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A Winter's Entertainment, IV

The winter break gives teachers a chance to plan new teaching strategies and develop new experiments for the lectures and laboratories they will teach in the spring semester. While we would not claim that learning chemistry can always be fun or that all topics that a student would deem "irrelevant to my life" should be dropped from the curriculum, it is clear that students respond and learn more if the material is presented in a way that is entertaining and that relates to other things they find interesting. Thus, each year in the December issue, the *Journal* provides a group of articles that will assist teachers in making their classes more entertaining without sacrificing pedagogy.

The field of entertainment itself offers us some ideas for introducing new concepts in ways that capture students' attention. The long (re)running TV series "Star Trek" has many avid followers, and **Hudson** (page 1039) has found that the "dilithium crystals" that are supposed to power the starship make an ideal subject for teaching the Born–Haber cycle and the thermodynamic considerations used to determine reaction feasibility. Sherlock Holmes is another familiar source of entertainment, both to readers of detective fiction and viewers of the PBS series "Mystery! **Inman** (page 1014) takes a reference to an experiment in one of the Holmes stories and carries out his own series of deductions of what the substance under investigation must have been. His conclusions provide some interesting organic chemistry.

Baseball is considered the all-American sport, and, thus, **Krug** (page 1000) finds that the factors involved in homerun hitting make a great analogy for explaining the variables that apply in collision theory.

Music is as equally important as TV and sports in providing students with entertainment. **Turrell** and **Demol** (page 1025) show how to make a demonstration device that translates the various modes of molecular vibrations into musical tones. A wind instrument will have different pitches when sounded in gases of differing molecular weights, and this fact has been used as the basis of an interesting demonstration of gas properties. **Augustine** (page 1053) offers a new design for the sounding device that allows rapid alteration between the two gases, and thus even the most tone deaf can hear the change in pitch.

When the teacher can link the principles he or she is teaching to substances that students encounter routinely, the students seem to get more involved in the learning process. Molecular structure discussions that seem pointless suddenly are fascinating when the taste of a molecule is related to its configuration or composition. **Tseng** and **He** (page 1003) review the current thinking on how structural theories explain human taste responses to both inorganic and organic molecules. Their work contains many interesting concepts that have application throughout the curriculum.

Students are interested not only in the mechanism involved in taste but also in the things they taste; thus common items of food and drink make interesting subjects for lecture illustrations and lab experiments. **Burrows** and **Cardoso** (page 995) make use of the interesting fact that red wines absorb more radiation than white wines and then release it as heat as the basis of a simple and attention-getting demonstration of radiationless relaxation. The ordinary GC quantitative experiment takes on significance in the students' minds when the substances they analyze are a variety of American and Scotch whiskies. **Rice** (page 1055) discovered a column packing that is designed especially to determine the congeners in distilled whiskey and has developed around it an experiment for his instrumental analysis course.

Although not as titillating a topic to young people as alcoholic beverages, soda pop is more frequently consumed (by student and teacher alike). Aspartame, the common sugar substitute in diet drinks, is the basis of two experiments that teach many concepts of amino acid chemistry in a way that makes their everyday applications clear. **Lindeberg** (page 1062) presents "A Convenient Synthesis of Aspartame", and **Conklin** (page 1065) gives details of the "Analysis of Aspartame and its Hydrolysis Products by Thin-Layer Chromatography".

The claims of those espousing the "organic" or "natural" way of life are appealing to many young people; they are often surprised to find that "natural" is not always equivalent with "safe" or "harmless" and that many natural products are themselves toxic. **Vollmer, Steiner, Larsen, Muirhead,** and **Molyneaux** (page 1027) examine in depth the toxic constituents of comfrey, an herb that has recently been touted as "being good for every ill of mankind". Their work can be used as an experiment for advanced undergraduates or a demonstration for introductory students. Another natural product that has been recognized as toxic (in this case to insects rather than humans) is pyrethrin I, derived from chrysanthemums. **Kelly** (page 1061) gives a simple synthesis of chrysanthemic ester, the active component of the natural compound.

Bent has long been an advocate of using simple, familiar objects to demonstrate scientific concepts. In this month's *Bench Remarks* (page 1047), he uses a common match to show the difference between chemistry and physics, illustrate the second law, introduce the kinetic–molecular theory and energy concepts, and philosophize on the meaning of scientific inquiry. **Grampone** (page 1057) uses another prosaic household item, the bar of soap, as the basis for a spectrophotometric determination of iron that has real-life applications as well as real-life difficulties in the analysis.

Another situation that will attract student interest and that illustrates the complex problems of applying chemistry to real life is the current concern about gasohol. It was at first welcomed as a fuel-saver but now has had "bad press" because the alcohol can combine with water in the gasoline and form a corrosive separate phase. This very timely subject is discussed by **Tackett** (page 1059), who presents an experiment that allows for the determination of methanol in gasoline by gas chromatography.