LETTERS

A Further Trivia Question

To the Editor:

Alan Mellors devised a Trivia Quiz for chemists [J. CHEM. EDUC., **61,** 1057 (1984)] which included questions such as: What elements derive their names from those of continents? and What country has two elements named for it? I suggest adding the question: *What country is named after an element?*

Very few chemists can give the answer to the question. A surprising number answer by reciting a list such as: France (francium), Poland (polonium), America (americium), etc.

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Editor's Note: The answer is given upside down below.

2-Butanol Safety Warning

To the Editor:

I wish to report another incident involving an explosion during the distillation of 2-butanol. Even though there have been previous reports [*C&E News* [19] *59*, May 11, **1981,** 3; *J. Chem Educ.* **1984,** *61*, 476] it does not seem to be generally known that alcohols pose a danger of peroxide formation similar to that of ethers. There are no warnings of this danger either on the product labels or in the laboratory manuals. In our organic chemistry laboratory, a student had been issued a 50-ml sample of 2-butanol as an unknown for a simple distillation exercise. This alcohol was among those listed in the lab manual as possible unknowns for this experiment. As the student was lowering the heating mantle with 2–3 ml of liquid left in the still pot, a loud detonation occurred. Three students received multiple lacerations and puncture wounds from the flying glass. Fortunately all were wearing safety glasses at the time. Subsequent testing of the original bottle of 2-butanol with aqueous KI showed the presence of peroxides. This alcohol, which had been in stock for several years, was discarded after treatment with aqueous $FeSO_4$ to destroy the peroxides. I would suggest that people test their stocks of alcohols and discard those that show significant amounts of peroxide impurities.

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Sulfur Origins

To the Editor:

It was a real pleasure to read your feature article "The Sulfur Chemist", [*J. Chem. Educ.* **1984,** *61*, 372]. I hope that other important elements will be treated in the same way.

However, I wish to point out that one of the important languages of the Middle East, of Indo-European origin, has been omitted from Table 2. This is the Persian or Iranian, the official language of Iran, Afghanistan, and Tajikistan.

The word for sulfur in Persian is *Googuerd*, in Pahlavi or Middle Persian *Gōgird* [MacKenzie, D. N. "A Concise Pahlavi Dictionary"; Oxford University Press]. The same word is used in Dari, Tajik, Kurdish, Baluchi, and all other Iranian dialects. In all Turkish languages sulfur is called *Kükürt*, which is a modified form of *Googuerd*, according to Turkish phonetics. Scientific words derived from Persian, in great numbers, may be found in many languages of the Middle East, even in Arabic!

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Factor-Label: Another View

To the Editor:

Unaccustomed though I may be to controversy, I am, nevertheless, sufficiently provoked by the *Provocative Opinion* of Navidi and Baker [*J. Chem. Educ.* **1984,** *61*, 522] on the factor-label method to respond. Given the choice between discovering "how to flip flop the units" and the "common sense" approach advocated by the authors, I, too, might come to the conclusion that the introduction of the factor-label method should be postponed, perhaps indefinitely. But this is only because there is more to the factor-label method than just juggling the units as these authors imply.

What the authors are not telling us (and apparently are not telling their students) is that each fractional factor is a multiplicative identity, i.e., equivalent to one. Each is one because its numerator taken with its label (dimensions) is equivalent to its denominator taken with its label. Whenever any quantity is multiplied by this factor, its "value" is unchanged; it is simply expressed with a new label (in new units).

The observation is mathematically rigorous, even if one does not have the common sense to align the units of the conversion factor so as to cancel those of the quantity being multiplied by that factor. Of course, if one has the most profound common sense to realize that each multiplicative identity is its own reciprocal, and if one then aligns the labels of the conversion factor so as to cancel those of the quantity being multiplied, the conversion is not only valid, but old units are replaced by new units.

Rather than adopting the well-now-let-me-see-if "common sense" approach advocated by Navidi and Baker, I feel that we should contribute to the early development of our students by introducing the factor-label method properly in the first place. We should teach our students to examine each conversion factor to see: 1) if its numerator is logically equivalent to its denominator and 2) if the labels in the numerator and denominator are aligned so as to replace old units with new ones. We should tell them that this process may be repeated as many times as necessary (using valid conversion factors) to achieve the desired result. Because of its mathematical rigor, this procedure is always sensible and never mysterious, regardless of whether the conversion is chemical in nature (6.02×10^{23} of 'em/1.00 mole of 'em) or not (1.00 dependent/$1000). Therefore, we provide a service beyond that which is required of a sound chemical education when we introduce the factor-label method properly.

It is my perhaps equally provocative opinion that we cannot provide this valuable service too early in our courses.

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Argentina is the country named after an element.