# The effects of pressure on X-ray fluorescence analyses: pXRF under high altitude conditions

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## Abstract

In Latin America many mine sites are located more than 2000 m above sea level, and some over 4000 m above sea level. Portable X-ray ray fluorescence (pXRF) is becoming a routine method for collecting chemical data at different altitudes during mineral exploration campaigns. As altitude increases, air density decreases, and the physics of X-rays being transmitted through air mean that the transmission of low-energy X-rays increases and accordingly the transmission effectiveness of low-atomic weight elements (e.g. Mg, Al, and Si) also increases. Here we assess the performance of pXRF units across a range of pressures that equate to 0-5000 m above sea level by conducting well-documented tests with changing pressure to assess the use of a pXRF unit in high-altitude environments. Utilising both field test work, and test work using a hypobaric chamber in a laboratory where external conditions could be better controlled we examine how changing altitude can affect the performance of pXRF units. Units that have in-built pressure corrections perform reasonably consistently as altitude increases, whereas those that do not perform exactly as X-ray transmission modelling suggests. That is to say, the increased count rates of low-atomic weight elements (e.g. Mg, Al, and Si) means that these elements are over-reported and as a result the unit may under-report heavy elements.

## Palabras clave

**KeyWords Plus:** PLUTONIC GOLD MINE; WESTERN-AUSTRALIA; EXPLORATION; PERFORMANCE; RESOLUTION; DEPOSITS; CANADA; NICKEL

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