Determination of Heavy Metals in Fruit Juices and Juice Blends by Total Reflection X-ray Fluorescence

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Fruit juices are some of the most popular drinks among adults and children alike. The juices come in a variety of choices from freshly squeezed, high and low pulp, to juice blends. Often sugar is added to enhance flavor and in some cases the juice is fortified with vitamins and minerals. Dietitians often recommend the consumption of fruit juices to children on a daily basis to increase vitamin intake and therefore it is important to examine whether the juices are free of harmful contaminants such as heavy metals and pesticides. Pesticides are broken down by radiation or microorganisms eventually but heavy metals remain in the environment and can be easily taken up by the fruit plants through the soil or groundwater. Other entry points for heavy metals include fruit harvesting, transport and processing. In an effort to investigate the heavy metal content in various fruit juices, a random selection of juices and juice blends was purchased and analyzed by total reflection X-ray fluorescence spectrometry (TXRF). Different sample preparation methods including centrifugation, acid digestion, and enrichment with a cation exchange column were applied and compared with each other. It was found that several juices contained chromium, nickel, and also lead in measurable amounts raising the question about the origin of those elements in the juices.