

**From:** Tracie Catania  
**Sent:** Friday, January 08, 2010 11:38 AM  
**To:** John Gonzalez  
**Cc:** Rodney Oka  
**Subject:** the IR Spectrophotometer

Hi John... here's the info on the broken chem. equipment. Rod, please let me know if I've got any of this wrong or if there's any missing info. John, please let us know if you have any further questions. We need to proceed with the repair or replacement soon so the instrument will be ready to use for Spring session. Thanks!

tracie

### **IR Spectrophotometer FAQ**

**How old is it?** The instrument we presently own is 5 years old. Their expected life-time is from 7-10 years. With the servicing, it should bring the instrument to almost-new status since it is only 5 years old.

**How much does it cost to repair it?** It appears that a worst case scenario estimate puts the repair cost at \$7600. It will likely cost less than \$6500. Our written repair estimate (worst case) is closer to \$9500, but does not include a 35% discount on a certain very expensive part and a reduction in total hours of labor. The repaired instrument would then have a 90 day warranty.

**How much is a new one?** The cost of a new instrument is about \$12,000. Perkin-Elmer has one for \$12,155, and Thermo-Fisher (the brand we currently own) is between \$12,000 and \$13,000. Both have 1-year warranties, which seems to be an industry standard.

### **What is it and why do we need it?**

The IR Spectrophotometer is an analytical instrument designed to let a person know what kinds of chemical bonds are in a compound. The way we use it in lab is to allow the student to prove that he or she has made the compound that they were hoping to make in the experiment. So, in a typical lab, they would synthesize a compound, and then prepare a sample to run the IR experiment on. Once you run the experiment, the instrument provides a readout, called an infrared spectrum, which must then be interpreted by the chemist to see if the correct kinds of chemical bonds are there (and also, they look to make sure that bonds that should not be there are not present). So much of chemistry that is done now is through instrumental analysis, so it is imperative that the students be exposed to at least IR spectroscopy. Ideally, we would also have an NMR (nuclear magnetic resonance) instrument, but they cost on the order of \$100,000, which we realize is a bit expensive...Todd has quoted the organic chemistry professor at UCSC who said that the IR spectrophotometer is a necessary (and minimum) component of any organic chemistry class. We spend a lot of time with the study of instrumental analysis, and in fact, the last two exams of Chem 12A and every exam in Chem 12B always has IR/NMR questions.

In my greensheet, I have the following statement:

Scope and Objectives. This course is the second semester of a two-semester sequence for science majors entering fields such as biology, biochemistry, chemistry, chemical engineering, dietetics, dentistry, medicinal, medical technology, toxicology, environmental science, and pharmacy. The student is exposed to many areas of organic chemistry such as structure, reactions, nomenclature, and kinetics. The laboratory will provide the student with an opportunity to obtain the skills necessary for laboratory investigations and procedures in organic chemistry. Instrumental analysis will be included in the labs (including FTIR).

The use of IR spectroscopy is important not only because it allows exposure to modern instrumental analysis, but also because it is a wonderful opportunity for the students to employ reasoning skills. They must be able to look at an IR Spectrum as part of a group of information, and figure out a structure based upon their interpretation of the spectrum and other pieces of data (such as a molecular formula).

So, to summarize: We need to have the IR Spectrophotometer to expose the students to instrumental analysis and to give them the skills to interpret spectra (IR and NMR) and to operate the instrument. To be accepted as an equal to the university's organic chemistry classes, we need to be able to tell them that our students have a firm grasp of instrumental analysis, and operating an instrument is therefore imperative.