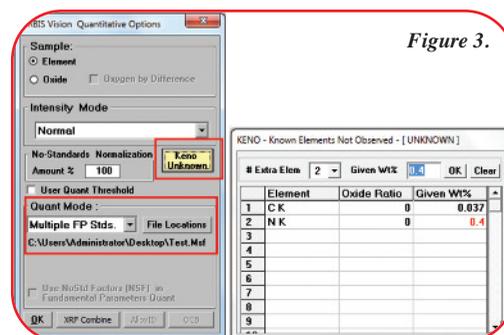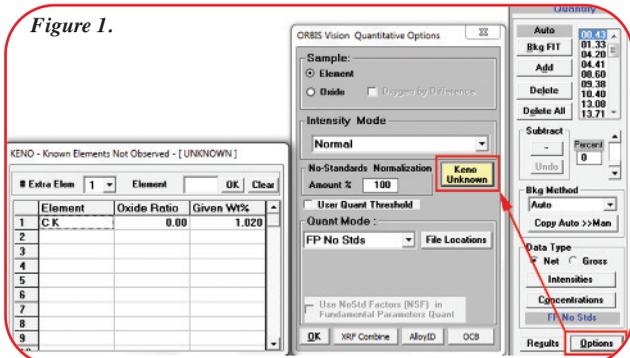# Orbis Vision Version 2.1 Update – Revised KENO Function

One of the key quantitative features in the Orbis Vision Micro X-ray Fluorescence (Micro-XRF) software is the Known Elements Not Observed (KENO) function, which allows compensation of known values for elements that were not detected in the spectrum. This is particularly useful in quantifying samples which have known concentrations of organic elements, since micro-XRF is typically unable to detect elements lighter than sodium. With the recent release of Orbis Vision version 2.1, the KENO function has been updated, so that whenever quantification is performed, the Fundamental Parameters (FP) routine will directly use whatever values are active in the KENO window and apply them for both standard-less and standardized measurements. This allows the user to use calibration standards that may have different KENO elements and values than those which are in the sample. This is shown in the following example, where an FP calibration is done using different KENO values for the standard versus the samples.

Figure 1.

In Figure 1, a stainless steel standard is measured, which contains a KENO value for carbon at 1.02 weight percent. When the KENO icon is highlighted yellow, it signifies that it is active.

The left-hand window in Figure 2 shows the initial No-Standards results, which includes the initial KENO value for carbon. As a result of using the KENO value, quantifying this spectrum with FP No-Standards normalizes the detected elements to a total of 98.8%. Note that the KENO window is marked "KENO-Unknown" thus far.

Figure 2.

This spectrum will now be used as a new calibration standard, and the known weight percent values are entered into the Concentration column of the FP window, as shown on the right-hand side of Figure 2. For any standards that have KENO elements, such as this example, the elements and values must be entered through the KENO dialog box from the FP window, as highlighted in red in Figure 2. Note that this KENO window is now marked "KENO-Standard." If the standard has no KENO elements, then this dialog must be cleared. Once the values are entered, click "Add" to apply this standard. It is possible to use multiple standards that each have different KENO elements and concentrations. Save the calibration file (.MSF) once all standards are added.

Figure 3.

Once the .MSF file is saved, it can be used to quantify other "unknown" stainless steels that have similar compositions. However, since different steels may have varying KENO values from the initial calibration standards, the user should open the unknown spectrum file and modify the KENO elements accordingly, as shown in Figure 3. In this sample, to reflect these changes in KENO values, carbon was changed to 0.037%, and a second KENO entry was made for nitrogen at 0.4%. These new values will be applied for all quantifications thereafter until the user deactivates or changes the KENO values. After exiting the KENO window, load the appropriate .MSF file from the File Locations menu, and select "Multiple FP Stds" from the Quant Mode dropdown, as indicated in red in Figure 3.

At this point, any spectra that are quantified will use the newer KENO values, and can be applied for both individual quantification or bulk data reprocessing. Figure 4 shows example results from each.

Figure 4.

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