



**CALIFORNIA STATE SCIENCE FAIR  
2012 PROJECT SUMMARY**

<b>Name(s)</b> <b>Dylan L. Beyermann</b>	<b>Project Number</b> <b>J0904</b>
<b>Project Title</b> <b>Battery Performance at Different Temperatures</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective was to measure how well alkaline batteries perform at different temperatures. Batteries produce electrical energy using a chemical reaction. Since chemical reactions are slower at lower temperatures, a battery should not last as long when it is colder. <b>Methods/Materials</b> A resistor was connected to the battery to act as a load. The voltage across the load and the temperature were measured every 2 minutes and stored in a Data Logger. After the battery discharged, the data were downloaded to a netbook for analysis. From the time dependence of the voltage, the battery's lifetime was determined. The experiment was repeated twice at room temperature, in a refrigerator and in a freezer. <b>Results</b> At room temperature, the battery lasted 8.79 hours. The battery's lifetime decreased to 6.77 hours at 1.4 °C, and it only lasted 1.95 hours at -15 °C. This demonstrated that the battery's performance decreased with decreasing temperature. <b>Conclusions/Discussion</b> The experiment supported the hypothesis that alkaline batteries do not last as long when used at lower temperatures. Since the storage of energy is essential in our technological world, knowing how batteries perform in different environments is important.	
<b>Summary Statement</b> This experiment is about how an alkaline battery's performance is affected by temperature while being used.	
<b>Help Received</b> Father helped me build the circuit and mount the experiment on the display board. Mother helped me prepare the display board. Parents purchased some materials.	