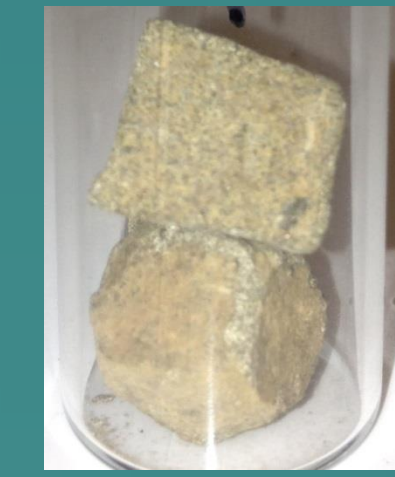


Mosaic Tesserae Analyzed Via X-Ray Fluorescence Spectroscopy



Monica Redente and Dr. Mary Kate Donais

Saint Anselm College, Department of Chemistry, 100 Saint Anselm Drive, Manchester, NH 03102



Introduction

Mosaic tesserae are primarily made out of stones, ceramics or glass. The tesserae being analyzed were made of glass. Glass samples can be analyzed via X-Ray Fluorescence (XRF), Raman Spectroscopy, and Fourier Transform Infrared Spectroscopy (FTIR). XRF spectrometry is a common instrument for analyzing glass samples because it allows for more efficient fieldwork, sufficient detection limits and is non-destructive. XRF instruments can detect from Ca to Pb in SiO_2 . The main coloring agents in the glass tesserae analyzed were found to be Fe, Cu, Mn, and Co. Energy-dispersive XRF spectrometry was used to analyze the tesserae samples.

Method

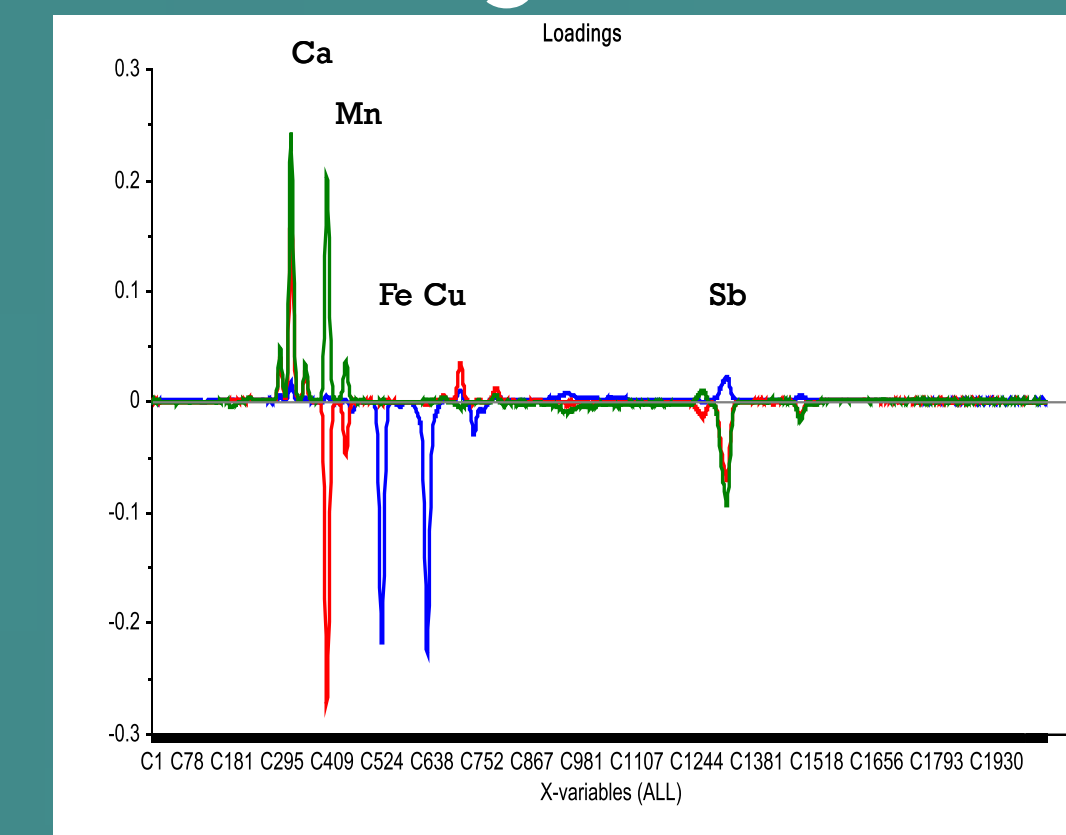
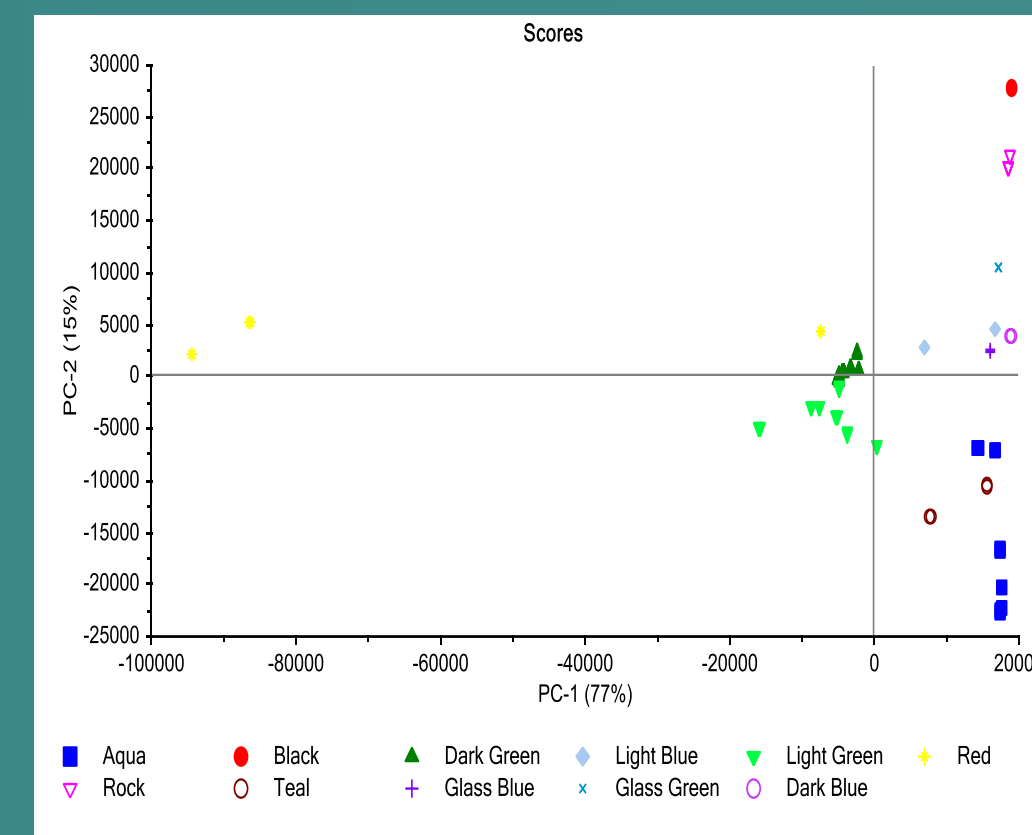
The tesserae were separated by visual inspection and analyzed via XRF Spectrometry. For some tesserae all six sides were analyzed under vacuum conditions. Also for each color one whole tesserae was analyzed and then the tesserae was crushed and the crushed tesserae was analyzed.

Instrumentation

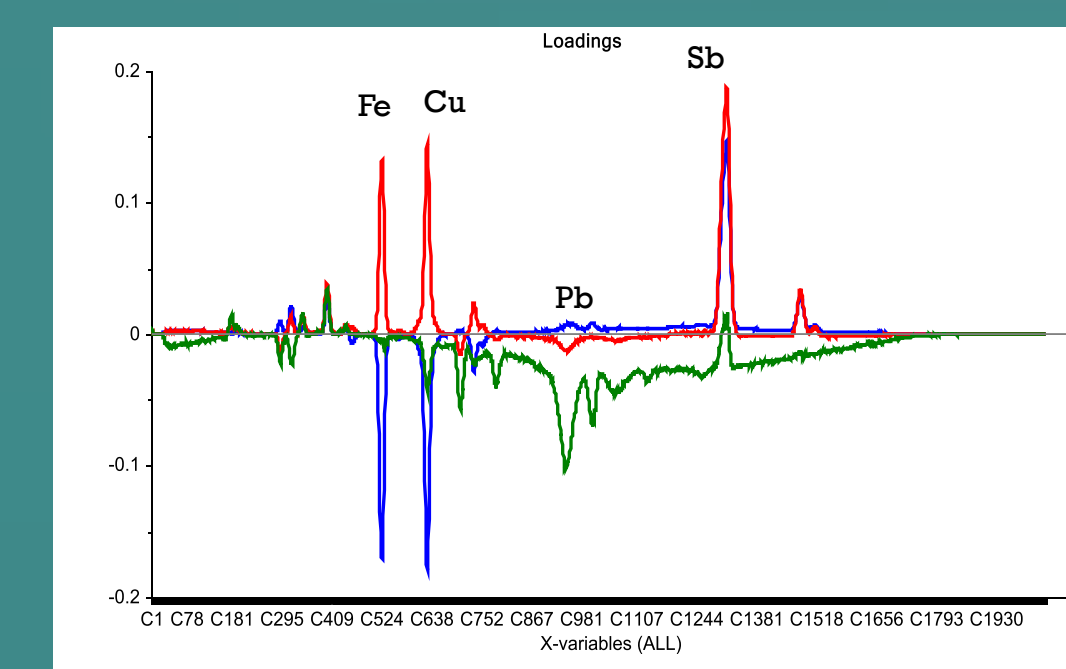
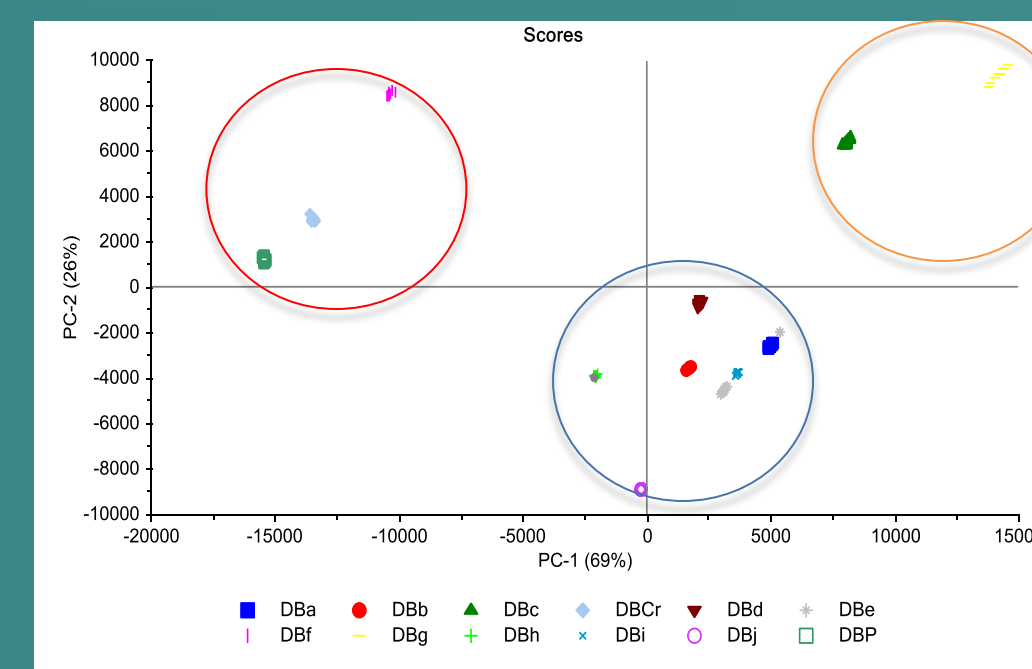
- Bruker Tracer III-V, yellow filter, $8 \mu\text{A}$, 40keV
- Bruker Tracer III-SD
 - with vacuum pump, no filter, $25 \mu\text{A}$, 15 keV
 - With out vacuum pump, yellow filter, $11.7 \mu\text{A}$, 40keV

Results

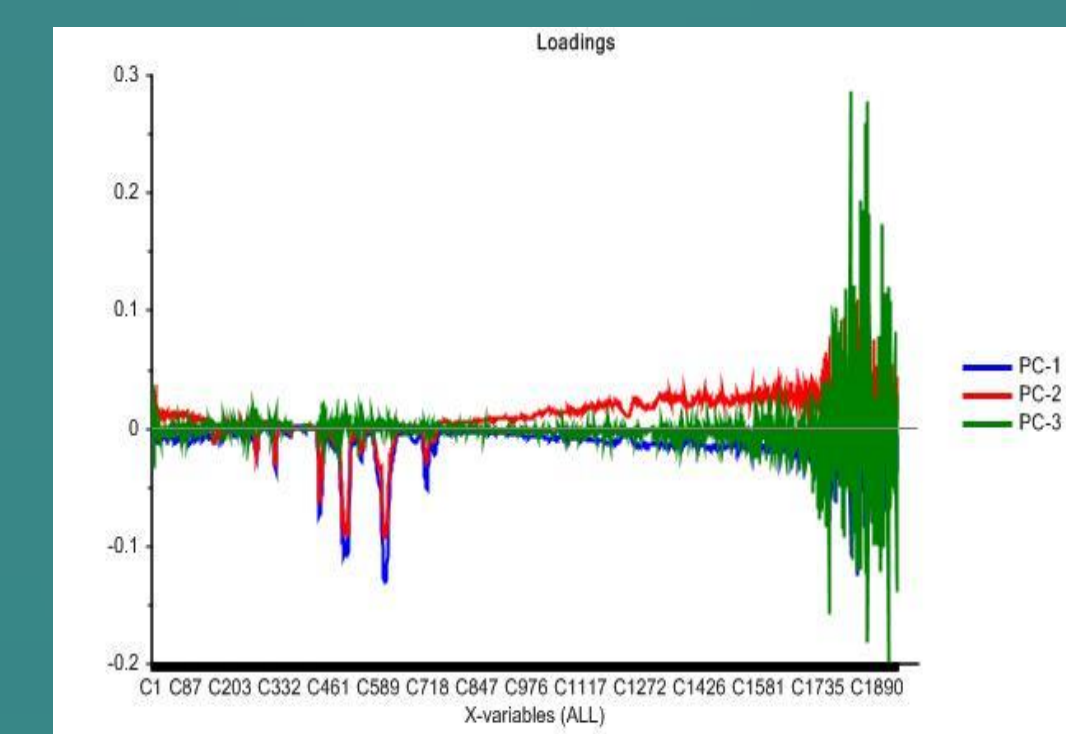
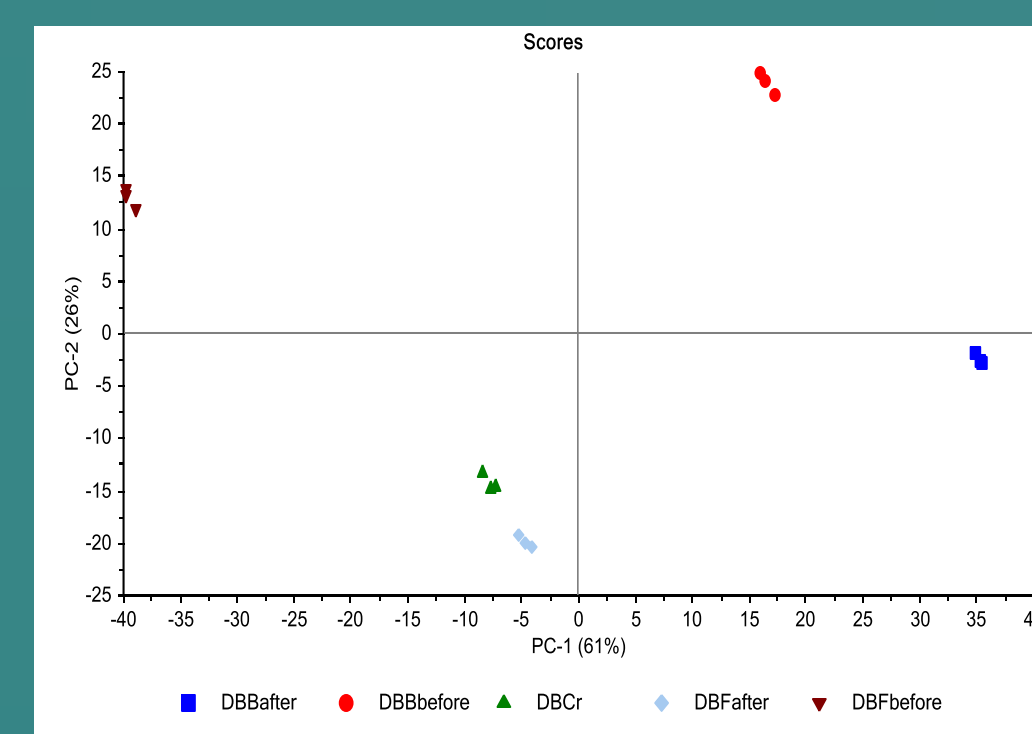
All Tesserae Scores/Loadings Plots



