The Effect of Varying Temperatures on the Release of Antimony within Polyethylene Terephthalate Plastic Beverage Bottles

Rumalla, Kranti

The purpose of this scientific study is to determine the levels of Antimony present in bottles containing different beverages after changing the temperature of the liquid. Bottles are often placed in areas exposed to extreme temperatures, which can degrade the plastics and release chemicals. By applying different temperatures to a plastic bottle and measuring the Antimony, one can find how dangerous heated water bottles are. To carry out this experiment, create forty test groups with the parameters (-17.8,3.3,22.2,43.3,60 degrees Celsius), (Coca Cola, Zephryhills, Aquafina, Tropicana), (1 hour, 8 hour). Place four bottles into each respective parameter. After the experiment is carried out, allow the liquids to return to room temperature. Then measure the electrical conductivity for each liquid with the HM(c) Digital meter. Apply the formula to convert microsiemens/centimeter into parts per billion. When beverages were heated to 60 degrees Celsius for 8 hours, the Antimony levels increased .276 - 17.3 parts per billion when compared to the control group. The same beverages when cooled to -17.8 degrees Celsius for 1 hour had Antimony levels which increased between a range of .09 - .224 parts per billion compared to the control group. The hypothesis presented was supported by the results. As displayed in the graphs, as the applied temperature increased, the electrical conductivity of the liquid increased. An increase in electrical conductivity corresponded with an increase in Antimony levels across all beverage types.

Awards Won: