

## Utilizing Internal Intensity Ratios in Micro-XRF

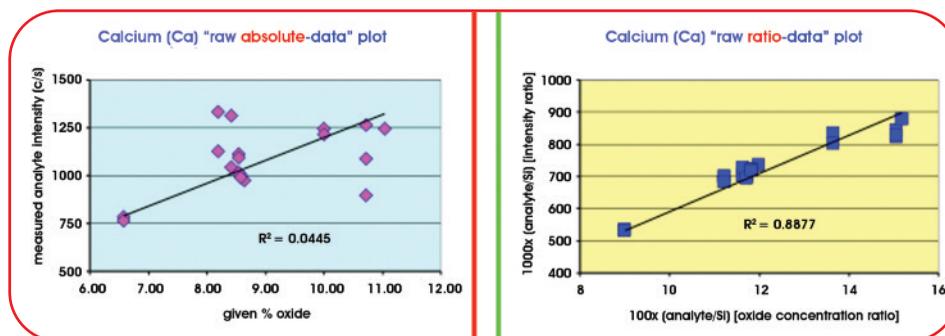


Figure 1. Ca intensity plots showing the benefit of the internal ratio method (right plot). Wt% quantification is achieved by normalizing the results to 100 wt%; ratioing to a single element and assuming intensity variations from sample topography only.

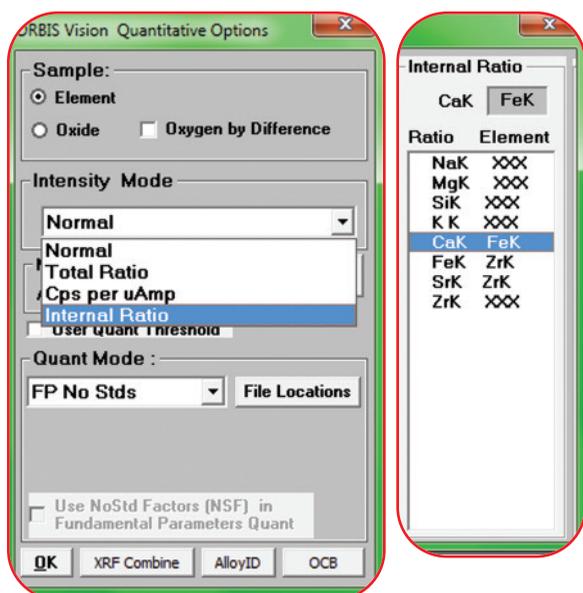
In X-ray Fluorescence (XRF) analysis, elemental intensities can be affected by sample topography and thickness if the sample is not thick enough to be considered a “bulk” sample. This can make quantitative or comparative analysis difficult to perform. To compensate for the influence of sample topography on absolute elemental intensities, one can employ an internal ratio methodology where the elemental intensity of one element is compared to the intensity of another element from the same sample. This is useful, for example, when analyzing small glass fragments of varying size and shape non-destructively with micro-XRF. Figure 1 shows an application of this method for the quantification of Ca in SiO<sub>2</sub>-based glass fragments.

The internal ratio method of calculating elemental intensity ratios is implemented in Vision32 and OrbisVision software packages.

Furthermore, this intensity ratioing mode can also be used in conjunction with automated multi-point acquisition, allowing large batches of ratios to be processed without the need for manual calculations or cutting and pasting.

To set up this automated processing feature:

1. Label all elements of interest in the spectrum using the Peak ID list, including the ratio elements.
2. In the Quantification panel of the Vision software, open the Options window, and select the dropdown menu for “Intensity Mode”, as shown in Figure 2a.
3. Select “Internal Ratio” and a side window will appear, containing a list of all identified elements in that spectrum.
4. Highlight an element and type the ratio element in the entry box above (elemental symbol followed directly by K, L, or M), as shown in Figure 2b. Elements without a ratio will be calculated as an absolute intensity.
5. Click OK to exit the Options window. If all the ratios have not been filled in, an alert message will appear (Figure 3).



Figures 2a & 2b. Figure 2a shows the path for finding the Internal Ratio mode. Figure 2b shows the set up window, where the ratio elements are defined.

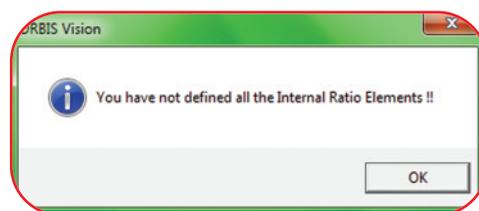


Figure 3. Alert message if all the ratios have not been filled in.

6. If the ratio list is correct, click OK to proceed.
7. At this point, all spectra quantified for intensities, individually or in a batch, will be calculated using the internal ratios defined. The software will implement the internal ratio calculations for both live, multiple point acquisitions and spectral reprocessing of a series of spectra.