

Laboratory #3
Estimation of Copper in a Water Sample by
Flame Atomic Absorption Spectroscopy

Your third laboratory assignment is to develop a method for the quantitative determination of dissolved copper in tap water (in the range of 0.05 to 1.2 ppm) by flame atomic absorption spectroscopy (FAAS). As part of this technique development, you will also determine the copper content in pond water. In both cases, you will use a standard working curve and the method of standard addition. In addition, you will assess whether there is any “matrix effect” and incorporate this insight into your final proposed method for the determination of copper in the water samples. Again, as part of the method development, you must assess and determine all the various analytical figures of merit for your proposed method.

In this assignment, you will make a standard solution of copper by diluting an AA standard that will be provided. Since such AA standards are expensive, we ask you to be careful about not wasting any reagent. Care should also be taken to avoid accidents related to burns (you are using a hot flame) and explosions. Prior to your actual experiment, you must familiarize yourself with the instrument, attend the FAAS demo, propose an analytical approach and discuss it with the one of the TAs to receive his/her input to continue.

In addition to this basic or core (required) experiment, you are strongly encouraged to investigate another application of atomic spectroscopy. Examples of this extra application are as follows:

- 1) Determination of a major cation such as Na^+ , K^+ , Ca^{2+} , or Mg^{2+} by flame atomic emission spectroscopy.
- 2) Determination of another trace metal such as Pb or Cd in tap water and pond water. These metals need to be analyzed at a lower wavelength where you need to be concerned about non-atomic absorption interferences and how to correct for them.
- 3) Develop a micro-sampling system for the determination of Cu by FAAS that would be useful in a situation where sample size is a limitation.
- 4) Interfacing the auto-sampler with the FAAS system.
- 5) Determination of Cu in tap water and pond water by GFAAS (graphite furnace).
- 6) Determination of Cu in tap water and pond water by ICP-OES.

You must talk to the instructor and TAs to obtain permission for carrying out your special “extra” application. Remember, these are “extra” projects and not a replacement for the core analysis of copper by FAAS.