Chemical & Engineering News

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LETTERS

CHEMICAL SAFETY

Aluminum with fluorinated ligands

Aluminum compounds with perfluorophenol substituents have been identified as potentially explosive [*Organometallics*, **10**, 1917 (1991)]. I wish to communicate my experience as well as that of my colleagues.

Adding 1,4-tetrafluorodihydroquinone (1 mol equivalent) in toluene to a toluene solution of trimethyl aluminum (1.1 mol equivalents) resulted in a gel-like reaction mixture. Filtration and drying gave a white solid that was isolated in a nitrogen-filled glove box. A 50-mg sample of this solid detonated violently when pressed gently between a stainless-steel spatula and a glass surface. Fortunately, no one was hurt in this incident.

Tris(pentafluorophenyl)aluminum etherate has been reported to be explosive when heated [*Naturforschg.*, **20b**, 5 (1965)]. Clearly, extreme caution should be used when handling compounds of aluminum with fluorinated ligands.

Rupert Spence
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Calgary, Alberta

Electro-optic polymers

The article on electro-optic polymers (C&EN, March 4, page 22) contained a good summary of the large amount of creative chemistry that has been invested in these materials. Unfortunately, the information provided represents a one-sided view. There were contributions from people who study these materials, but no definitive comment from potential users of electro-optic polymer devices. Thus, you have run afoul of Greenberg's Law: "Don't ask the barber if you need a haircut." There are some important considerations that should be presented to your readers.

Had the information been available, C&EN might have seen a warning light in the observation that all major industrial laboratories potentially interested in using electro-optical polymer devices—including IBM, Philips, DuPont, British Telecom, and Bell Labs—have stopped research in the area. Akzo, which invested much effort, is said to retain only work on some sort of thermal switch.

At a September 1995 joint meeting of the American Chemical Society and the Optical Society of America in Portland, Ore., the IBM group presented evidence for a gradual reduction in transmission of one of its high stability materials when near-infrared light was transmitted through a waveguide. Given that there was essentially no absorption at that wavelength, this does not bode well. Optical loss is a major consideration for any device. Unfortunately, you did not give any quantitative information for the materials discussed, and I believe that current materials have unacceptably high loss, attributable to both scattering and absorption. Clever polymer

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Hot articles

In response to requests by several World Wide Web browsers of the ACS Publications Division home page (http://pubs.acs.org), links to all Hot Articles in C&EN and other ACS publications available on the Web since March 1995 have been reestablished. The primary index of articles published in the last three months can be accessed by clicking on "Hot Articles." At the bottom of each primary index are links to 1995 articles and articles published earlier this year.

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chemistry has prevented the relaxation of field-aligned molecules, as you presented in some detail, but this is not the only critical issue regarding electro-optic polymers.

I take serious exception to the latter part of the most controversial statement in the article: "Furthermore, these modulators—unlike lithium niobate devices—can be easily integrated with both semiconductor and fiber-optic transmission lines." The core diameter of an optical fiber is 8 µm. Unfortunately, all of the work with polymers has used films that are only 1 µm thick, probably because the poling field required is several megavolts per centimeter.

You don't have to know much about optics to see that an unacceptable loss will be incurred in trying to butt-couple a fiber to such a device for injection. To his credit, Larry R. Dalton is the only chemist who has openly raised this issue, but he does not provide a practical solution. Prism or grating couplers can be used in the laboratory, but they are not realistic for a working device that requires fiber pigtails. This issue has been raised often with a number of people in the field, but they seem to prefer to avoid it.

Polymer electro-optic devices cannot be regarded as realistic until a full set of facts is presented, and these questions and more are answered. Some of these questions have been swept aside for more than a decade. Practitioners of the art delight in pointing out the deficiencies of lithium niobate, but those devices are being used today. They may not be optimum, but the organic materials are not at all ready to offer competition.

Edwin A. Chandross
Murray Hill, N.J.

