



**CALIFORNIA STATE SCIENCE FAIR  
2013 PROJECT SUMMARY**

<b>Name(s)</b> <b>Hannah P. Pingol</b>	<b>Project Number</b> <b>J0613</b>
<b>Project Title</b> <b>Do Temperature and Particle Size Affect the Rate of a Chemical Reaction?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective is to determine whether the particle size of Alka-Seltzer tablets and the temperature of water affect the reaction time, or the time it takes for the tablets to dissolve in the water. <b>Methods/Materials</b> Alka-Seltzer tablets were used as a particle, and water as a solvent. 12 Alka-Seltzer tablets were used for each trial; 3 tablets were kept as whole, 3 tablets were split into halves, 3 were split into fourths, and 3 were pulverized into a powder. 3 glasses of water were used, labeled as cold (20°C), lukewarm (40°C), and hot (65°C). Each tablet was dropped into each glass of water, the glass being refilled after each trial. The amount of time the tablets took to dissolve was measured in seconds, and was recorded when the tablets completely dissolved in the water. <b>Results</b> The average reaction rates in seconds for the whole tablets were 19.53 seconds for hot water, 36.15 seconds for lukewarm water, and 96.17 seconds for cold water. The average reaction rates for the tablets split in halves were 18.97 seconds for hot water, 30.50 seconds for lukewarm water, and 89.53 seconds for cold water. The average reaction rates for tables cut into fourths were 16.25 seconds for hot water, 29.75 seconds for lukewarm water, and 77.65 seconds for cold water. The average reaction rates for the tablets pulverized into powder were 7.40 seconds for hot water, 24.24 seconds for lukewarm water, and 57.30 seconds for cold water. The pulverized tablets dropped into hot water proved to be the fastest chemical reaction. The whole tablets dropped into cold water proved to be the slowest chemical reaction. <b>Conclusions/Discussion</b> As a result of the experiment, the hot water caused the Alka-Seltzer tablets to dissolve about 2 times quicker than water at lukewarm temperatures, and about 3 times faster than water at a cold temperature. Reducing the particle size quickened the reaction rate as well. Pulverizing the tablets cause the reaction to occur almost 2 times faster than keeping the tablet as a whole. Combining hot water with pulverized tablets was the quickest chemical reaction to occur. These results fully supported the hypothesis. The higher the temperature of water and the smaller the particle size of the tablets, the faster the rate of the chemical reaction.	
<b>Summary Statement</b> Do particle size and temperature affect the time it takes for the tablets to dissolve?	
<b>Help Received</b> Teacher (Mr. Buckles) helped answer questions; Father (Ronald Pingol) bought supplies and helped with display board; Sisters (Sarah and Anna Pingol) helped do the experiment; Mother (Annelyn Pingol) supported the student and bought supplies; Used books at National City Public Library	