

Teaching with Technology: A More Effective Method of Learning Organic Spectroscopy

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Hundreds of thousands of undergraduate chemistry students learn to interpret infrared spectra during their collegiate study of organic chemistry. Traditionally, students learn to identify functional groups in spectra primarily through unsupervised practice exercises. A significant number of students struggle with this task and must seek supervised practice with faculty and teaching assistants so that they may receive immediate feedback and useful direction toward appropriate supplementary information.

We propose to apply learning psychology strategies – commonly used by popular websites like Memrise and Duolingo for the purpose of foreign language acquisition – to accelerate and improve learning of spectral analysis without the presence of faculty members or TAs. These strategies include:

- (i) **Testing Effect:** frequent low-stakes testing with immediate feedback and direction to appropriate resources.
- (ii) **Spacing Effect:** avoid short-term memory saturation through spaced practice intervals – robustly enforced by the website.
- (iii) **Scheduling:** minimize the time needed for a student to reach proficiency by testing weaker material with more relative frequency.

With these strategies in mind, we've developed a website that aims to accomplish this task by using:

- (i) HTML5 + JavaScript – no plugins necessary!
- (ii) Open source spectral data from ChemSpider
- (iii) Parse database of molecules and spectral data indexed by SMILES strings

Our poster will go into detail in regards to the database schema, technical specifications, and show screenshots of the website in action. Additionally, Dan Hopkins will run a live demo of the most current build of the website. We plan to test the use of this website during Haverford College's introductory chemistry courses in the fall of 2015, and are interested in finding other Colleges and Universities that are willing to help us test this product.