



Teacher: Ruth Orlowicz

Unit Topic: Macro, Micro, and Nano-Scale Characterization of Paper. Specific topics include the molecular structure of cellulose chains, pH, and laboratory methods (measuring mass, using a microscope, pH testing, keeping lab notebook).

Methods of instruction:

- Verbal instruction and reading from Excerpt
- Laboratory experience
- Small Group presentations and Discussions
- Final Lab write up

Procedure/Objectives:

1. Participants will do a pre-reading activity in which they predict the answers to a set of true/false statements about cellulose, pH, and paper degradation and conservation. Then they will read a short excerpt of an article on the same topic, and discuss the role of paper conservation for libraries such as the New York Library.
2. They will use what they have learned from the text to write a series of simple hypotheses about the differences in grammage (g/m^2), microscopic appearance, and pH of several paper samples of different types and ages, based on the appearance and texture of the samples.
3. They will then test and evaluate their hypotheses, present on their findings to other groups, and compare points of view about the significance of the results. Through the process of peer review, they will refine their ideas about the connections between the macro-scale and nano-scale attributes of the paper samples and their implications for paper conservation.
4. They will write up these ideas in the form of a lab report.

Resources:

- Benbow, Ann, et.al. *Pulp and Paper Research and Development*. NY: W/H. Freeman and Company, 2000. Print.
- Martinez, Jo Anne and Marc Reeves. "Collections Maintenance Activities at the New York Public library, Research libraries." *The Book and Paper Group Annual*. Vol. 11, 1992. The American Institute for Conservation. Web. 30 May, 2014. <http://cool.conservation-us.org/coolaic/sg/bpg/annual/v11/bp11-19.html>.
- Seery, Michael. "Saving Paper." *Education in Chemistry*. March 2013: 22-25. Web. 30 May, 2014. <File:///C:/Documents%20and%20settings/Admin/My%20Documents/EiC0213-paper-conservation-chemistrycm18-227485.pdf>

Common Core Standards:

- **Reading (Key Ideas and Details 1):** Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
- **Writing (Research to Build and Present Knowledge):** Conduct short as well as more sustained research projects based on focus questions, demonstrating understanding of the subject under investigation.
- **Speaking and Listening (Comprehension and Collaboration 3):** Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric.