A Determination of the Aspartame Content in Select Diet Beverages

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Abstract

Millions of dollars are spent every year on diet beverages and there has been much controversy on the contents in these beverages, mainly the artificial sweetener aspartame. It is known that aspartame is included in many of these beverages, but the actual amount of aspartame used is not listed in the nutritional facts or provided by the beverage manufacturers. For this reason, the aspartame content of various soft drinks; Coke Zero, Pepsi Max, Diet Pepsi, and Pepsi Next was analyzed and compared to a calibration plot utilizing Diet Coke as a standard. Diet Coke was used due to the unavailability of an aspartame standard. This experiment was carried out using High Performance Liquid Chromatography to allow for the separation of aspartame from other components in these beverages. Since a standard of Diet Coke was used, aspartame was measured in Diet Coke Units (DCU). This was the devised unit used to allow for the aspartame content of the sample drinks to be compared to the Diet Coke standards. This experiment showed that there was an aspartame concentration of 0.7853 DCU, 1.5779 DCU, 0.8140 DCU, and 0.9269 DCU for Coke Zero, Pepsi Max, Diet Pepsi, and Pepsi Next respectively.

1. Reason for Study

1. Aspartame is present in most diet beverages.
2. Aspartame content is not included on nutrition labels.
3. There have been claims from media linking aspartame to tumor creation.
4. Aspartame metabolizes into methanol.
5. Aspartame poses a danger to individuals with Phenylketonuria.

2. Materials and Methods

1. Hewlett Packard Series 1100 HPLC
2. Phenomenex 250x4.6 mm C18 reverse-phase column
3. Diet Coke, Coke Zero, Diet Pepsi, Pepsi Max, Pepsi Next

Method

1. High Performance Liquid Chromatography (HPLC)
2. Aspartame standards were not available so Diet Coke was used as a standard reference.
3. Diet Coke standards were heated and a 50% Diet Coke solution in deionized water was assigned as 1,000 Diet Coke Unit (DCU).
4. Concentrations of 0.5000 DCU, 0.2500 DCU, and 0.1250 DCU were analyzed via HPLC.
5. Samples were diluted to 50% and analyzed without altering HPLC parameters.

3. Results

![Diet Coke Standard Chromatogram](image)

Figure 3: Diet Coke Standard Chromatogram 1.000 DCU Aspartame elutes at 10.595 minutes.

![Concentration (DCU) vs. Area (mAu*s)](image)

Figure 4: Concentrations of Diet Coke standards and their areas. A 1,000 DCU concentration is equivalent to the amount of aspartame in a 50% solution of Diet Coke.

![Calibration Curve Using Diet Coke Standards](image)

Figure 5: Calibration curve for Diet Coke standards using Concentration (DCU) vs. Area (mAu*s).

4. Conclusions

1. When compared to Diet Coke, Pepsi Max contained the highest concentration of aspartame out of all the diet drinks analyzed.
2. The diet drink samples with less aspartame than Diet Coke contain other artificial sweeteners along with aspartame.
3. This study is important for future quantitative analysis of aspartame content in select diet beverages.
4. In addition, the use of an aspartame standard, instead of a comparison to Diet Coke, would have been able to yield the milligram quantity present in these and other diet beverages.

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