🕀 SHIMADZU

Application News



EDXRF Analysis of Cd, Hg, and Pb in Blood

There is a need nowadays for the rapid estimation of the various types of poisons in medicine that have combined with metals, in order to be able to give emergency treatment through the administering of an antidote. The EDX-700/800 can identify various types of metals after simple preparation of a sample. Furthermore, the testing is non-destructive so the sample can be analyzed with a different analyzer after testing. Shown below are examples of qualitative analysis with the sample in liquid form and with the sample dried on filter paper.

Sample

- A sample of blood to which the anticoagulant Heparin has been added.
- A sample where aqueous solutions for atomic absorption spectrometry with 1000ppm of Cd, Hg, and Pb has been dropped and mixed into the blood and prepared so that the concentrations of Cd, Hg, and Pb are 10 ppm.

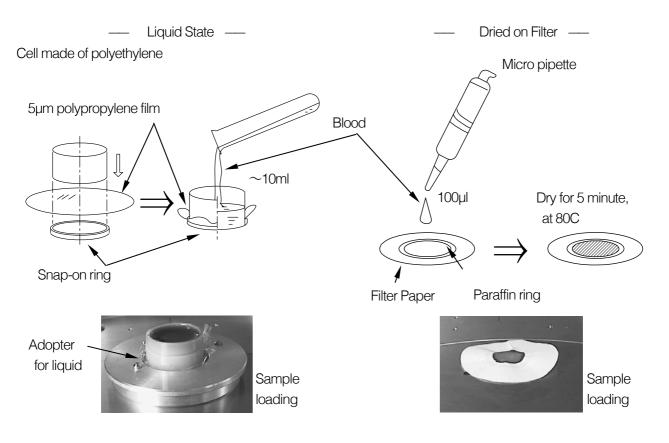
Sample Preparation

(1) Liquid Cell Method

Approximately 10ml of the sample was poured into the liquid sample receptacle and sealed with 5µm polypropylene film.

(2) Filter Method

After dropping 100μ I of the sample onto filter paper, the paper was dried for 5 minutes at 80° C.

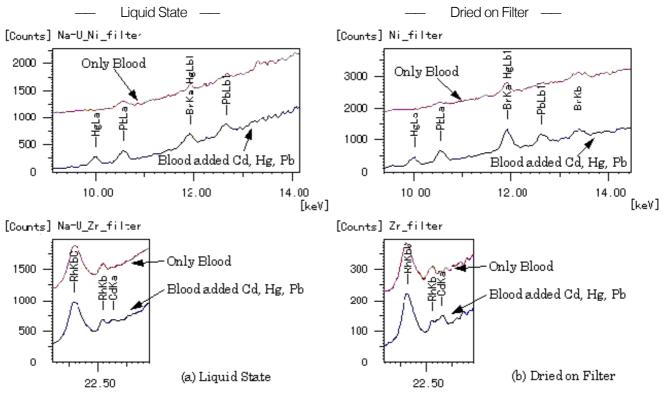


Analytical Conditions

Instrument: EDX-700 X-ray Tube: Rh target Filter: Ni, Zr Voltage - Current: 50kV-24~500µA (Auto) Atmosphere: Air Measurement Diameter: 10mmφ Measuring Time: 1000sec Dead Time: 6~26%

Results

The sample of blood and the sample with 10ppm of Cd, Hg, and Pb were qualitatively analyzed with the liquid cell method and the filter method. The comparative results are shown in Figure 1. In addition, the difference in profile between the blood of Fig. 1(b) and that of the sample with the added Cd, Hg, and Pb is compared in Figure 2.

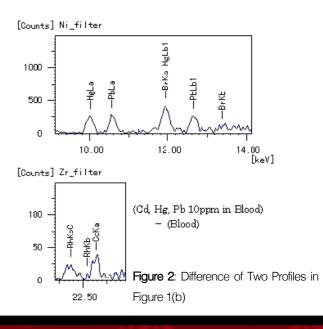


"Only Blood" Profile has offset (Backgrounds are same between "Only Blood" and "Blood added Cd, Hg, Pb ") Figure 1: Qualitative Analysis of Cd, Hg, Pb 10ppm in Blood

Lower Limit of Detection (L.L.D)

The lower limit of detection of Cd, Hg, and Pb in blood calculated from the results of the qualitative analysis is shown in Table 1.

Element	Liquid State	Dried on Filter
Cd	9.9 ppm	8.0 ppm
Hg	$3.4 \mathrm{ ppm}$	1.9 ppm
Pb	2.2 ppm	1.6 ppm



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