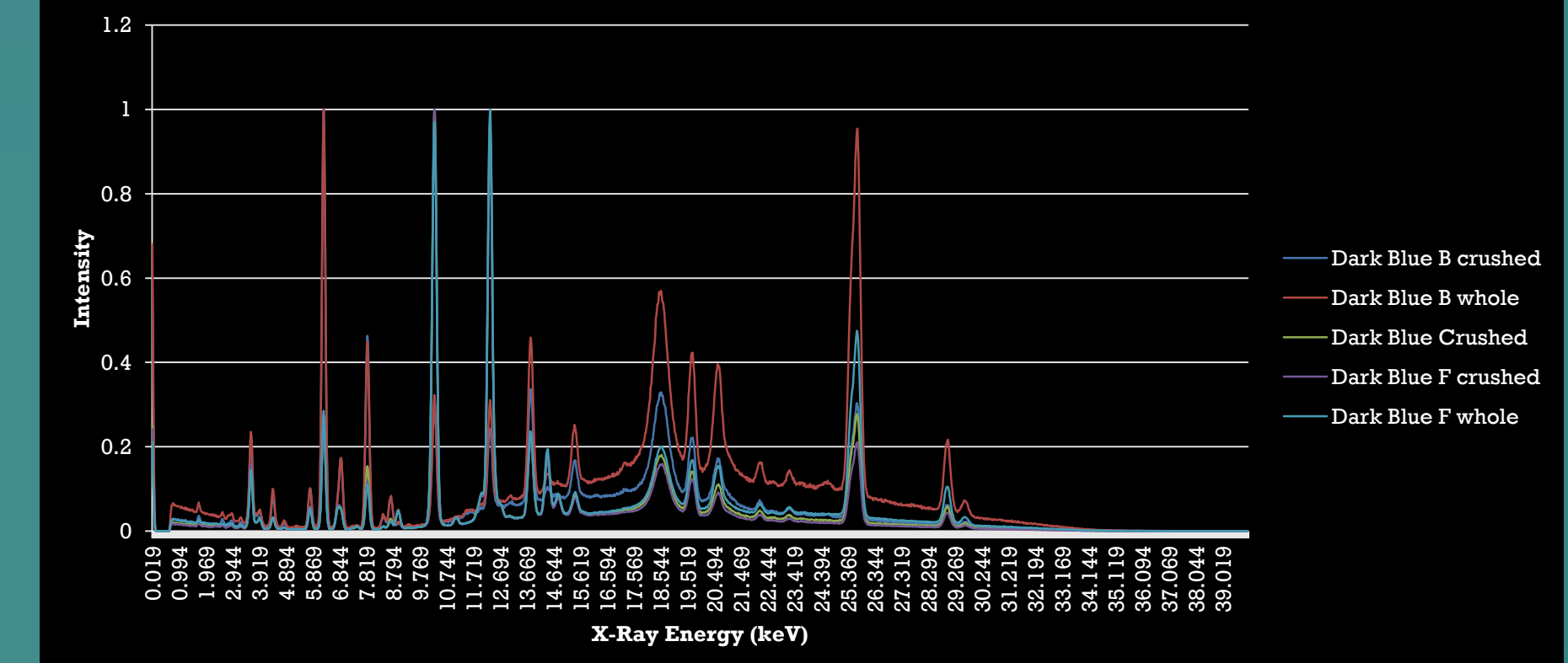
Dark Blue Scores/Loadings Plots



Dark Blue Homogeneity Scores/Loadings Plots



Overlap of Dark Blue Tesserae Whole and then Crushed



Conclusions

- Through the XRF analyses and principal component analyses (PCA), some of the key elements within the mosaic tesserae were identified.
- The PCA of all the Dark Blue tesserae showed that the samples varied only in relative elemental concentration.
- The PCA and overlaying plot of the varying Dark Blue homogeneity study tesserae showed that the Dark blue tesserae are not homogeneous.

Acknowledgements

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