

Teaching the capabilities and limitations of geochemical instruments

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Problem

- “I know our campus drinking water periodically has high concentrations of lead...I hypothesize that a Brita filter will remove lead from our drinking water.”
- “I want to see if a water sample has mercury in it.” Or chlorine or nitrogen...
- Can you measure isotopes on this sample?

Background

- General student population: ~50% 1st generation college students
- Regional, comprehensive university
- Chemistry is not required in Washington state high schools

- Course: Environmental Geochemistry or Principles of Geochemistry (Jr/Sr level course)
 - Prereq: 1st year Chemistry courses
 - Students: Geology majors; Env Sci majors (with an emphasis in Biology or Geology)

- Little analytical experience with instruments

- Timing: laboratory exercise offered early in the quarter as an intro to different types of analytical equipment
 - before using analytical equipment (UV-Vis spec, ICP-OES)

Goals of This Assignment

- Understand

- the options for inorganic elemental analysis, e.g.,

- *UV-Visible spectrometer
- AA (flame, graphite furnace)
- *ICP-OES
- ICP-MS

- pros and cons of each instrument (e.g., cost, user friendliness, detection limits)

- limitations of each instrument (e.g., detection limits, interferences)

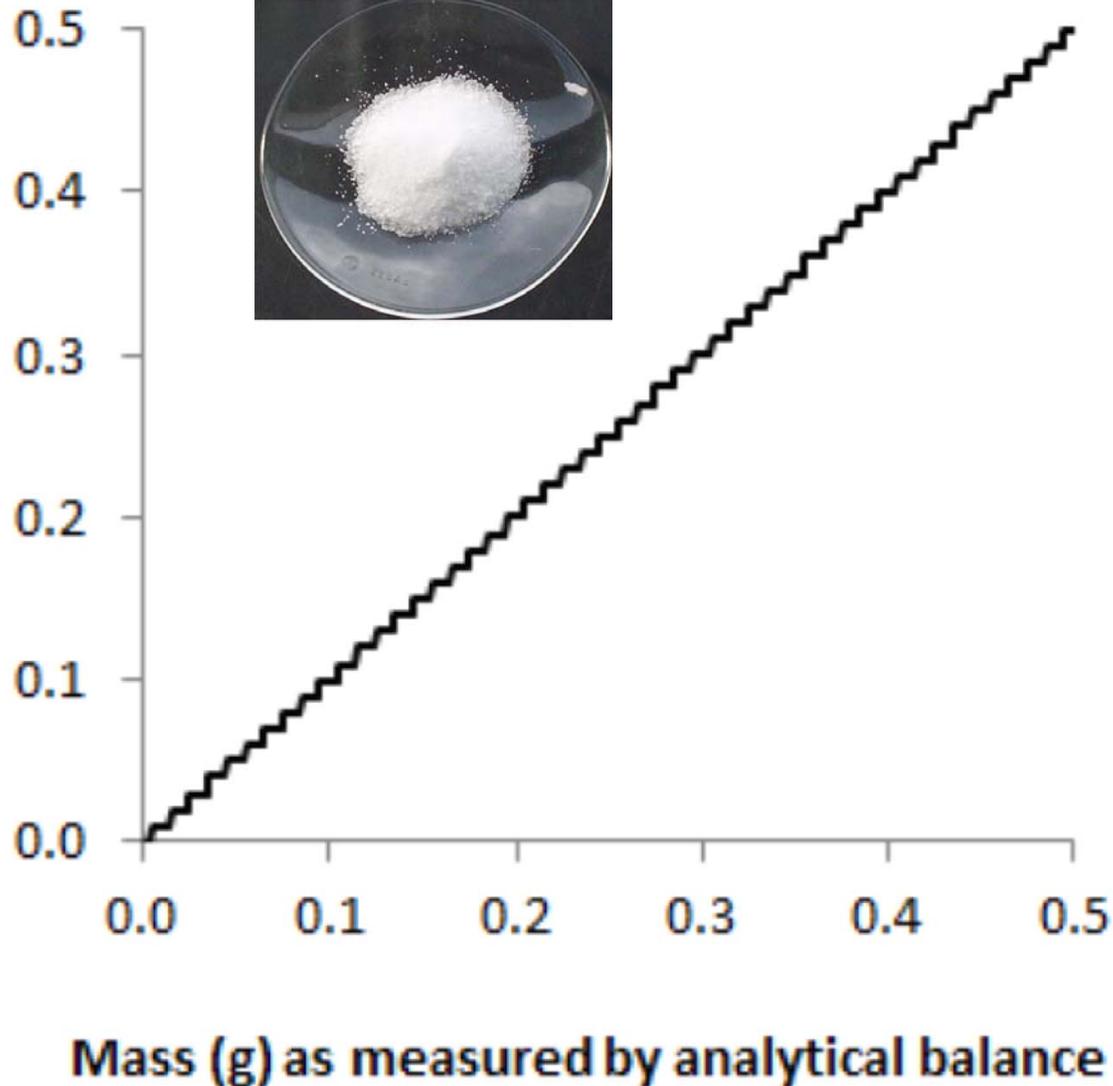
*Available for student use in my Geochem Lab.

Resources

- Description of the electromagnetic spectrum and UV-Visible Spectroscopy
 - <http://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/Spectrpy/UV-vis/spectrum.htm> (Sections 1-3)
 - <http://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/Spectrpy/UV-vis/uvspec.htm#uv1>
- “Guide to Inorganic Analysis” by Perkin-Elmer

Limit of Detection (LOD) and Limit of Quantitation (LOQ)

Mass (g) as measured
by top-loading balance



Limit of Detection (LOD) and Limit of Quantitation (LOQ)