Industry alliances

In her editorial "Secrecy in Science" (C&EN, Feb. 19, page 5), Madeleine Jacobs worries about the hazards to scientific openness posed by increasing corporate funding of academic research. Although her analysis is useful, she has ignored one of the most important results of the growth in collaborations between industry and academe—its impact on the training and employment of young scientists.

Although corporate funding is a boon to established researchers in this era of tight funding, I fear that industry is using it to indirectly have its basic research done by graduate students and postdoctoral fellows, rather than staff scientists. This lowers the number of graduates who will eventually be hired by these companies. In essence, corporations are outsourcing portions of their research to graduate students and postdoctoral fellows—poorly paid groups of temporary employees.

About a year ago, I attended a lecture by a prominent pharmaceutical research manager who said that his company does little basic research anymore. Instead, they target funds to academic groups doing desired types of research. The speaker could not answer questions about the eventual employment prospects of the students supported by this funding.

Academic researchers should be wary of taking funds that erode the job prospects of their own trainees. Alliances of industry and academe may be fruitful to those who run laboratories, but alliances must be designed in a way that does not exploit the students and postdoctoral fellows conducting the bulk of the research.

Susan I. Waters
Princeton, N.J.

Computer cheats

I would like to add a footnote to Rudy Baum's Science Insights column on the chess match between Garry Kasparov and the IBM supercomputer Deep Blue (C&EN, March 25, page 28). Deep Blue and similar metal monsters can calculate chess positions up to an astounding 200 million moves per second—but they cheat! While tournament chess players may not bring chess books to the board, these computers are preprogrammed with thousands of classic chess games and with the latest opening theory—akin to playing Scrabble with a copy of the Oxford Dictionary. Not only did Kasparov find himself dueling against a bolt of lightning, but, quite literally, he was opposing thousands of the best moves of the best chess games played over the past 100 years. Unfair!

Nevertheless, Kasparov met and vanquished this giant silicon entity. Unlike many games, chess is much more than calculation and past experience: It is truly art and fantastic creativity. Kasparov has reaffirmed the magnificence of the human mind.

Gordon W. Gribble
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Ammonia and tobacco

Affidavits from former Phillip Morris employees that "the use of ammonia chemistry was important to the industry in maintaining adequate nicotine delivery to satisy smokers," and that "[ammonia] apparently works by increasing the pH of the tobacco smoke" (C&EN, March 25, page 8), are rather convoluted explanations. Our experiments, presented at the ACS national meeting in New Orleans, suggest a much more direct and insidious role for adding ammonium compounds.

We observed that commercially available processed cigarettes released 23 times more nitric oxide when compared with commercially available additive-free cigarettes. Nitric oxide is a known combustion product from ammonium and other nitrogen-containing sources. As expected, the processed brands contained much higher levels of water-extractable ammonium and nitrate salts—approximately fourfold and 10-fold, respectively—when compared with the additive free brands. This suggests that ammonium and nitrate doping of cigarettes increases nitric oxide, a well-known vasodilator that can counteract the vasoconstrictive role of nicotine and enhance nicotine uptake. Considering the potent carcinogenic and mutagenic action of nitrogen oxides, I think it is high time for cigarette manufacturers to disclose their "processing" practices and get the "fertilizer" out of tobacco.

William Potter
University of Tulsa

Combinatorial libraries

I read with great interest the articles on the newly emerging, highly popular, and overpromoted technology of combinatorial chemistry (C&EN, Feb. 12, page 29). These reviews gave me a feeling that the brain is becoming passé and that future achievement in this area is directly proportional to our ability to produce more and more chemical libraries.

When the computer was introduced, many elderly scientists claimed that the brain will shrink and the finger will grow. The development of combinatorial libraries certainly fits this scenario in which thinking is replaced by the production of millions and millions of libraries, and we simply expect the unexpected. The field of combinatorial chemistry is still in its embryonic stages. But it is certain that one day many industrial firms will have their own lead compounds obtained by using this strategy. It is also quite apparent that the use of combinatorial libraries will become a common approach—but not the sole approach—for producing new and interesting drug candidates.

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Letters to the editor

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