CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

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Project Number

33375

Project Title

The Effect of Electrolyte Conductivity on Gas Production during Electrolysis

Abstract

Objectives/Goals

Hydrogen is most commonly obtained through a process of decomposing water in a process known as electrolysis. Hydrogen can be used to store electrical energy for use in hydrogen fuel cells and it is key to know what factors effect gas production during electrolysis in order to better improve the efficiency of the process. I tested how varying the conductivity of the electrolyte effects the amount of hydrogen produced at the cathode and gas produced at the anode during electrolysis. My hypothosis was that if differing levels of molar solutions of hydrochloric acid, Sulfuric acid, and ammonium chloride are used as an electrolyte in electrolysis then conductivity will be the only major factor effecting gas production.

Methods/Materials

I used a electrolysis apparatus to measure the amount of hydrogen produced at the cathode and gas produced at the anode during electrolysis. I ran trials of hydrochloric acid, sulfuric acid, and ammonium chloride, at three different molarity, and three trials were run for each of these nine solutions. I also measure the conductivity of each of these solutions and use this data to a eliminate conductivity as a variable and thereby show if any other factor was having a significant effect and gas production.

Conclusions/Discussion

My data supported my hypothesis. When conductivity was removed as a factor the amount of hydrogen produced remained approximately the same at about 7.76 mL per .1A every ten minutes. The standard deviation of the data was at average around the .3 mL and a two-way ANOVA test showed that for molarity 96% of the variation in the data was due to chance and for solution type 50% of variation was due to chance. This showed that neither solution type nor molarity had a significant effect on electrolysis and therefore conductivity was the only major factor in hydrogen production.

Summary Statement

I tested the effect of electrolyte conductivity on gas production during electrolysis.

Help Received

I borrowed an electrolysis apparatus from the chemistry department.