Uranium Analysis in Urine Samples by ICP-MS

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The LLNL Bioassay Program analyses several hundred urine samples for uranium per month. Currently urine samples are prepared by nitric acid and hydrogen peroxide digestion followed by muffle furnace dry ashing at 550 ℃. Samples are then analyzed by Kinetic Phosphorescence Analysis (KPA). This method is time consuming, subject to interference and not isotope specific.

A method is being developed at LLNL to analyze urine samples by ICP-MS, with minimal sample preparation. ICP-MS analysis is fast, has fewer interferences, is isotope specific and is more sensitive.

High suspended and dissolved solids are a problem with this method. However, the high sensitivity of ICP-MS allows use of dilution to reduce the high dissolved solids problem. U-233 is used as an internal standard to account for fluctuations in the sample introduction system.

A comparison of results will be discussed between KPA and ICP-MS analyses. The ICP-MS data will compare results for sample preparation ranging from dilution only to a quick microwave digestion followed by dilution before ICP-MS analysis.