

Activity ②

Name:

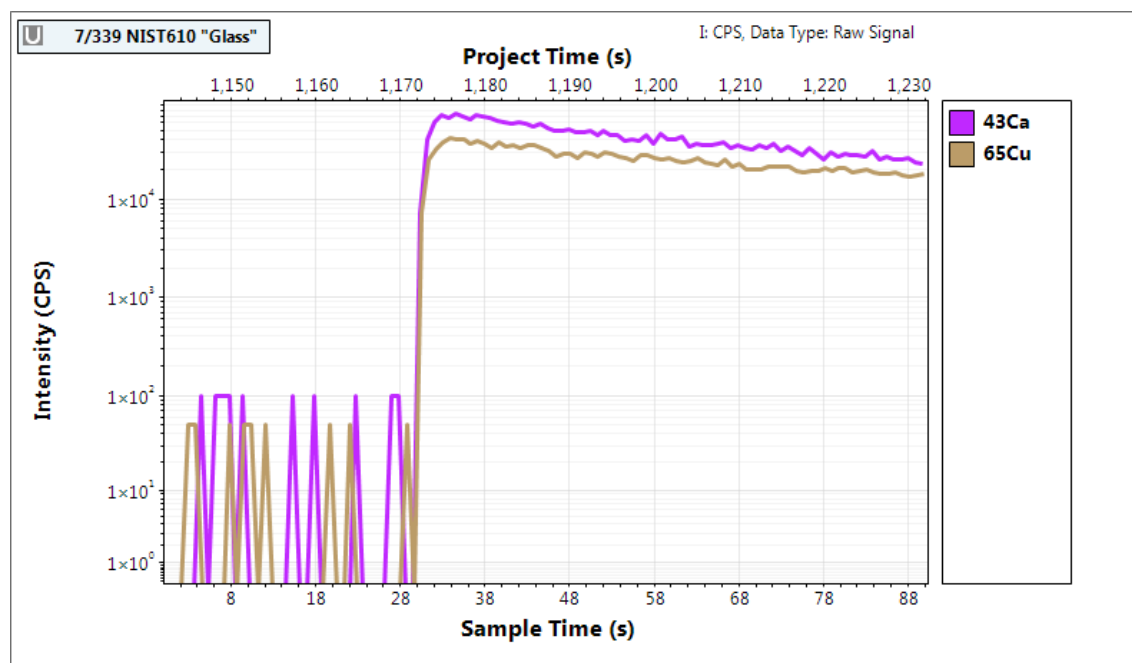


LA-ICP-MS Data Reduction Short Course

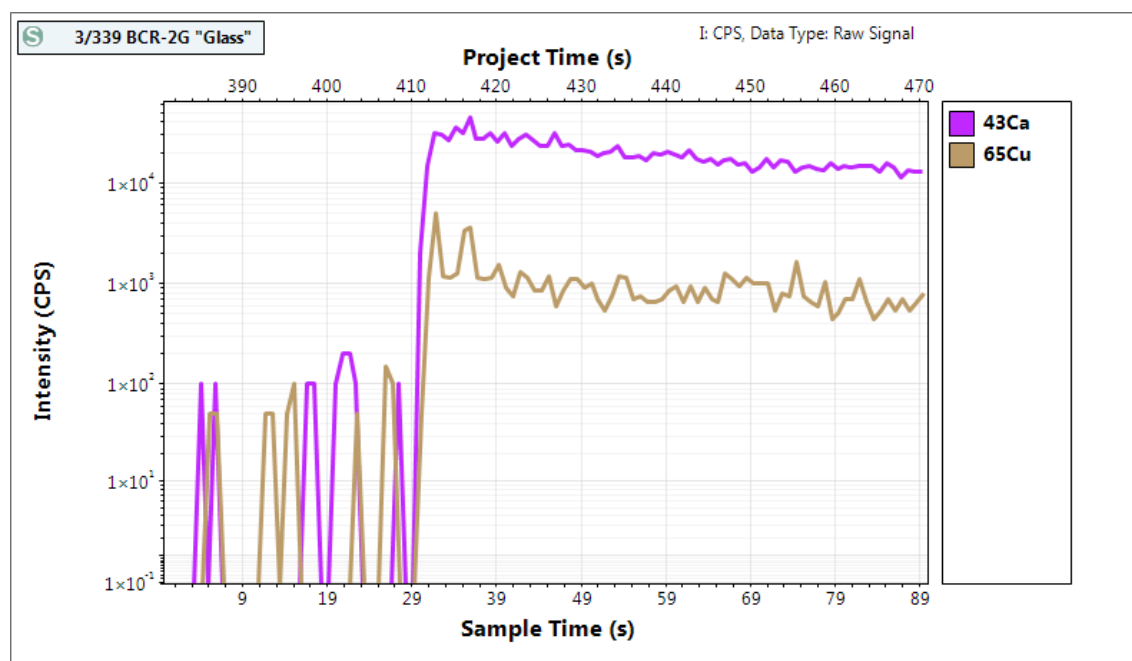
Single Point External Calibration with Internal Standard

The charts show signals of ^{43}Ca and ^{65}Cu from ablation of a reference material and an unknown material, in this case a basaltic glass.

Reference Material – NIST610 Glass



Unknown – Basaltic Glass



1) Use the scale on the charts to estimate the intensity of the gas blank and ablated signal.

	Reference Material		Unknown	
	⁴³ Ca (IS)	⁶⁵ Cu (EL)	⁴³ Ca (IS)	⁶⁵ Cu (EL)
Gas Blank Intensity (CPS)				
Ablation Intensity (CPS)				
Net Signal Ix (CPS)				

2) Use the known concentrations from the reference material to calculate the calibration factor.

Known Concentration of Cu: 441 µg.g⁻¹

Known Concentration of Ca: 85000 µg.g⁻¹

Calibration Factor: $F = \frac{\frac{C_{STD}^{EL}}{C_{STD}^{IS}}}{\frac{I_{STD}^{EL}}{I_{STD}^{IS}}} =$

3) Use the calibration factor and known concentration of Ca in the unknown to calculate the concentration of Cu in the unknown.

Known Concentration of Ca: 50500 µg.g⁻¹

Concentration: $C_{UNK} = F \times \frac{I_{UNK}^{EL}}{I_{UNK}^{IS}} \times C_{UNK}^{IS}$

True Concentration: 18 µg.g⁻¹

Notes

How close is your concentration to the true concentration?

Where did the concentration of calcium in the unknown material come from? Isn't this supposed to be a technique for measuring concentrations in unknowns?

While the signal is measured using isotopes of copper and calcium, note that the isotopic abundance of either element is not used at all to calculate the total concentration of copper in the unknown.

The signal on the unknown is quite noisy and this would contribute to greater uncertainty in the result. However, it is not immediately obvious what the uncertainty in the ratio is, but more on that later!

This calculation is more susceptible to errors caused by reading the signal intensity values from the charts. Repeat the calculation using the true average intensity values in the table below:

	Reference Material		Unknown	
	⁴³ Ca (IS)	⁶⁵ Cu (EL)	⁴³ Ca (IS)	⁶⁵ Cu (EL)
Gas Blank Intensity (CPS)	29	13	32	19
Ablation Intensity (CPS)	41739	25666	19581	921
Net Signal Ix (CPS)	41710	25653	19548	902

How close is the result now?