



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

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| Name(s) Alhassan Alhassan | Project Number J0601 |
| Project Title Dissolve, Act, and React: The Effect of Temperature on Reaction Rate | |
| Abstract Objectives/Goals The objective of the experiment was to determine the effect temperature has on the chemical reaction rate of Alka-Seltzer and water. Methods/Materials Four clear identical cups were prepared, each filled with the same amount of water (4 oz.) at various temperatures initially measured by a thermometer for each trial and recorded on a data sheet. The cups were labeled with four treatments: very hot ($>69\text{ C}^\circ$), hot ($55\text{-}66\text{ C}^\circ$), warm ($30\text{-}47\text{ C}^\circ$), and cold ($8\text{-}20\text{ C}^\circ$). One whole Alka-Seltzer tablet was dropped into each of the four cups, and the reaction time was obtained through a timer. The amount of time the tablets took to completely dissolve was measured in seconds, and was recorded in a data table. The experiment was conducted three more times, completing a total of four trials for each type of treatment (temperature). The average reaction time for each of the four water temperatures, in each trial, was calculated and also recorded in a data table. Statistical plots displaying the data were made, analyzed, and the conclusion was drawn. Results According to the data collected, with the temperatures ranging from hot to very hot, the Alka-Seltzer tablets appeared to dissolve more rapidly, taking about 17-27 seconds to do so. For the temperature condition labeled as warm, the tablets took about 29-37 seconds to completely dissolve. However, with each cold temperature used, it took about 74-143 seconds for the tablets to dissolve, with bubbles still visible even after a few more minutes. The average reaction rates for the Alka-Seltzer tablets in the four trials were 19 seconds for the very hot water, 24.25 seconds for the hot water, 32.75 seconds for the warm water, and 115 seconds for the cold water. The results showed that the higher the temperature, the faster the chemical reaction. Conclusions/Discussion According to the experiment and results, the Alka-Seltzer tablets dissolved more quickly as the temperature increased. These results fully supported my hypothesis which stated that the higher the temperature of water, the faster the rate of the chemical reaction. Molecules move faster when the temperature is higher and as a result bicarbonate ions contact hydrogen to trigger the chemical reaction and produce carbon dioxide bubbles to speed up the reaction rate. | |
| Summary Statement The purpose of my project was to determine the effect temperature has on the chemical reaction between an Alka-Seltzer tablet and water. | |
| Help Received My parents helped me with the graphs using Excel spreadsheet and provided the materials needed for the project. | |