

Reports from Other Journals

The Science Teacher: Summer Reading

by Steve Long

Welcome to a new feature summarizing articles of interest for high school chemistry teachers from *The Science Teacher* (*TST*). Perhaps summer will allow time to catch up on a few of the professional articles you have been saving for a more relaxed time. These might be good starting points. The articles selected include some feature articles as well as some shorter teaching tips. There are also articles reviewed that focus upon multicultural education—a topic many of us are facing with greater interest and need.

"Analyzing Cigarette Smoke" by Dan Jaffe, Dale Griffin, and Janet Ricker (*TST* 1997, 64(9), 29–33) provides an activity for students to quantitatively analyze total smoke and tar (both main and sidestream) with an alternative method to that used by the Federal Trade Commission. The article continues with procedures to make both quantitative and nonquantitative determinations of carbon monoxide using, respectively, Dräger tubes and visual indicator badges. Sources for detectors as well as Internet resources are included in the article. This would be a good extension activity for instructors using the ACS *ChemCom* textbook. Recently, this *Jour-*

nal reported a procedure by Wong, Ngim, Eiserich, Yeo, Shibamoto, and Mabury (*J*) on "Determination of Formaldehyde in Cigarette Smoke" that would be of interest to teachers working on a study of cigarette smoke.

"The Idea Bank" in the same December issue (*TST* 1997, 64(9), 56) has a short teaching tip on a "Safer Solubility Experiment" by Franklin Bickford, which suggests the use of alum (potassium aluminum sulfate) in place of the commonly used potassium nitrate. Bickford cites advantages of alum including possibly lower costs, local availability, and safety because of the elimination of the potassium nitrate that could be used in black gunpowder. One disadvantage noted of the use of the alum is the tendency of the material to form supersaturated solutions more readily than the traditional potassium nitrate.

The January 1998 issue describes an activity to relate a familiar material, aluminum, to the practice of unit conversions and mole calculations. In "Aluminum Analysis", William Sumrall (*TST* 1998, 65(1), 32–35) reworks his previous exercise on silver into a more environmentally appropriate metal. Sumrall provides an overview of how the lesson would be conducted, including numerous examples with solutions. A short section on possible extensions is also included.

Sumrall states that his approach to teaching numerical conversions is practical, relevant, requires integration of chemical knowledge, and shows chemistry in everyday life. Norman Craig has published two articles in this *Journal* (2, 3) discussing Charles Martin Hall and the electrochemical process for aluminum production. These articles would make interesting reading for teachers or students using Sumrall's aluminum conversion techniques.

"Students as Teachers" (*TST* 1998, 65(1), 63–64) in "The Idea Bank" explains a successful grant project by Joanne Van Houten. It uses high school students as both teachers and demonstrators for local fourth grade students. The project was designed to be beneficial to both groups of students. High school students gained skills in chemistry, teamwork, planning, and presentations. The younger students saw an exciting demonstration program, participated in a problem-solving session, and were encouraged to keep an interest in science.

The February issue of *TST* was a bonanza of chemistry articles! Michael Pleacher (*TST* 1998, 65(2) 48–51) writes about "The Science and Math Connection". This article explains Pleacher's program to connect trigonometry and covalent bonding. He shows how trigonometric identities are used to prove the optimum angle for molecules with four identical atoms bonded to a central atom. The uses of the valence-shell electron-pair repulsion (VSEPR) model, three-dimensional models, Lewis structures, and trigonometry connect math and science. The relevance of trigonometric identities (an exasperating study for many high school students) is provided through their practical application to a chemical problem.

