

May 2008, Post-course reflection

Chem 503 focused on biologically important compounds—lipids (esters), sugars (acetals and hemiacetals), psychoactive alkaloids (amines), and proteins (amides), and continued to review intermolecular forces, bonding, and geometry as it pertains to these compounds. I felt like I finally began to make the connection between the abstract patterns of reactions I had learned by rote (and struggled to barely understand) in undergraduate to the general chemistry understanding that made sense to me. I think I now possess a richer understanding of why certain reactions occurred.

If you had asked me in undergraduate organic chemistry to explain the reason why a particular compound reacted a certain way (for example, why fats seem to “dissolve” in the presence of a strong base such as lye, NaOH), I might have had the ability to answer you if the question was asked in a canned fashion (similar to the questions I had memorized), but in all likelihood, I would have been stumped because I had memorized hundred of snippets of seemingly unrelated reactions, rather than grasping the underlying principles of why certain reactions occur.

When asked now, however, I can confidently respond that an Fischer esterification occurs in which the alkoxy group of the ester in the triglyceride (made of a glycerol or triple alcohol bonded by ester bonds to three fatty acids) is replaced by a hydroxy group yielding the three fatty acids (perhaps in carboxylate form) and the original glycerol. I can further justify this response by explaining that the carbon of the carbonyl bond is an electrophile because of the electronegativity difference between it and the oxygen to which it is bonded. This makes it a good target for a nucleophile like  $\text{OH}^-$ , and a  $\text{S}_{\text{N}}1$  reaction can occur in which the  $\text{OH}^-$  replaces a protonated alkoxy group (if the reaction takes place in aqueous solution).

I have seen the power of POGIL used in conjunction with a well-structured course. The structure of

- a) Pre-reading and preliminary set done before class, due when class meets
- b) Class discussion of preliminary problem set at beginning of class
- c) Group POGILs of new material
- d) In-class workshop problem sets, done in groups and then discussed as class
- e) Take-home assessment

has worked remarkably well in providing the necessary balance between group work and discussion and individual accountability and effort.

I am going to attempt to modify this class structure to my need teaching high school! The key thing is that I realize how much information is retained and actually learned when a student (me, in this case) has to put forth an active effort to learn and be prepared.