

Radon: Some concrete issues

For years, environmental engineers have recommended that homeowners seal cracks in the concrete of basement or slab floors to limit the infiltration of radon, a radioactive gas emitted by radium in the soil. However, while cracks do provide an easy entry, radon also can pass through intact concrete.

In fact, because intact floors and below-grade walls usually cover a dramatically greater surface area than cracks do, diffusion through solid concrete may actually prove a home's dominant portal for radon, observe Vern C. Rogers, a Salt Lake City-based engineering consultant, and his colleagues in the September *HEALTH PHYSICS*.

Rogers' team analyzed radon's diffusion through 25 samples of residential concrete, 16 of them cored from Florida homes. They found that gas molecules passed through the 2- to 4-inch-thick samples at rates of about a ten-millionth to a hundred-millionth of a meter squared per second — or up to five times faster than reported previously.

Where the soil's radium content is relatively high and the ground fairly impermeable to air flow (such as in clays), there will be relatively little air-driven seepage of radon through concrete cracks, says coauthor Kirk K. Nielson. Diffusion, however, is fairly insensitive to soil permeability. As such, he notes, where high-radium, low-permeability soils occur, diffusion can predominate — sometimes accounting for up to 90 percent of the radon entering a home from soil.

The new data also indicate that the amount of water used to mix the cement affects its porosity and therefore radon seepage. The wetter the mix, the faster radon diffuses through hardened concrete, explains Nielson.

But concrete can itself be a source of radon, points out a pair of researchers from the Netherlands in the same journal. The two scientists, at N.V. KEMA in Arnhem, recorded radon emissions that continued for at least 8 years after a concrete was poured. The good news: The release rate fell with time — particularly after the first 2 years.

These investigators focused on the role of fly ash — the fine ash produced by incinerators and power plants — which the Dutch have begun adding to much of their concrete. Because this material tends to contain more radium than cement, concern has been building that ash-based concrete may become an increasingly important source of indoor radon.

But in the Dutch study, adding fly ash to Portland cement reduced a concrete's radon-emission rate "in all cases." For concretes made with "blast-furnace cement," however, adding fly ash increased the amount of radon seepage — though not beyond that seen in normal, ashfree concretes.

The Arnhem researchers also observed that for the concretes they studied, radon emissions rose as the humidity in the environment increased — to a maximum of 75 percent relative humidity. This provides yet another reason to keep those basements dry.

Styrene in foods: What does it mean?

Styrene is a constituent of many plastics and Styrofoam. In 1991, when researchers found styrene in eggs, concern arose that the carcinogen's presence traced to the plastic cartons in which the eggs had been stored. But a new study illustrates why plastics cannot take the fall for all dietary styrene.

In the August *JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY*, David H. Steele of the Midwest Research Institute in Kansas City, Mo., and his colleagues find that styrene occurs naturally in 8 of the 12 foods (not eggs) that they analyzed. For wheat, peanuts, coffee, peaches, oats, strawberries, and beef, concentrations fell well below 10 nanograms per gram (ng/g) of food. The lone outlier was cinnamon. All samples exceeded 150 ng/g — and two Indonesian samples topped 36,000 ng/g.

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Med-student tally: Who's Number 1?

White men scored higher than white women on a standardized test for U.S. medical students. In fact, this group outscored all other groups, no matter what their sex or ethnic background, says a new study.

The National Board of Medical Examiners Part I is a multiple-choice test of basic science subjects that is generally given to students after their second year of medical school. Beth Dawson of the Southern Illinois University School of Medicine in Springfield and her colleagues looked at different racial and ethnic groups taking the exam in 1986, 1987, or 1988.

The analysis found "substantial differences in performance"; white students scored higher than Asians and Pacific Islanders, Hispanics, and blacks. Within each group, men racked up better marks than women. The authors describe their results in the Sept. 7 *JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION*.

On average, Asian students had scores 15 to 20 points lower than white students. Hispanics scored 60 points lower than white students, and blacks' scores were 100 to 120 points lower. The study found that prior academic performance explained much of the observed differences between ethnic groups; however, it did not account for the gap between male and female students' scores on this test.

"The results are not surprising," comments Robert A. Schaeffer of FairTest, a Cambridge, Mass., research and advocacy group. Standardized multiple-choice tests often measure the speed at which an individual can make an educated guess, he says. For some reason, white males seem to excel at this ability, Schaeffer says.

Do white men make better doctors than any other group? Dawson and Schaeffer caution against that interpretation of the study's findings. High marks on a test often don't match a person's performance on a job, Schaeffer says. And the Part I exam isn't designed to measure the clinical skills required to care for patients. It may be that women and minorities will excel at Parts II and III of the test, which do look at patient skills, Dawson points out.

Schaeffer believes medical schools should move away from multiple-choice exams. He thinks schools should evaluate a student's actual performance.

Questions? NIEHS will get answers

What is the human toxicity of styrene? Who can provide expert testimony on the risks associated with mercury emissions from power plants and municipal incinerators? How can I find out if my faucet is leaching lead into my drinking water?

Beginning next month, anyone in the United States and Puerto Rico seeking information on these and other environmental health issues can call 1-800-NIEHS94 (643-4794) weekdays for answers or help in tracking down the best available data.

This toll-free hotline is a new service of the National Institute of Environmental Health Sciences in Research Triangle Park, N.C. The goal is to answer inquiries within 2 working days, says Finis Cavender, overseer of the answer line's development. However, he points out, on fast-breaking issues — such as the hamburger-*E. coli* scare that erupted last year — callers may have to be a little more patient.

Those who can't tap into the hotline during scheduled hours can fax queries anytime to 1-919-361-9408. What about people who prefer to let their fingers do the talking? By next spring, Cavender says, they should be able to send requests via a home computer. And those who live outside the hotline's calling range (in Russia, Pakistan, or Chile, for instance) — or who simply prefer the written word — can mail questions to EnviroHealth, 100 Capitola Dr., Suite 108, Durham, N.C. 27713.

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