Name(s)	Project Number
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Project Title

Does Electrode Surface Area Affect the Yield of Hydrolysis?

Abstract

Objectives/Goals
The purpose of this experiment was to determine if surface area of electrodes in a Hoffman Voltameter affect the yield of hydrolysis. It was hypothesized that regardless of surface area, all electrodes would have the same hydrogen yield.

Methods/Materials
A Hoffman Voltameter, distilled water, sodium chloride and sodium bicarbonate as a solute, a volt meter, and six pairs of modified copper wire anodes and cathodes were used to perform hydrolysis. One set of electrodes minimized surface area, one set maximized surface area, and one set was similar to the standard shape and surface area.

Results
Three electrodes were compared in two electrolytic solutions. Results were measured in milliliters of hydrogen yield under atmospheric pressure. In the 0.05 M NaCl solution, 3.5 mL, 3.5 mL, and 7mL yields were made with the electrodes that maximized their surface area, minimized their surface area, and were standard in shape, respectively. In the 0.1 M $NaCHO_3$ solution, 4 mL, 4 mL, and 7mL yields were made with the electrodes that maximized surface area, minimized surface area, and were standard in shape, respectively.

Conclusions/Discussion
Because altering the shape to change the surface of the electrodes, the distance between the anode and the cathode was changed. To account for this variable, comparisons of correlation coefficients were made. The correlation coefficient between surface area and hydrogen production was 0.71 for NaCl (aq) and 0.71 for $NaCHO_3$ (aq). The correlation coefficient between the distance between the electrodes and hydrogen production was 0.77 for NaCl (aq) and 0.77 for $NaCHO_3$ (aq). The r^2 value clearly shows that the distance between the electrodes was more important than their surface area. Since this variable was not controlled, little can be concluded. Keeping constant the electrode length and only altering the surface area by changing one dimension would solve this problem.

Summary Statement

To find a more efficient means of producing hydrogen, I tried to see if the surface area of the electrodes I made would affect the hydrogen yield of hydrolysis.

Help Received

Teacher loaned necessary materials and lab equipment; my parents helped with the display.