# Instruments Used for Inorganic Analysis

## Overview:

The purpose of this exercise is to understand the capability and limitations of several instruments used for geochemical analysis of environmental samples.

## Read the following:

* 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

## Questions

1. a. List the **detection limits** (in μg/L) of the following elements on a Flame AA, graphite furnace AA, ICP-OES and ICP-MS. (28pts)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | See Question 2 | |
|  | Flame AA | GFAA | ICP-OES | ICP-MS | EPA MCL | Instruments |
| Al |  |  |  |  |  |  |
| As |  |  |  |  |  |  |
| Ba |  |  |  |  |  |  |
| Cd |  |  |  |  |  |  |
| Cu |  |  |  |  |  |  |
| Pb |  |  |  |  |  |  |
| Se |  |  |  |  |  |  |

b. How many μg/L are in 1 mg/kg? Show your calculations. (10pts)

1. In the table above, record the EPA maximum contaminant levels (MCLs) for drinking water (if applicable). You can find these concentrations on the web page: <http://www.epa.gov/safewater/contaminants/index.html>. (14pts)
2. Indicate in the table above which instruments could be used to accurately measure concentrations at or just below this level (record this data in the table also). (16pts)
3. Below, list 2 pros and 2 cons for using of each of the following instruments for chemical analysis: Flame AA, graphite furnace AA, ICP-OES and ICP-MS. (32pts)