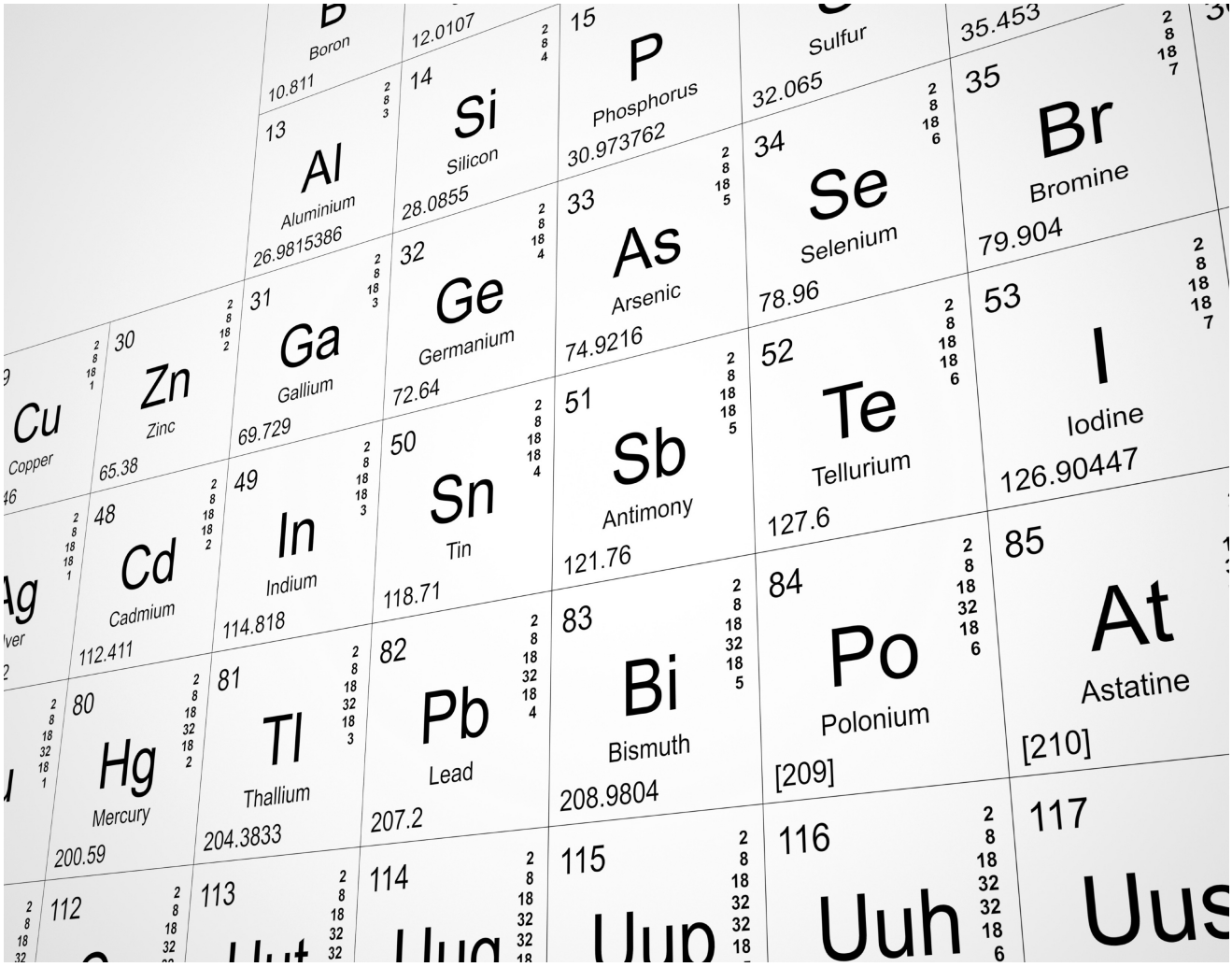

Mercury in Fish

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BRUKER TEST RESULTS

Objective

The goal of the present paper is to show a simple application of spectral analysis to identify Mercury concentrations in fish

Method

Spectrum were taken from 3 fish. The first fish was raised under normal sea water conditions. The second was raised in water with 4 ppm of Mercury. The third was a sample from a large tuna fish caught in the open ocean.

