

Distribution and Characteristics of Toxic Elements in Soil and Minerals based on X-ray Analytical Techniques

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Exploitation of lead and zinc deposits contaminates usually a large amount of water, soil and farmlands. Toxic elements from them will last enter plants and food chains, and cause a lot of damage to human health. The farmlands near a lead-zinc mine have been chosen as the ecology and environmental geochemical investigation field. The toxic elements in soil and minerals were determined by x-ray fluorescence spectrometry. Characteristics of minerals and the relationship between the minerals and soils were studied by scanning electron microscopy and electron probe techniques. The impact of the toxic elements on food chains was evaluated.

The lead-zinc mine, located at the southeast part of China, near Yangtze River, has been exploited for over 50 years. People have lived near the mine for a long time and partly relied on the farmlands in the contaminated soil for vegetables, poultry and fish. In the research, therefore, samples of minerals and rocks were first taken from the mine. And the soil around it and the vegetable soil in farmlands were then sampled. Pb, As, Cd, Cu, Zn and Mn, as well as other minor and trace elements in the samples, were determined by polarized energy dispersive x-ray fluorescence spectrometers.

The data from the ecology and environmental geochemistry investigation and the analytical experiments show that some of toxic elemental concentrations in soil are higher than the acceptable maximum of them in edible vegetable soil. The concentration of toxic elements, such as arsenic in soil profiles, is relative to lead in some cases. Several special kinds of minerals, related to lead and zinc sulfides, were found in the vegetable soil. The relationship was revealed between the farmland soil and the minerals from the exploited lead-zinc mine. Transfer of the toxic elements into water and plants was found, which implies a great possibility that the toxic elements in this area, especially lead, impose harms to human health.