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Cent. Eur. J. Biol. • 8(2) • 2013 • 178-185
DOI: 10.2478/s11535-013-0117-1

Central European Journal of **Biology**

The content of lead in herbal drugs and tea samples

Research Article

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Received 25 April 2012; Accepted 09 October 2012

Abstract: Heavy metals are highly toxic to living organisms even in low concentrations owing to their cumulative effect. In this study the overall content of lead in herbal drugs was determined, as well as the content of lead which was released from tested drugs during the preparation of tea drinks. To determine the content of toxic lead, the highly sensitive microanalytical technique of the potentiometric stripping analysis (PSA) with oxygen as the oxidant was used. The lowest overall content of lead was detected for chamomile and ranged from 0.73 to 0.77 μg/g, while the greatest content of lead was determined in the samples of the frangula bark, and yielded approximately 3 μg/g. The lead content in the prepared tea drinks ranged from 0.26 to 1.23 μg/g and depended on the manner in which tea drink was prepared. All of the herbal drugs in this study contain a certain amount of the toxic metal lead, but at the same time, the contents were below the levels prescribed for this metal. The content of lead released from the herbal drug into the tea drink was three to five times lower than those of the overall content of this metal.

Keywords: *Herbal drugs • Tea preparation • Lead • Potentiometric Stripping Analysis (PSA)*

1. Introduction

The use of herbal drugs for the prevention and treatment of various types of illnesses is becoming highly recognized in modern medicine. For example, pharmaceutical companies are using herbal drugs as raw material for making pills, creams, syrups and different dietary supplements [1]. In addition, ordinary people use herbal drugs to brew tea which they then use either as a refreshment or as an aid, for medicinal purposes. Herbal-based remedies, in addition to their positive therapeutic effects, can have harmful effects on people's health. Inadequate use of herbal remedies during treatment, including unsupervised medication, or combinations with synthetic drugs, the ways in which teas are made (brewing tea, dousing the herbal drug in cold or hot water), can often times lead to harmful effects. The harmful effect of herbal remedies can originate from the presence of heavy metals in the raw part of the plant. Thus, numerous studies have indicated that the presence of heavy metals in herbal drugs, as well as the inadequate use of herbal remedies, represents a potential danger to people's health, due to their cumulative-toxic effect [2-5]. Lead as a highly toxic heavy metal, with a cumulative effect, is one of the most common contaminants of found in plants [6]. The main sources of Pb in plants occurs during uptake through growth media, pesticides and fertilizers which are used during the vegetative period of the plant. Uptake of lead by plants can also be influenced by emissions of pollutants from industrial plants, motor vehicle exhaust gases and waste water. Elevated lead levels cause damage to plants such as delayed flowering, lower chlorophyll content and reduction in the number and quality of shoots [7]. The accumulation of Pb in certain parts depends on the plants lifecycle, mobility of the metal, soil composition, pH values, precipitation, and the presence of other ions and molecule types in the soil [8]. Recent findings have indicated that the greatest content of the highly toxic metal, lead, was detected

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