Data were taken at 40 keV with a current of 25 μA in dry air conditions with a 1 mil Cu/1 mil Ti/12 mil Al filter. Samples were not prepared prior to analysis. Data were taken for 120 seconds to allow for detection of elements in very slight concentrations.

Background

Mercury contamination is a growing concern for fisheries around the world. While it is understood that Mercury contamination is a particular threat for long-lived fish, there are nonetheless important questions about assessing risk. By looking at how different concentrations of Mercury in water can build up in the body, it is possible to be predictive about food contamination risks when environmental parameters are known. The first challenge is determining if XRF is appropriate and can detect the small concentrations of Mercury present.

Results

Mercury was clearly detectable in a fish grown 4 ppm of water, though this comes close to the detection limit. Mercury was not detectable in the tuna steak or the control grown in conditions without mercury. It was detectable in a second sample. Lead was present in all samples - indicating another pollutant is present in the water.

RESULTS

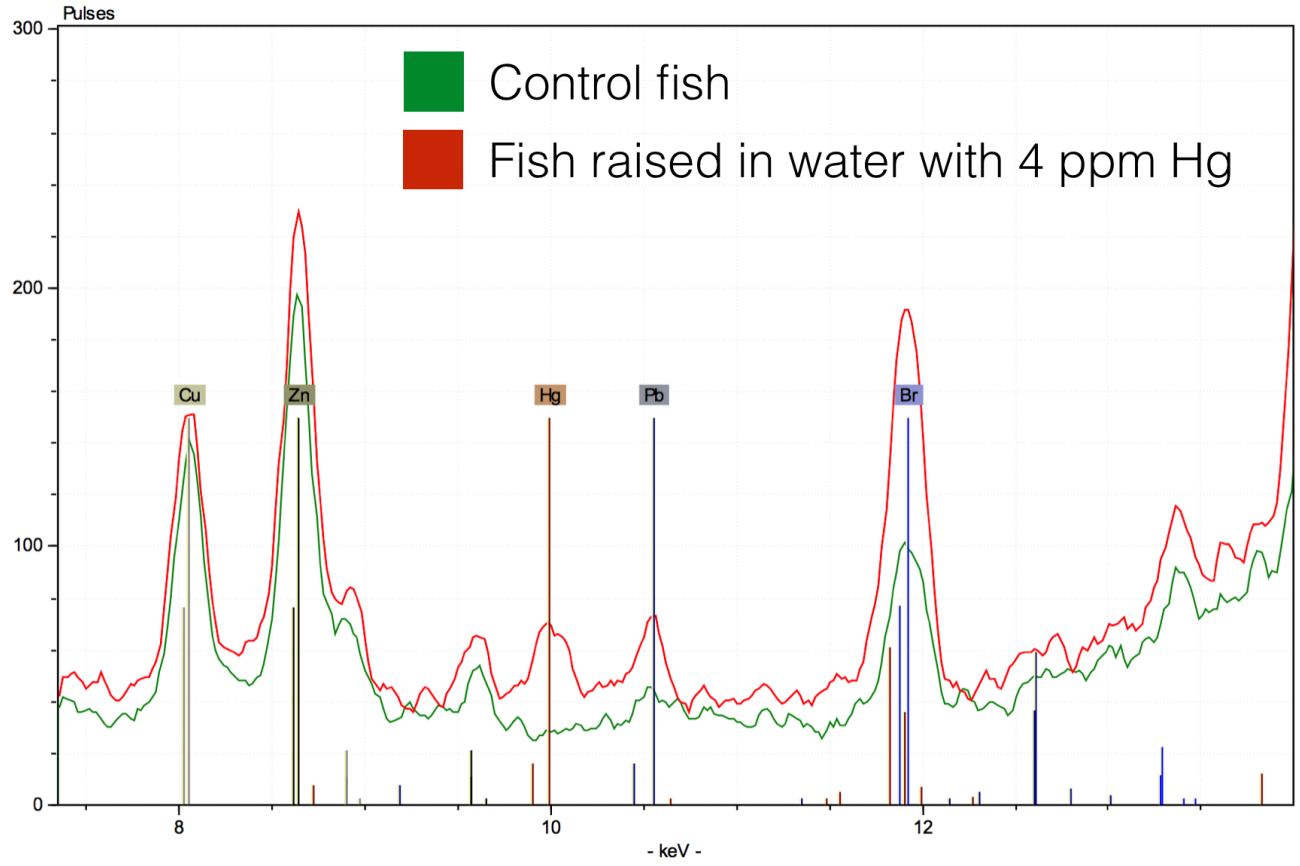

Figure 1: The fish grown in controlled conditions (green line) while the fish grown in water with 4ppm of Mercury shows a clear signal of that same element. Both fish show lead, indicating the water has some concentrations of heavy metal pollutant, even in the controlled conditions.

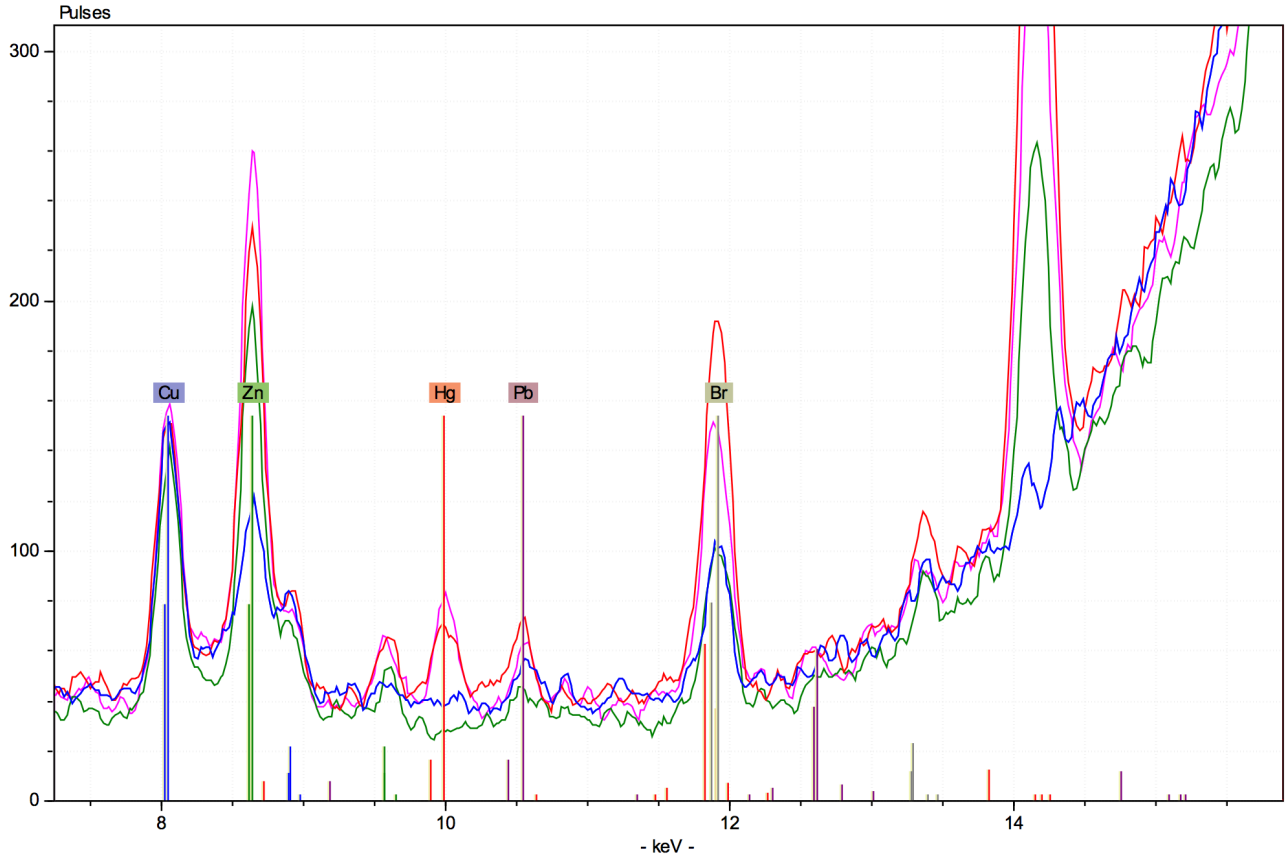

Table 1: All spectra from fish samples, including the tuna sample (blue) A barely detectable limit of Mercury may be present, but the sample may require some processing to lower the detection limit.

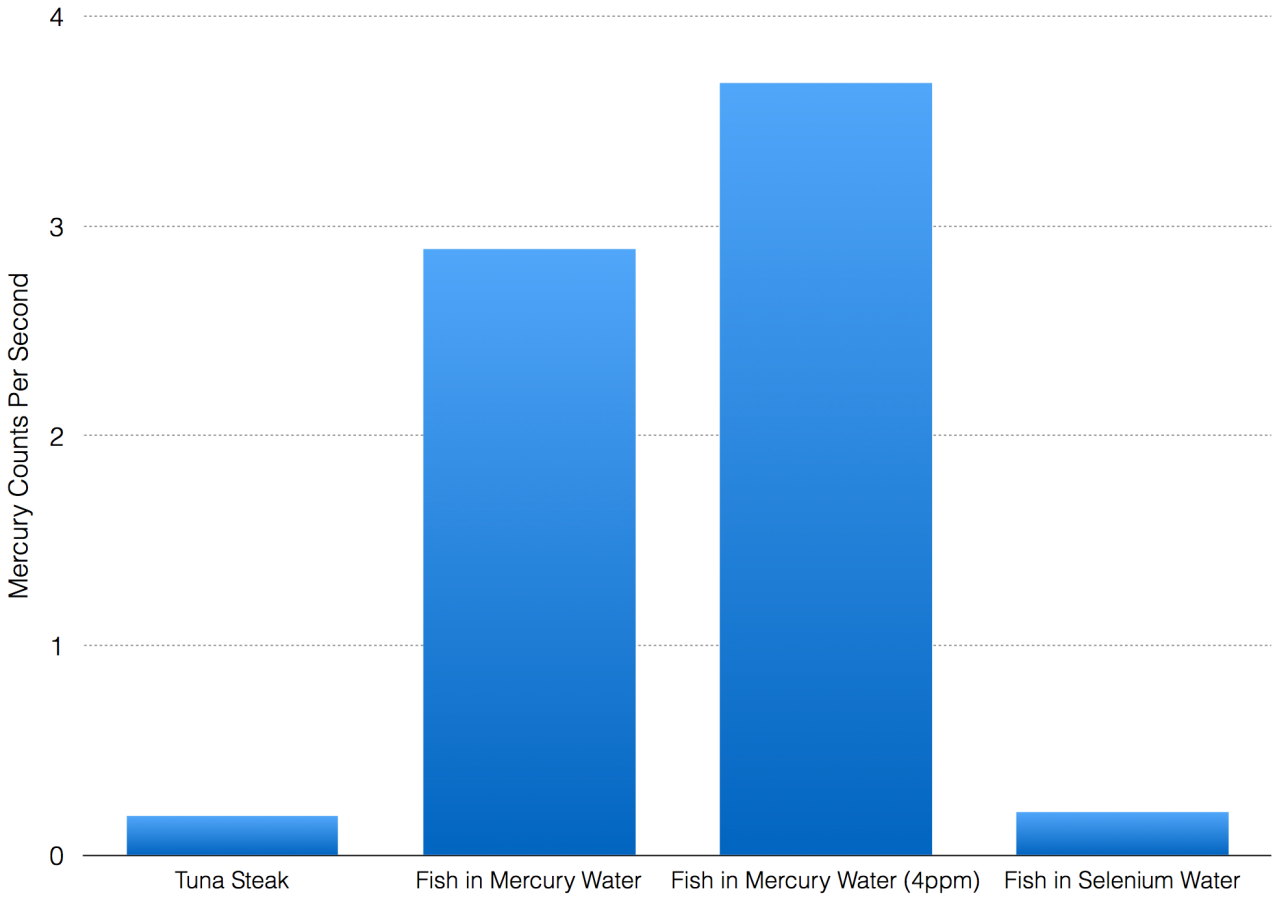

Table 1: Net photon counts per second for 4 fish samples. The tuna steak and the control fish grown in Selenium saturated water both show no detectable Mercury. The fish grown in water with trace amounts of Mercury present both show an unambiguous signal for the element in question.