinse and wash half cells (50 mL beakers) to be used.

8. Repeat steps 1-7 using diluted copper and zinc solution each time diluting solution to 2x, 4x, 6x and 8x dilution.

Part B

Table of Values 1. 0

| Concentration | Current Flow | |(mol/L) |(Volts) | | 0. 125 | 1. 09 | | 0. 167 | 1. 097 | | 0. 25 | 1. 11 | | 0. 5 | 1. 122 | | 1 | 1. 143 |

Random Errors:

Not enough solution for the experiments, miscalculated quantity needed for the experiment, could afffect the precision and accuracy of the results.

Not measuring volumes at eye level (angle of paralllax) will affect the accuracy of results due to the wrong factor of dilution.

Systematic Errors:

Voltmeter not properly calibrated resulting in wrong measurement of direct current voltage reading.

Fixed solution concentration not the same suggested concentration affecting overall data record.

The importance of repeating the experiment for the number of samples in the experiment is to reduce the amount of error in the experiment and to make the the experimental measuring more accurate and precise.

Due to exposure of random and systematic errors the accuracy of the results may vary from the actual measurements of concentration and current, meaning that the recorded data was not accurate. The precision of the results did vary, there were points below the line of best fit suggesting random error. The experiment was not very precise, repeats of the experiment could improve this problem.

A large quantity of undiluted solution could have improved the overall experiments by repeats of the same experiment, as one of the test samples could have been compared with other samples of the same test to improve the accuracy and precision of results.

Keeping the salt bridge at the same length for each experiment could have improved the results from each testing, as wet equipment could have had an effect on the concentration level of the different experiments creating errors within the experiment.

The experiment showed that an increased concentration did increase the amount of current flowing through the circuit. This verifies that the hypothesis was valid for the experiment. Although taking into acocunt that there is not evidence to suggest an accurate relationship between the concentration and flow of current.