MON–26

Evaluation of Tin Concentration in Canned Food by GF AAS

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The amount of tin in the human diet has greatly increased when canned food was introduced in the nineteenth century. Tin plating has been used for preserving food because it provides a robust form of packaging, allowing minimization of headspace oxygen and sterilization of the foodstuff within the hermetically sealed can, giving a long safe, ambient shelf life with no or minimal use of preservatives [1]. However, leaching of tin from the can occurs, particularly when plain uncoated internal surfaces are used. The Provisional Tolerable Weekly Intake for tin is 14 mg/kg body weight and recommended maximum permissible levels of tin are typically 250 mg/kg for solid foods (Codex Alimentarius, 1998).

In this work tin amounts were evaluated in canned vegetables and *in natura* samples. Samples were lyophilized and cryogenically ground. The digestion of samples was accomplished using microwave energy and sealed PFA flasks. The amount of tin was determined by graphite furnace atomic absorption spectrometry (GF AAS). A Varian SpectrAA-800 atomic absorption spectrometer with transverse Zeeman-effect background correction, PSD 100 autosampler and tin hollow cathode lamp (286.3 nm) were used. The analytical signals were acquired using 20 µl of diluted sample (0.5% v/v nitric acid) co-injected with 5 µl of 100 mg l^{-1}palladium solution Pyrolysis and atomization temperatures were 1200 °C and 2600 °C, respectively.

Some factors, such as concentration of Ca, Fe, Cu, and pH, determined in the preservative liquid of food, and kind of coating inside the cans, were taken into account to evaluate their possible influence on the leaching of tin. These factors were analyzed by use of Principal Component Analysis (PCA) and then correlated with tin concentrations determined in the samples by GF AAS.

The results showed that tin was leached from cans in different amounts for different samples from various producers, even though the concentrations determined were lower than tolerable level. In green pea samples, for example, tin concentration ranged from 4.8 mg kg^{-1} to 13.5 mg kg^{-1} and in natural samples it was lower than the limit of detection. Among the factors selected do evaluate influences of tin leaching, pH presented strongest influence on the cluster formation using PCA, but it did not present correlation with tin contents in samples.

[1] Blunden, S. and Wallace, T., *Food and Chemical Toxicology*, **41** (2003) 1651-1662.