

Architectural engineer Jeffrey Siegel stands in the indoor air quality testing chamber, holding an instrument that tests both carbon dioxide and carbon monoxide levels, as well as air temperature and relative humidity. His study found that not only do ion-generating air cleaners not clean the air all that well, they also emit ozone, a highly reactive molecule that irritates the lungs and can produce other harmful substances. He also found that a HEPA filter-based device worked an average of 10 times better than the ion generators at removing pollutant particles — without producing any ozone.

ENGINEERING

UT study: Ion-generating air cleaners don't work

DEVICES THAT MAKE PARTICLES electrically charged to remove them from circulating air don't do much good and can generate substantial amounts of ozone, according to a study of five commercially available air cleaners tested by a University of Texas architectural engineer.

"We should be careful about what we are willing to call an air cleaner," says Jeffrey Siegel. "If it's not that effective, and it creates chemicals that are harmful to people without removing them, then the technology in the devices needs improving."

Siegel presented the research findings at the 10th International Conference on Indoor Air Quality and Climate held Sept. 4-9 in Beijing, China. The findings are the most comprehensive review of this type of air-purification device to date and were peer-reviewed before pub-

lication in papers that form the proceedings of the meeting.

The air-purification devices he studied are a small, but growing, part of the portable-air-cleaning industry that makes about \$500 million in sales annually. Siegel's review of industry trends suggests at least 1 percent of American homes have ion generators. These devices propose to take advantage of the fact that particles of opposite charges attach to each other in the same way that magnets of opposite polarity attract.

In ion generators, a particle in the air that has picked up a negative or positive charge (become ionized) will become attached to metal plates in the ion generator that carry the opposite charge. But the high-voltage wire used to ionize air particles also converts oxygen in the air into ozone, a highly reactive molecule that irritates the lungs and can pro-

duce other harmful byproducts.

The five air cleaners Siegel tested in stainless steel rooms in his laboratory emitted an average of 2.9 milligrams of ozone per hour. When used in a typical home, this translates to what would be an increase in outdoor ozone concentrations of between 4 and 20 parts per billion.

The results alarmed Siegel because a 2004 study suggested exposure to an increase in outdoor ozone of 10 parts per billion was associated with an increased risk of death the following week of 0.5 percent.

"There's substantial evidence that ground-level ozone is a bad thing," Siegel says, "so why would you want to bring something that generates ozone into your home?"

A High Efficiency Particulate Air (HEPA) filter-based device worked an average of 10 times better than the ion generators at removing pollutant particles in a separate test — without producing any ozone.

In part, the HEPA filter tested alongside the others won because it could

handle a larger volume of air in the first place. A device that takes in more of a room's air can remove more contaminants. The midrange HEPA filter device Siegel evaluated in a separate test for air flow could handle 377 cubic feet of air per minute. The best ion generator tested the same way topped out at 44 cubic feet per minute.

A typical house receives at least 100 cubic feet of fresh air from outside every minute. An air-cleaning device needs to have a flow rate that can handle more than that volume to effectively remove airborne particles.

"You could have the best air cleaner in the world, but if it had a low flow rate, it wouldn't do any good because it's not moving the air," Siegel said.

As in similar studies done previously, the HEPA filter worked about five times better at removing particles than most of the ion generators.

Since Siegel's study was released, one leading manufacturer has updated its ion generators with ozone scrubbers, which are typically attached to photocopiers and other devices to soak up any ozone they produce. However, the one ion generator with an ozone scrubber Siegel's group tested still released 70 percent as much ozone as an identical unit without a scrubber. Siegel also says he hoped manufacturers make other advances based on future scientific findings.

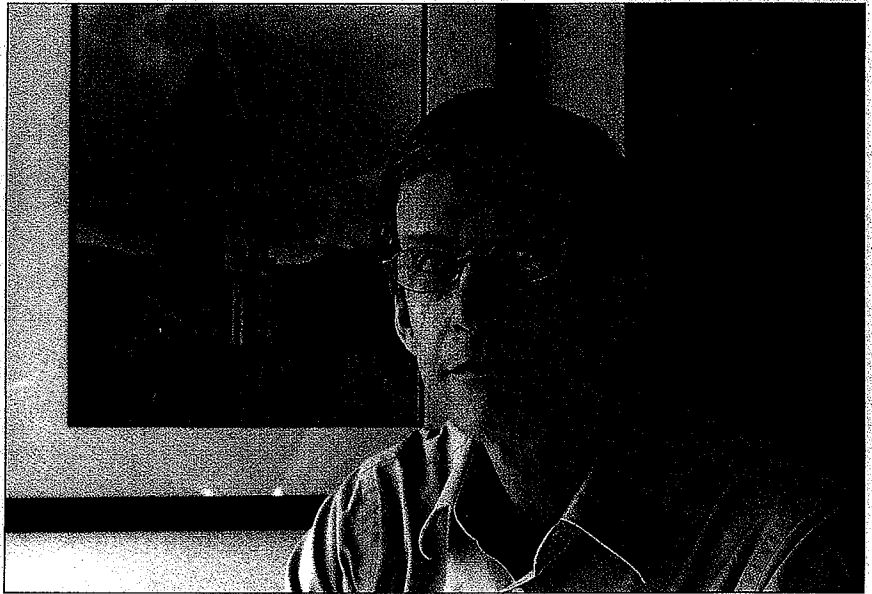
"The manufacturing industry has a very active and important role in helping consumers find ways to clean up indoor air," Siegel says, "and I definitely want to encourage their innovation in developing better technologies and standards."

Siegel's research is partly supported through the International Society of Exposure Analysis with funding from the American Chemistry Council. —
Barbra Rodriguez

LIBERAL ARTS

Faculty receive millions to fund varied research

Several researchers within the College of Liberal Arts have received substantial grants to conduct multi-year studies in a broad range of topics including ecological preservation, contraception, and gender in education.



Joseph Potter, a sociology professor and affiliate of the University's Population Research Center, will lead a \$2.2 million, five-year study of oral contraceptive (OC) use among Latino women, funded by the National Institute of Child Health and Human Development. Potter's research will focus on low-income Mexican immigrant and Mexican-American women living on the U.S. side of the U.S.-Mexico border, as well as low-income Mexican women on the Mexican side of the border.

"Our research will answer important questions regarding the appropriate role of medical supervision in OC provision and the factors influencing compliance and continuation," says Potter. "Additionally, it will add substantially to the slim literature on the increasingly important area of Hispanic fertility and contraceptive practice."

Researchers will conduct interviews and track effective use of OCs among one group of women obtaining prescriptions for pills at U.S. health clinics and another group purchasing OCs over the counter in Mexico. Subjects will be interviewed to assess whether their baseline decisions about an OC procurement source are associated with satisfaction, compliance, continuation, and unintended pregnancy. The results of the study will have implications for broad policy issues regarding the availability of all types of contraceptives, including "emergency contraception," for women in the United States.