Journal of Applied Geochemistry
Vol. 19, No. 4 (2017). pp. 382-399

FIELD-PORTABLE ANALYTICAL INSTRUMENTS IN MINERAL EXPLORATION: PAST, PRESENT AND FUTURE

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Abstract

Geochemical exploration studies have become expensive and time consuming when performed with traditional laboratory based methods. Recent technological advances in portable analytical instrumentation have enabled successful mineral exploration both on and off the land. Over the past few decades, many analytical instruments have dramatically shrunk in size and have become portable with performances approaching to those of laboratory instruments. These include on-site or portable instruments, on-site laboratory technologies, various core scanners and technologies for fluid analysis. Portable or field technologies such as portable UV-Vis spectrophotometer, portable x-ray fluorescence spectrometer (pXRF), portable x-ray diffractometer (pXRD), portable near-infrared shortwave-infrared spectrometer (pNIR-SWIR), portable Raman spectrometer and portable laser induced breakdown spectrometer (pLIBS) have become extremely useful in obtaining chemical and mineralogical information in field. Portable spectrometers provide in-situ data that allow the Geologist to integrate several data sets - geophysics, geochemistry and mineralogy - in the field at the outcrop itself saving considerable amount of money and time. Portable atomic absorption and emission spectrometers, and portable LED fluorimeter (for uranium) are valuable tools for understanding the chemistry of ground water in field. This article will discuss the challenges, concerns, strategies and successes of these instruments in mineral exploration studies on continents and oceans. Related aspects such as groundwater geochemistry and indicator mineralogy in the field, data quality issues along with the associated advantageous and limitations are also discussed.

Keywords: portable, analytical instruments, mineral exploration, portable UV-Vis spectrophotometer, portable x-ray fluorescence spectrometer (pXRF), portable x-ray diffractometer (pXRD).