

Using the Ocean Optics S4000 to Obtain Flame Spectra

Flame spectra from elements in an unknown solution can confirm the absence or presence of the elements, but interpretation is not always clear cut. A spectrometer can be helpful in this diagnosis, but also does not always lead to a clear cut conclusion. The Ocean Optics S4000 is set up in FSC 315 for your use. This spectrometer is set up to sample the flame every 100 ms and display the spectrum in real time on the computer screen.

In the Barium-Magnesium group, four elements give a flame test: Na, K, Ba, and Ca. The Ba and Ca flames disappear too rapidly to be observed by the spectrometer. The spectrometer does work very nicely to identify the presence of Na and K.

The Na spectrum is a peak at 590 nm.

The K spectrum is a peak at 770 nm

When Na is present in the solution, the peak persists for a long time. When it is an impurity, the peak fades with time. However, since both Na and K are found as impurities in lots of things, you must still judge what constitutes a positive test and what is just an impurity. Note that sloppy technique on your part can also introduce these as impurities.

Procedure

1. If it is not already running, start the SpectraSuite program.
2. Light the burner. Don't change the orientation of the burner and the fiber optic probe - both are attached to a ring stand.
3. Clean your probe using con HCl as described in your text. Hold the probe in the flame for at least 15-30 seconds before dipping into the HCl again. You will probably still see traces of K and Na peaks even when it is "clean."
4. Compare the spectra of your unknown with spectra of single ion known solutions of K and Na. This will help you tell the difference between a positive test and an impurity.
5. The program is **not** set to capture and save spectra, just observe the peaks and their behavior with time.