



| New Approaches in Sample Preparation and Precise Multielement Analysis of Crude Oils and Refined Petroleum Products

Comprehensive multielement determinations in crude oil and refined petroleum products have been a difficult task, historically resulting in myriad of sample preparation and instrumental analytical methods. These methods are somewhat limited and many do not include all elements that are important to the petroleum industry. Most methods previously developed tend to have limited numbers of targeted elements, which are often determined based on specific method detection limits (MDL), method quantification limits (MQL), or a specific single element need. As a result of these limitations, the elemental suite is typically limited and also different from one method to the next.

In general, a single crude oil multielement analysis method is elusive without multiple, often complex and time consuming sample preparation or elemental group separation steps.

A sample preparation method that uses a microwave digestion system with a SRC (UltraWAVE, Milestone) is capable of producing an organic-free sample solution (<0.1% total carbon) used for analysis of up to 55–57 elements with the appropriate ICP technique. In the paper titled “New Approaches in Sample Preparation and Precise Multielement Analysis of Crude Oils and Refined Petroleum Products Using Microwave Digestion Coupled with ICP-MS” written by J. Casey, Y. Gao, W. Yang, and R. Thomas, they use in tandem an ICP-OES system for quantitation and screening of higher abundance elements and an ICP-MS system with a triple-quadrupole mass spectrometer, specifically to allow interference-free analysis of low-abundance elements. The single digestion procedure with these two instrumental techniques accommodates the wide range of elemental concentrations necessary for characterizing crude and refined oils in a more comprehensive and routine manner.

This more comprehensive elemental list may lead to more sophisticated applications of elemental analysis for crude oil and derivatives, with benefits extending from exploration and production to refining, product monitoring, and regulatory and compliance efforts.

Read the full article here: <https://www.milestonesrl.com/resources/application-reports#ultrawave-4>

