The Effect of Microwave Heating on Substances in Foods and Beverages

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The microwave oven is one of the fastest selling home appliances in world, but there are major concerns about the effects of microwave heating on various food nutrients/substances. For my project, I determined the concentration change of various food substances at different microwave heating durations; then, I used regression line to model the change in concentration. I measured L-ascorbic acid in orange juice, caffeine in stock solution, and cobalamin in stock solution. I hypothesized that the concentration of L-ascorbic acid and cobalamin would decrease while the concentration of caffeine would be unchanged with increasing duration. To determine concentration I used UV-visible spectroscopy. Stock solutions were first made from the pure analytical standards, and I diluted them to lower and distinct concentrations. As a result, the spectrophotometer created calibration curves and formed linear regression lines for each substance. After finding the regression line, I heated the beverages containing the designated food substances for specific durations, and the absorbances were recorded. After finding the absorbance, the concentration of the substance were calculated using the linear regression lines. I concluded from my experiment that the concentration of L-ascorbic acid in orange juice decreased with increasing duration, and it follows a quadratic regression. Therefore, it is not recommended to heat orange juice for long durations. I also concluded that the concentration of caffeine increased as the duration increased. The increase in concentration was small at the lowest and highest durations, but between 30 and 60 seconds, it was fairly significant following a cubic regression. Cobalamin was not signific impacted by increased microwave heating duration.

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