Beverages intoxicated by lead in crystal

Lead crystal, containing 24 to 32 percent lead oxide, is revered for its brilliance and clarity. But preliminary experiments by two New York City researchers now indicate that extremely high levels of lead, a toxic heavy metal, can migrate from crystal decanters into the beverages they hold. The team's findings suggest that "long-term storage *of anything* in lead crystal is really to be avoided," says Joseph H. Graziano, who led the study.

Graziano, a toxicologist at Columbia University's College of Physicians and Surgeons, recalls that when internist Conrad Blum first questioned him about lead migration from glass, he thought Blum was "crazy." But Blum's home tests, showing the apparent leaching of lead from crystal into wine, piqued his curiosity. The two Columbia researchers describe their subsequent investigation in the Jan. 19 LANCET.

Blum supplied three lead-crystal decanters from home. He and Graziano cleansed each decanter and poured in port. Two days later, they began periodic samplings of the wine. "When we analyzed the first sample, I couldn't believe it," Graziano says. Lead showed a steady increase, from an initial level of 89 micrograms of lead per liter to between 2,160 and 5,330 µg/l four months later.

White wine doubled its lead concentrations within an hour of being poured into one lead-crystal glass, and tripled within four hours, they found.

Alcoholic beverages in 14 lead-crystal decanters brought in by colleagues showed similar spikes. Two brandies stored in lead crystal for more than five years accumulated 19,900 to 21,500 µg/l lead, the researchers found. (EPA's lead standard for drinking water is 50 µg/l, and there have been discussions of lowering it to 20 µg/l.)

Because a single glass of the contaminated brandy "contains as much lead as you would ordinarily become exposed to in a month from all other sources" — including air, water, diet and dust — Graziano contends that consuming such drinks would be "stupid."

And in a letter submitted Jan. 8 to the JOURNAL OF PEDIATRICS, Graziano, Blum and Columbia colleague Vesna Slavkovic report that apple juice and infant formula leach lead from crystal as effectively as alcohol does. In juice samples that sat in lead-crystal baby bottles for four hours, lead levels spiked from an initial 1 µg/l to 166 µg/l. Warm formula attained comparable levels in 15 minutes and reached 280 µg/l in four hours. Because infants are more sensitive to lead's effects than adults, the authors suggest "that the sale of these [crystal baby bottles] be forbidden," and have sent the new data to the FDA.

According to a statement issued last week by the Lead Industries Association (LIA), the alcohol study suggests "there is negligible risk" from beverages placed in lead-crystal barware "for short periods of time, such as during a meal." LIA and another industry group, the International Lead Zinc Research Organization, plan a study of the risks posed by long-term storage of alcohol in lead-crystal decanters. FDA is already conducting a similar investigation. — *J. Raloff*

C_{60}: Definitely a beauty, maybe a beast

Since last August, physics graduate student Lowell D. Lamb and his coworkers at the University of Arizona in Tucson have donned gloves and masks when working with chemistry's latest darling, a soccerball-shaped molecule known as buckminsterfullerene. That's when Henry K. Hall Jr., a chemist at the university, alerted them to health hazards that may lurk in the 60-carbon beauty.

No one has reported ill effects from buckminsterfullerene, but Hall and others urge researchers to proceed with caution. If biologists were to happen upon a new animal species with teeth and claws, they would take precautions even though the animal might turn out to be a pussycat. The same should hold for scientists probing new chemical species, Hall warns.

By some estimates, hundreds of researchers now spend at least part of their time studying C_{60}, its molecular cousins such as C_{70} and C_{84}, and the solid materials, called fullerites, into which these cage-like molecules assemble (SN: 12/8/90, p.357). The fullerites join diamond and graphite as the third material form of carbon atoms.

But the same structural symmetries and physical oddities that render these celebrity chemicals so intriguing may represent the molecular equivalent of teeth and claws, researchers are finding.

Robert Whetten of the University of California, Los Angeles, and his coworkers have been outspoken about such possibilities. In the Jan. 9 JOURNAL OF PHYSICAL CHEMISTRY, they report that C_{60}, in the presence of light, efficiently transforms oxygen molecules into a so-called singlet state, an especially reactive form that can sabotage biochemical harmonies underlying the health of cells and tissues. The researchers do not yet know if C_{60} actually can initiate these processes under physiological conditions, Whetten notes. Besides pegging buckminsterfullerene as a potential health threat, the findings show how the molecule's electrons harness and shunt light-energy as C_{60} interacts with nearby molecules.

"The degree to which C_{60} is present in the environment becomes a very important question," the UCLA researchers state in their paper. That the synthesis of C_{60} yields fine powders only heightens their concern. "We feel it is important to warn researchers to take precautions against skin contact and breathing of the dusts, at least until the physiological properties of the material have been better characterized," warn Whetten, Francois N. Diederich and Christopher S. Foote of UCLA, and Fred Wudl of the University of California, Santa Barbara, in a letter in the Dec. 17, 1990 CHEMICAL & ENGINEERING NEWS. — *I. Amato*

Asthma culprit cloned

It starts with some wheezing, a hoarse, dry cough and a growing sensation of pressure that leaves victims panicked and gasping for breath. War in the Middle East notwithstanding, this is not a poison gas attack. These symptoms represent common occurrences for the more than 8 million Americans with asthma.

Despite decades of work, scientists have yet to design the perfect asthma drug — one that specifically targets the potent biochemical mediators of this immune overreaction. But new research led by a Japanese physiological chemist may speed the development of such a drug.

Takao Shimizu at the University of Tokyo, with colleagues there and at the Protein Engineering Research Institute in Osaka, has cloned the cell-surface receptor for a blood compound called platelet-activating factor (PAF) — one of the body's most potent alarm chemicals and the one responsible for much of the biochemical mayhem underlying asthma attacks and other inflammatory reactions.

When released from blood cells in response to an allergic reaction or toxic exposure, PAF triggers circulating platelets to release substances that promote bronchial spasms and leakage of fluid into the lungs. The newfound ability to mass-produce PAF receptors should help medicinal chemists design drugs that can calm the oversensitive receptors, the researchers assert in the Jan. 24 NATURE.

"It's very good work, an important development," says Donald J. Hanahan, a PAF biochemist at the University of Texas Health Sciences Center in San Antonio. He notes that PAF is made of fat rather than protein, and says the new work seems to mark the first cloning of a receptor for a fat-mediated cellular signal. As such, Hanahan says, the new research may also help explain how prostaglandins and leukotrienes — extremely potent, fat-based mediators of pain and inflammation — perform their biological duties. □