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Pressure Induced Voltage Output in Piezoelectric Crystals

This project was designed to determine if a piezoelectric crystal would produce increasingly higher voltage outputs when that crystal was struck by increasing amounts of force. Rochelle salt was chosen as the piezoelectric crystal as it was easy to create at home with common household chemicals. A single crystal was chosen and used throughout the experiment to control for possible changes in voltage output due to variance in crystal size. A glass marble was dropped repeatedly from different heights onto the crystal to create an increase in force. The marble was dropped 30 times each from one to five inches in height in one inch increments. An oscilloscope was used to record the resulting peak-to-peak voltage spikes produced each time the marble struck the crystal. The oscilloscope probes were placed on either side of the crystal to close the circuit electrically when the variable force was applied to the crystal. The resulting peak-to-peak voltage values were captured with the oscilloscope each time the marble struck the crystal and were recorded on a spreadsheet for statistical analysis. There were five independent groups of recorded peak-to-peak voltages; one group for each of the five different heights. An analysis of variance (ANOVA) was used to determine if there was a significant difference between groups. Although there was no significant difference between groups one and two, and four and five, the results of the ANOVA showed that there was indeed an overall increase in voltage output for each increase in force striking the crystal.