CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

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Project Number

J2101

Project Title

What's the Matteries with Your Batteries? Comparing Performance, Cost and Environmental Impact of "Green" NiMH Battery

Abstract

Objectives/Goals

The Nickel Metal Hydride battery is an example of a "green" product. Is the NiMH AA Battery better than an Alkaline, Lithium or Ni-Cad battery? To answer this question I must find out:
1. Which AA battery is best performer & value?
2. Which AA batteries have metal concentrations at levels that could impact the environment?
3.What batteries are people using? Are they recycling, or are these ending up in landfills?

Methods/Materials

Exp 1:Priced batteries. Measured voltage using a multimeter. Calculated average time for alkaline & lithium and total time for NiMH and NiCad. Calculated $/min. Exp 2: Worked with a lab to analyze batteries. Exp 3: Conducted survey with confidence level of 95%, margin of error as 5.5%, and California as the population. Visited battery recycler.

Results

Collected around 4,000 data points. Exp 1: NiMH=0.00059 $/min, Alkaline=0.0019 $/min, Lithium=0.004 $/min & NiCad=0.0091 $/min Exp 2: Neither NiMH nor Alkalines were found to be toxic. Exp 3: 407 surveys collected for accurate representation of selected population. Only 11% ±5.5 use NiMHs. 44%±5.5 throw used batteries in the trash. 79.2%±5.5 did not know it is illegal to throw batteries in the trash.

Conclusions/Discussion

You need at least 14 alkalines to get the run time of one NiMH, and in the long run, with some change in habits, the NiMH is an effective "green" product that is non-toxic even when thrown in a landfill and it meets user needs. More needs to be done to get people to use this battery, esp. since my survey shows that people are not aware of battery recycling laws. But NiMHs are taken to China for recycling. If you think about making a "green" product, travelling to China to be recycled is against that idea because it increases the carbon footprint, and the environmental laws in China are not strong enough to protect people and natural resources the way we do in the US.

Summary Statement

Comparing performance, cost and environmental impact of #Green# NiMH battery

Help Received

Mr. George Havalias of American Analytics helped me with the lab analysis and was very nice about explaining all the technical details. I could not have done this project without him. And my sister Aamna Abbasi for being a great pretend judge to help me practice!