Especially for High School Teachers

by Diana S. Mason

The Tried and True with a Cyclic Twist

There's always talk about strengthening the academic preparation of our students. New and innovative teaching methods abound, but somehow the tried and true always sneak back into the mix. Several of the articles in this month's issue highlight the practice of teaching. There is an excellent review of the history of how we have chosen the currently popular biology–chemistry–physics (BCP) sequence for instruction in the United States. Sheppard and Robbins (p 561) take us back to the 1890s with the establishment of the Committee of Ten chaired by Charles Eliot, professor of chemistry and president of Harvard. This is a must-read for those interested in how and why the majority of the country has chosen the BCP sequence and not the "physics first" curriculum promoted by several prominent scientists.

photo by A. A. Smith and C. A. Smith

Promoting changes in the ways science is taught is at the mercy of how most of us learned science content for ourselves. The PIM (Penn Inquiry Model) is a heroic attempt to retrain University of Pennsylvania's graduate students to use inquiry methods in the classroom in hopes that this model will be reproduced in their own classrooms (see p 567).

Another tried-and-true classroom instructional method is mastery learning. This teaching method has been promoted by this *Journal* for many years and is a major focus of articles by Peters (p 571) and Brooks, Schraw, and Crippen (pp 637 and 641). These authors accentuate the importance of a solid evaluation program with immediate, directed feedback that can be used to improve retention, motivation, and student success, and they remind us that improving student self-efficacy has great value.

Other tried-and-true activities include an old standby, the electric pickle. If you want to know how to make your pickle glow red, then read the article by Rizzo et al. (p 545). Another tried-and-true topic is presented with a twist by Jennings and Keller (p 549). As an analogy to a two-step reaction mechanism, they have students unwrap and eat candy. Wrapped candies represent reactant molecules, eaten candies represent product molecules, and unwrapped candies represent reaction intermediate molecules. Unwrapping is analogous to the rate-limiting step and students get a feel for the build-up of the concentration of an intermediate. Computer-based laboratories are also well known, but have you considered using temperature probes to demonstrate the unusual change in density of water between 0 °C and 4 °C? Branca and Soletta (p 613) have. Their novel approach allows students to use graphs of temperature versus time to discover that water's behavior is different from the norm.

Long (p 514) highlights a very important topic: how to reach out to students with disabilities. The American Chemical Society and this *Journal* are superb resources for ideas on how to incorporate activities for the visually impaired into a standard curriculum. On pp 607–610, Neppel et al. discuss an interesting way to perform an acid–base titration using the sense of smell. Chemistry instructors have always been known for being creative, but this is one of the most interesting ways of determining end points that I've ever seen. I am sure that all students would enjoy this unique way for stimulating our olfactory glands to do chemistry.

Secondary School Featured Articles

- *JCE* Classroom Activity: #71. Investigating the Invisible: Attenuation of Radio Waves, by Anthony A. Smith and Charles A. Smith, p 560A.
- Chemistry, The Central Science? The History of the High School Science Sequence, by Keith Sheppard and Dennis M. Robbins, p 561.

Many students limit their conception of electromagnetic spectrum to that present in the visible and UV regions and they really don't think about some of the other regions. Smith and Smith (pp 560A–B) show how students can use a handheld radio and everyday objects to investigate attenuation of AM and FM radio waves. To attract students to the practical side of chemistry, Greengold (p 547) uses a matching game that helps students learn the names of common laboratory equipment.

This is the April issue, so of course many new games and puzzles can be found. Helser (pp 551 and 552) provides us with two "Wordsearches." The first one on water is perfect for introducing complex vocabulary associated with water to the students. Other examples of intertwining creative writing with chemistry can be found on pp 539 and 541. Also, Voegel, Quashnock, and Heil present a student outreach program where high school students are trained by university faculty to engage elementary students in the wonders of science using demonstrations (see p 634).

Make Plans for Summer 2005!

New and experienced teachers are invited to attend one of the six Flinn Foundation chemistry workshops this summer (p 524). For specific details visit the Flinn Foundation site: *http://www.flinnsci.com/Sections/Foundation/foundation.asp.* These workshops, facilitated by nationally renowned high school teachers, are located all over the U.S. and are very popular, so register soon! Also, don't forget to add ChemEd 2005 at The University of British Columbia, Vancouver, BC, Canada to your summer travel plans (for conference details see *http://nobel.scas.bcit.ca/chemed2005/*).