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An Investigation of the Use of Visible Spectrophotometric Analysis of Lead in an Herbal Tea Supplement

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Abstract : Lead is a neurotoxic metallic element that is slowly accumulated in bones and tissues especially if present in products taken in a regular basis such as herbal tea supplements. Although sensitive analytical instruments are already available, the USP limit test for lead is still widely used. However, because of its serious shortcomings, Lang Lang and his colleagues developed a spectrophotometric method for determination of lead in all types of samples. This method was the one adapted in this study. The actual procedure performed was divided into three parts: digestion, extraction and analysis. For digestion, HNO3 and CH3COOH were used. Afterwards, masking agents, 0.003% and 0.001% dithizone in CHCl3 were added and used for the extraction. For the analysis, standard addition method and colorimetry were performed. This was done in triplicates under two conditions. The 1st condition, using 25µg/mL of standard, resulted to very low absorbances with an r2 of 0.551. This led to the use of a higher concentration, 1mg/mL, for condition 2. Precipitation of lead cyanide was observed and the absorbance readings were relatively higher but between 0.15-0.25, resulting to a very low r2 of 0.429. LOQ and LOD were not computed due to the limitations of the Milton-Roy Spectrophotometer. The method performed has a shorter digestion time, and used less but more accessible reagents. However, the optimum ratio of dithizone-lead complex must be observed in order to obtain reliable results while exploring other concentration of standards.

Keywords : herbal tea supplement, lead-dithizone complex, standard addition, visible spectroscopy
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