**Introduction**

TriButylTin (TBT) is often used in marine antifouling paint, as it swiftly kills organisms such as barnacles, algae and mussels which naturally attach themselves to hard surfaces, including ship hulls. By killing these organisms, drag is reduced, thus lowering fuel consumption. The problem is that TBT leaches from the paint into the surrounding water, affecting marine life and seeping into the food chain where it accumulates and eventually reaches humans through fish consumption.

TBT compounds have also been used extensively in the past as:

- Wood preservatives
- Slimicides in industrial processes
- Molluscicides to prevent schistosomiasis

A recent European Directive has set requirements for TBT levels in surface waters to be < 0.2 ng/L on an annual average, with a maximum monthly allowable concentration of 1.5 ng/L.

**Analytical Methods for TBT Analysis**

GC-MS is the traditional analytical tool often used for the determination of TBT and other organotin compounds. This technique offers good detection limits and the ability to positively identify the species of interest via their mass spectra.

Despite its specificity, GC-MS is not sensitive enough to detect the low levels of TBT required by the EU. Therefore GC-ICP-MS was considered as an alternative technique to perform the detection.

**Sample Preparation**

The following procedures were used to extract organotin species from water samples:

- Transfer 100 mL of the sample into a long-neck 100 mL volumetric flask.
- Add 1 mL of 2M sodium acetate solution
- Add 0.5 mL of 5% acetic acid
- Add 1 mL hexane
- Add 0.5 mL of 1% sodium tetraethylborate
- Shake well, then leave to settle
- Transfer the hexane into GC sampling tubes for analysis

**Analysis of Water Samples**

Transfer of TBT in a surface water sample at < 0.2 ng/L. Full quantification of the levels of TBT in such samples is done using isotope dilution by spiking the samples with 119 enriched TBT prior to derivatization.

**Summary**

GC-MS and GC-ICP-MS can be used for the detection of TriButylTin.

Whilst GC-MS offers the means of confirming that the peak detected is truly TBT, for best detection limits on GC-MS, data will have to be collected in SIR mode. Under such conditions, GC-ICP-MS is more sensitive and more selective since it is quite possible that other organic species might interfere with a GC-MS analysis but would not survive passage through the plasma.

Using a simple extraction/derivatization procedure, it was possible to detect sub ng/L levels of TBT.