CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Tom Yang

Project Number
S1525

Project Title
The Effect of Temp. on the Voltage of Potassium Sodium Tartrate (Rochelle Salt) Crystals by the Piezoelectric Effect

Abstract

Objectives/Goals
My objective was to determine the effect of temperature on the piezoelectric effect of Rochelle salt crystals. My hypothesis was that higher temperatures would yield higher voltage values, and that lower temperatures would yield lower voltage values, based on the fact that resistance decreases as temperature increases.

Methods/Materials
The materials used were a three-beam balance, burner, computer, aluminum foil, voltmeter, cardboard, refrigerator, hammer, water, and potassium sodium tartrate (Rochelle salt).

Crystals of Rochelle salt were grown, under identical conditions. Then the crystals were taken out and struck with a hammer various times in order to measure the piezoelectric effect (the voltage produced). The temperatures of the crystals tested were altered to test the hypothesis. There were about 4 to 5 crystals tested and about 100 measurements for each temperature range. There were three temperature ranges: -5 degrees C; 20-25 degrees C; 40-50 degrees C. The measurements taken were voltage levels produced when crystals were struck.

Results
In the low temperature range (-5 degrees C), the mean voltage displacement was 0.053 volts. In the room temperature range (20-25 degrees C), the mean voltage displacement was 0.23 volts. In the high temperature range (40-50 degrees C), the mean voltage displacement was 0.060 volts. These show that temperature does effect the piezoelectric effect.

Conclusions/Discussion
The results showed that my hypothesis was partly correct and partly wrong. The lowest temperature range did have the lowest voltage displacement, but the room temperature range, not the highest temperature range, had the highest voltage displacement. The results show that the piezoelectricity of Rochelle salt crystals are not proportional to temperature, and is most efficient at room temperature.

Summary Statement
My project is about determining the effect of temperature on the piezoelectric effect of Rochelle salt crystals.

Help Received
Mom helped clean up project; Mr. Antrim lent me equipment; Mr. Nakaue gave me advice.