

## Comparison of Digestion Methods for Heavy Metals Analysis in SRM and Soils from Ulsan Fe mine Korea

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### ABSTRACT

The potential use of several analytical techniques has been compared and tested for the correct determination of toxic heavy metals in soils and SRM. It is also importance to develop a substantial protocol for analyzing concentrations of heavy metals from contaminated land as well as clean site. Complicity has arises in selecting a proper analytical technique as well as the sampling method to preserve real field information was required. In order to evaluate the true toxicities of heavy metals, developing a substantial sample preparation protocol must be accomplished for analyzing background and contaminants concentrations. This study report experimental studies to evaluate the use of EPA publication SW-846 (Test Methods for Evaluating Solid Waste; 3050B, modified 3050B, 3051a, Physical/Chemical Methods) as well as KBSI method (modified EPA 3052 Method) for choosing best analytical protocols for heavy metals analysis concerned at here.

The sample preparation technique used are distinguished either *a total digestion analysis* or *a total recoverable analytical method*. A *total digestion analysis method* requires more time than the *total recoverable analytical method* in order to achieve a complete digestion of sample materials followed by analysis. This method also requires the use of strong acid to get a complete dissociation of sample materials and the high temperature thermal decomposition process to enhance the chemical reaction. Nevertheless the total analysis method suffers the loss of elements of interest and incomplete recoveries of certain elements toward complete digestion. Compare to this, an alternative method, total recoverable digestion, have become a common method for sample digestion. The *total recoverable analytical method* is useful especially in environmental samples for the monitoring of toxic elements in contaminated areas.

The NIST SRM (Montana soil) was used to compare the extraction and digestion efficiency. The chemical analysis was done by ICP-MS (Elan 6100, Perkin Elmer) as well as ICP-AES (Ultima 2C, JY) for trace elements and major elements. USEPA Method 3050B for all elements analysis, 3050B for other elements such as Sb, Ba, Pb, and As, 3051a, and KBSI (Modified from 3052, Korea Basic Science Institute) digestion Method were used for the determination of elements of interest in SRM samples. Also samples were treated with aqua regia for complete metals digestion.

Key words: Digestion method, SRM, EPA SW-846 Test Methods, 3050B, modified 3050B, 3051a, KBSI Method, Toxic elements