

## Total X-ray reflection fluorescence spectrometry of black tea and herbal infusions

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The aim of this study was to determine elemental composition including trace element content in various tea and herbal infusions, among them those which are used for medical treatment purposes, by the mean of Total Reflection X-ray Fluorescence analysis (TXRF).

TXRF is an energy dispersive X-ray fluorescence (EDXRF) method with a special geometry, which is known for and characterized by its easy sample preparation, especially for solutions, simple quantification and increased measurement sensitivity, compared to conventional EDXRF.

Using the Mo-W mixed alloy anode X-ray tube the samples were monochromatically excited by Mo K $\alpha$  energy. The measurements were conducted under ambient conditions. The fluorescence radiation emitted from tea samples was analyzed with a Si/Li – detector with 80 mm<sup>2</sup> area, with 12 $\mu$ m Beryllium window. The tube voltage and current were constant during the whole measurement process – 50 kV and 37 mA.

During this work the observation was made which elements can be called intrinsic for the certain tea/herbal

solution type and which are more accidental, caused by pollution, soil difference or similar factors. It is essential to know elemental composition of a tea, due to high consumption [1] of this drink. The separate elements can relieve some disease symptoms or even pain. Some can cause serious health issues when overdosed. For example, phosphorous can increase the risk of cardiovascular disease [2].

The methodology of sample preparation was developed and data from 29 teas and herbal solutions were collected.

Evaluation and comparison between different types of tea/herbal solution were made based on statistically treated data and will be presented.

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[1] <http://www.thie-online.eu/herbal-infusions/herbal-infusions-history/>

[2] <http://umm.edu/health/medical/altmed/supplement/phosphorus>