



# CALIFORNIA STATE SCIENCE FAIR

## 2015 PROJECT SUMMARY

<b>Name(s)</b> <b>Tabitha P. Behnke</b>	<b>Project Number</b> <b>J2004</b>
<b>Project Title</b> <b>Fireflies in a Tube: How Does Temperature Affect the Glow of Light Sticks?</b>	
<b>Objectives/Goals</b> Light sticks are valuable in natural disasters and are also frequently used by emergency responders. In these type of situations how bright or how long a light stick glows can make the difference between life and death. Therefore, the purpose of my experiment was to test how temperature affects the brightness of light sticks and the length of time they glow. Since the light emitted by a light stick is produced by a temperature sensitive chemical reaction called chemiluminescence, I hypothesized that, although heat would produce a more intense glow, freezing temperatures would cause a light stick to remain lit up longer.	
<b>Abstract</b> Two trials were conducted in which identical light sticks were simultaneously placed in insulated cups of boiling water, warm tap water, cold tap water, or freezing ice-water. In each trial, the brightness of each light stick was compared and ranked over time until the light stick had completely faded and the total amount of glow time was measured.	
<b>Methods/Materials</b> Two trials were conducted in which identical light sticks were simultaneously placed in insulated cups of boiling water, warm tap water, cold tap water, or freezing ice-water. In each trial, the brightness of each light stick was compared and ranked over time until the light stick had completely faded and the total amount of glow time was measured.	
<b>Results</b> In both trials, the light sticks placed in the boiling water were immediately the brightest, yet they were the dimmest by one hour and had extinguished after two and one-half hours. Conversely, the light sticks in the freezing water were initially the dimmest and did not become the brightest until five and one-half hours however they lasted the longest amount of time and continued to glow for more than four days. Also, the light sticks in the warm water became brighter faster than the light sticks in the cold and freezing waters, but the glow did not last as long.	
<b>Conclusions/Discussion</b> Therefore, since heat produced a brighter glow, but freezing temperatures caused the glow to last longer, if an emergency required an intense light for a short period of time, warm the light stick. On the contrary, if the light needed to last a long time but did not have to be bright, try to keep the light stick cold.	
<b>Summary Statement</b> The effect of temperature on the brightness of light sticks and the length of time they glow.	
<b>Help Received</b> My Mom helped me understand some research, assisted with experiment set-up, especially boiling water and maintaining water temperatures, and edited my report with me, including tables and graphs. My Dad and Mom helped me mount some of the display.	