

Comparison of external calibration and isotope dilution in the determination of tributyltin (TBT) in seafood by GC-ICP-MS.

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Organic tin species such as tributyltin (TBT), are man-made persistent pollutants that are omnipresent in the global environment. Their use as pesticides, marine anti fouling agents and as stabilisers in PVC has led to their detection in sediments, open waters, drinking waters, seafood, human blood and liver. Their well described effect on genitals on dogwhelk and detection in other biological matrices such as blue mussels, has led to an increasing demand for high throughput analysis of samples without compromising on the trueness and precision of the analytical results.

Isotope dilution mass spectrometry (IDMS) has been deemed a superior method in many ways to other methods of quantification due to its many advantages. Among these advantages is the potential ability to achieve accurate results with better precision, and that the analyte recovery does not have to be quantitative providing isotopic equilibration has occurred. However, the IDMS method also suffers from some drawbacks since in order to achieve the optimum results one has to know the concentration of the analyte in question in the sample prior to analysis. A much simpler method of quantification is the external calibration (EC) without internal standard, where the samples are analysed together with known concentration of the analyte in standard solutions. Nevertheless, the EC also suffers from some serious drawbacks. Due to the lack of internal standard the accuracy of the analysis may be seriously affected by instrument drift and incomplete recovery of the analyte.

This study describes a direct comparison between EC and ID methods of quantification of TBT using gas chromatography inductively coupled plasma mass spectrometry (GC-ICP-MS). The certified reference materials BCR-CRM 477 (mussel tissue) and NIES-CRM 11 (fish tissue) were extracted along with relevant seafood samples. Both acetic acid/methanol and tetramethylammonium hydroxide (TMAH) extractions were used for the EC and ID determination. The results from this comparison will be discussed together with implications for large volume routine analysis of seafood samples, which may have large variations in their content of TBT.