BPA vs. BPS: An Analysis of Water Stored in “BPA-Free” Polycarbonate- Based Baby Bottles Using High Performance Liquid Chromatography and X-Calibur Software

Stratton, Rachel (School: Hilton Head Preparatory School)

Food and beverages stored in polycarbonate plastic containers can be unsafe for human consumption because industrial chemicals used in their production can leach into them. Bisphenol A (BPA) is an endocrine disruptor that can cause cancerous tumors, birth defects, and developmental disorders. BPA was removed from consumer products in 2012 and has been substituted with Bisphenol S (BPS). Recent studies, however, have determined that BPS has endocrine-disrupting effects because it is as hormonally active as BPA. The purpose of this experiment was to determine if BPA or BPS is present in liquids stored in baby bottles marketed as "BPA-Free" and whether the temperature of liquids introduced to the containers has an effect on the amount of chemical(s) leached. Previous year's research utilizing Gas Chromatography (GC) to test samples stored in polycarbonate water bottles detected BPA in 95% of the samples tested.. High-Performance Liquid Chromatography combined with Electrospray Ionization Tandem Mass Spectrometry (HPLC/ESI/MSn) was used for analytical analysis in this study. Water samples were prepared using thirty six "BPA-Free" baby bottles. Samples were stored for five days. Testing was performed at the University of Florida Mass Spectrometry Research Center. Testing determined that one bottle had BPA present (>1.55 ppb) and twenty-five bottles had BPS present at the sub ppb level. Both chemicals were found present in levels greater than those shown to have toxic effects. For further testing, food containers could be analyzed as well as developing a long term toxicity study using rats.

Awards Won: