

# **Break out Session 1**

## **Introduction of Spectroscopy in 1<sup>st</sup> and 2<sup>nd</sup>-year labs**

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## What's Happening in Our Introductory Labs

- Many of us are currently using UV/Vis in our introductory labs for quantification (Beer-Lambert Law), but less commonly for characterization. It is also often introduced (sometimes in lecture) alongside the model of the atom.
- The King's University College has been incorporating IR, MS, and NMR in their Chem 10x curriculum (lab and lecture) using a context-rich approach: Dr. Kris Ooms may provide more insight.
- As well, the University of Lethbridge will very shortly introduce ICP-AES into their intro program, making use of an autosampler.

## What's Happening in Our Organic Labs

- Several of our institutions (U of A, MacEwan, for example) introduce IR spectroscopy in the first organic chemistry course (e.g. Chem 261). The lab component includes and dry-lab tutorial/workshop with assigned problems and individual and group work. As well, sample preparation and spectrum acquisition is revisited several times later in the term.
- NMR is often introduced in the second organic course (e.g. Chem 263). The introduction to NMR in the lab is usually limited to dry-lab/tutorial work. Students may submit samples for analysis, but hands-on access to a spectrometer is rare.
- At UNBC students use NMR (samples submitted) to assess purity of products synthesized in the 2<sup>nd</sup>-year organic lab.
- Some institutions do offer a dedicated 2<sup>nd</sup> year spectroscopy course (U of A, MacEwan, for example). The labs involve lots of hands-on instrument use in addition to spectral interpretation.

## What's Happening in Our Organic Labs

- One of the interesting points that we discussed was whether or not it might actually be better to introduce NMR spectroscopy as  $^{13}\text{C}$  NMR *before* we introduce  $^1\text{H}$  NMR.
  - With  $^1\text{H}$ -decoupling,  $^{13}\text{C}$  NMR spectra are much simpler: with only chemical shifts to worry about,  $^{13}\text{C}$  NMR may be a better place to “start” with NMR.

## Challenges and Limitations

- A major limitation to incorporation of spectroscopy in 1<sup>st</sup> and 2<sup>nd</sup> year labs is instrument access – most common instrumentation is expensive, so for larger lab sections, hands-on access to instrumentation (other than UV/Vis and perhaps FT-IR) is difficult.
- Time can also be an issue: a complete suite of NMR experiments (1D and 2D) can take a fair amount of time for each sample submitted so that, in a lab section with several students with several samples each, acquisition time can be lengthy.
- Smaller lab sizes (enrolment) as well as use of autosampling techniques can help with this, but the challenge remains.

## Broader Questions

- How do we attract students into Chemistry? How can we make first year labs more interesting/attractive?
- How do we insure that students are ready for labs? The idea of requiring a lab report the same day/period of lab came up so that students have to be prepared for the lab because it is due at the end of the lab period (Brandon University).