

**Development of an Electronic-Based System for Water pH Analysis**

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## ABSTRACT

The streaming potential method is commonly used for charge analysis in water treatment and the paper industry. The colloidal charge of water determines its quality. This research focused on the construction of a system for determining the electric potential in a water sample through measurement of the output voltage at different pH values. Using *AutoCAD*<sup>®</sup>, the mechanical part of the system was first drawn in 3-dimension. Design and implementation of these parts involved construction of the system cell, its housing and the cam system. The motor control circuit developed is based on pulse width modulation (PWM). The various circuits were drawn using *Circuitmaker*<sup>®</sup>. Measurements of electric potential were carried out on water sample as a function of pH in the range 2-13. The pH of the sample was adjusted with small quantities of calcium hydroxide solution,  $Ca(OH)_2$  in the range 7-13, and with hydrochloric acid,  $HCl$  in the range 2-7. The results obtained showed that the output of the system varied with water pH level. In the pH range 2-6, the system output depicted a drop in potential from 33 mV to 24 mV while in the range 6-13, an increase in the output potential from 24 mV to 42 mV was noticed. From the results, the negative and positive gradient of the graph implies presence of acidic and basic media respectively. From these results, the relationship between the system output and the ionic concentration of particles in the water can be used in determining the stability of these particles hence the amount of alum needed during water treatment process. Various recommendations are given for future research especially in the automation of the system and calibration to allow measurement of other parameters such as temperature and turbidity that affect water quality.