

## The pathways of selenium poisoning in Enshi, China

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Enshi Prefecture became notorious as a Se-rich area in China when a sudden incidence of human selenium poisoning occurred in 1963 at Yutangba, located in the northern part of Shuanghe town about 81km SE of Enshi City, Hubei Province. During a field-screening study to investigate the distribution of Se in soils and rocks in Yutangba, anomalous levels of Se were found in cropland soils at different sites, which ranged from 346 to 2118 mg/kg with an average of 899±548 (n=11), significantly greater than the average of 3.5 mg/kg Se in soils. Selenium speciation in these samples and baked soils as the reference were studied to evaluate relative abundances of bioavailable and insoluble species. Results showed that elemental Se and Se associated with organic materials were dominant fractions, accounting, on average, for 75% and 20% of total Se, respectively. SEM observations showed that native Se crystals occurred in these samples, which are very similar to reported Se crystals derived from natural burning of stone coal and abandoned stone coal spoils. These results showed that the source of Se in croplands was different from that of uncultivated soils, and confirmed that the presence of native Se crystals indicates the process of Se enrichment. Local villagers customarily baked soil on fires fueled by the local Se-rich stone coal and dispersed baked soil as a fertilizer. This practice, commonly used by villagers in Yutangba and other places, introduced into croplands a large amount of Se that further accumulated suddenly in their food chain. The occurrence of native Se crystals in Yutangba croplands explains the reason why the sudden incidence of human Se poisoning occurred in some places like Yutangba but not throughout high-Se areas in Enshi. This finding suggested that high-Se areas in Enshi should be divided into 1) sites with acute, chronic Se poisoning and 2) high-Se, low-toxicity sites, in which different measures to prevent selenosis should be taken by the local government.

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## Simultaneous analyses of major and trace elements in fused rock powders using hermetic vessel heater and LA-ICP-MS

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An improved method of directly making homogeneous fused glass using a hermetic vessel heater was developed to simultaneously determine major and trace elements of whole rock powder by LA-ICP-MS. Unlike the fused glasses prepared using the iridium strip heater [1], losses of volatile elements (i.e. Cs, Ge, Sn, Pb) was not found in the fused glasses prepared using an hermetic vessel heater.

Major and trace elements in basalt and andesite glasses prepared using an hermetic vessel heater were simultaneously analyzed by LA-ICP-MS. Calibrated against multiple reference glasses (BIR-1G, BCR-2G and BHVO-2G) without applying an internal standard [2], the results generally agree with the preferred values within uncertainty at the 95% confidence level. Our results demonstrate that the hermetic vessel heater provides a simple and rapid way to directly make fused glasses for determining major and trace elements in basalt and andesite.

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