Featured Articles

"Analyzing Cigarette Smoke" by Dan Jaffe, Dale Griffin, and Janet Ricker (*TST* 1997, 64 (9), 29–33)

"Safer Solubility Experiment" by Franklin Bickford (*TST* 1997, 64 (9), 56)

"Aluminum Analysis" by William Sumrall (*TST* 1998, 65 (1), 32–35)

"Students as Teachers" by Joanne Van Houten (*TST* 1998, 65 (1), 63–64)

"The Science and Math Connection" by Michael Pleacher (*TST* 1998, 65 (2), 48–51)

"Microwave Oven Observations" by William Sumrall, Denise Richardson, and Yuan Yan (*TST* 1998, 65 (2), 38–42)

"Density Explorations" by Mary Stein and Dolores Miller (*TST* 1998, 65 (2), 45–47)

"Embracing Diversity" by Gerry Madrazo, Jr. (*TST* 1998, 65 (3), 20–23)

"Multicultural Chemistry" by Trent Daniel (*TST* 1998, 65 (3), 56)

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"Microwave Oven Observations" by William Sumrall, Denise Richardson, and Yuan Yan (*TST* **1998**, 65(2) 38–42) details a way to link terms such as specific heat and heat of fusion, which many students find confusing, with concrete examples. The authors state, "Students who are good at solving word problems might be able to plug the right numbers into the right equations but may not have a conceptual understanding of the terms these equations include." Sumrall, Richardson, and Yan put a microwave oven to work demonstrating various phase changes and the accompanying energies involved. A similar experiment, "Determination of Enthalpy of Vaporization Using a Microwave Oven", was recently described by Alvin Kennedy, Sr. (4) in this *Journal*.

Also appearing in the same issue was a collaborative lesson, "Density Explorations", by Mary Stein and Dolores Miller (*TST* **1998**, 65(2) 45–47). Stein and Miller devised an activity to allow students to determine the relative densities of five different sugar or salt solutions. The student teams layered three different solutions by trial and error. Then, they shared their results to allow the densities of all five solutions to be determined. The authors include a detailed description for assessment of the activity, and they discuss the dilemma that occurs when students' quantitative and qualitative observations do not agree. Another article relating to ammonia fountains and density columns was published in this *Journal* (5) as a "Tested Demonstration".

Multicultural curriculum is one of the most pressing topics in many schools today. Teachers burdened with multiple preparations, extra duties, and dwindling resources are facing a student population vastly different from that of even

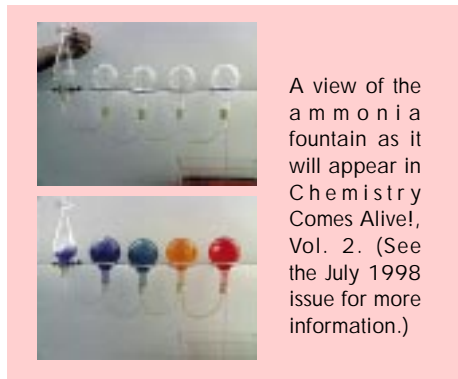
five years ago. How do these teachers cope with the rapid changes occurring in their rooms, and how do they learn to adapt their familiar curriculum to a broader base of ethnicities and cultural diversities? The March 1998 issue of *The Science Teacher* is devoted entirely to the many faces of multicultural education. Two articles stand out as examples of information we must all assimilate to become better educators in a more diverse world. "Embracing Diversity" by Gerry Madrazo, Jr., (*TST* **1998**, 65(3) 20–23) is a call-to-action for all teachers, and it is a plan whereby we can begin to become more culturally literate. While this is not an article specifically about chemistry, Madrazo urges all teachers to take actions to become both more astute on and more sensitive to cultural diversity. Trent Daniel in the "Idea Bank" describes a project on "Multicultural Chemistry" (*TST* **1998**, 65(3) 56). Daniel outlines his procedure for a student project in applied chemistry that links cultural awareness with a nutritional analysis of typical diets in different countries. The study culminated with the students' preparation and sampling of different cultural dishes.

These reviews should whet your desire to get into the stack of professional readings you have been setting aside. Thanks for trying out the new column. Happy summer reading!

Literature Cited

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2. Craig, N. C. *J. Chem. Educ.* **1997**, 74, 1269.
3. Craig, N. C. *J. Chem. Educ.* **1986**, 63, 557–559.
4. Kennedy, A. P., Sr. *J. Chem. Educ.* **1997**, 74, 1231.
5. Proksa, M. *J. Chem. Educ.* **1995**, 72, 931.

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A view of the ammonia fountain as it will appear in *Chemistry Comes Alive!*, Vol. 2. (See the July 1998 issue for more information.)