

Sn distribution in kidney of the hamster exposed to dibutyltin chloride by SR-XRF imaging

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Butyltin compounds were widely used for anti-fouling paints and their contamination into marine sediments is of recent concern. They exhibit nephrotoxicity in experimental animals¹⁾ but detailed distribution of Sn in kidney is still unknown. In the present study, SR-XRF imaging with micro-beam was employed for renal sections obtained from the animals exposed to dibutyltin chloride.

SR-XRF imaging revealed that Sn was high in the renal cortex than the medulla after administration of dibutyltin chloride. Upon further analysis for the renal cortex, Sn was detected in the glomeruli as well as the renal tubules. In the case of inorganic mercury, a nephrotoxic metal, the metal accumulates in the renal tubules selectively and causes lesion at the site²⁾, suggesting that the mechanism of renal toxicity induced by dibutyltin differs from that of inorganic mercury. Further experiments, such as time course study, are

required to understand the cell-specific accumulation of Sn in butyltin compounds-promoted nephropathy.

References

- 1) Wester, P. W., *et al.*, *Food Chem. Toxicol. Pharmacol.* **28**, 179-196, 1990.
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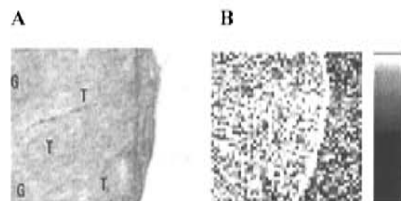


Fig. 1. Sn distribution in kidney of the hamster exposed to dibutyltin chloride. A, photograph of the specimen (6 μm); B, XRF imaging of Sn of renal specimen obtained at 24 hr after oral injection of dibutyltin chloride (360 $\mu\text{mol/kg}$). G, glomerulus; T, renal tubule. Measurements condition was as follows; energy of X-rays, 37.5 keV; beam size, 3 μm^2 ; step size, 10 μm ; counting time, 10 sec per point. The Sn concentration of the specimen was 6.7 $\mu\text{g/g}$ of wet tissue.

Trace Elemental Analysis of Physical Evidence in Forensic Science Using SR-XRF

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In the last experiment, we demonstrated that high energy XRF at BL37XU was nondestructive and sensitive method for discrimination of tiny fragments of glasses composing cars and buildings.

In this study, the technique was applied to characterize trace elements in microscopic glass fragments of various drink bottles including the same brand bottles and different industrial bottles.

Two typical XRF spectra are shown in Fig.1 (a) and (b), glass fragments of which are the same brand bottles obtained from different places. They could be distinguished by comparison of trace elements. Especially, Er detected from bottle (b) was useful for characterization of the glasses.

Four kinds of bottle glass, which have about the same refractive index, show the XRF spectra (a), (b), (c) and (d) in Fig.2. These spectra were apparently different from each other, because characteristic element components could be successfully detected as shown in Fig.2. These bottle glasses could not be identified only by the refractive index measurement which was known as nondestructive method in forensic field.

This SR-XRF technique has also been successfully used for discrimination of microscopic bottle glasses.

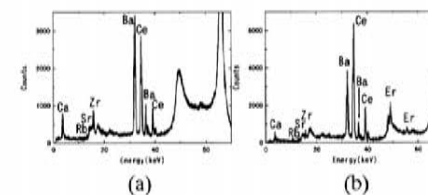


Fig.1 XRF spectra of microscopic glass fragments of same brand bottles.

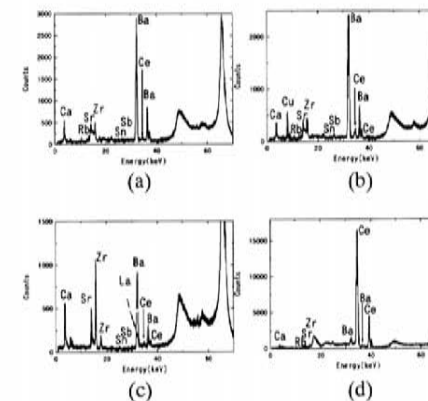


Fig.2 XRF spectra of four kinds of glass fragments which have about the same refractive index.