Smoke toxicity debate rekindled

The vast majority of the 8,000 fire fatalities in the United States each year are due not to burns, but rather to the inhalation of smoke. Carbon monoxide (CO), a combustion product of wood and most other materials, long has been considered the primary toxic threat in such smoke. In recent years, however, fire safety officials and industry representatives have intensely debated whether the increased use of plastic and other synthetic building materials — which emit hydrogen cyanide and many other toxic gases in addition to CO when burning — heighten the danger of fires.

Now, a recently released report on combustion toxicity — prepared for New York state by Arthur D. Little, Inc., a consulting firm in Cambridge, Mass. — is expected to spur the next round in this heated debate. The report states that technology exists to identify toxic gases emitted when building and furnishing materials burn and recommends that the state adopt regulations requiring manufacturers to submit such combustion toxicity data to a designated agency. The report is particularly noteworthy in that it follows on the heels of a National Institute of Building Sciences report that reached the opposite conclusion — specifically, that available tests for combustion product toxicity are inadequate and therefore should not yet be incorporated into codes or regulations. Fire safety officials charged that the Washington, D.C.-based NIBS — which released its report in preliminary form last summer and in final form last month — was pressured by plastics industry representatives into reaching that conclusion (SN: 8/7/82, p. 86).

It was a string of highly publicized hotel fires — in the last few years — that brought burning plastics under close scrutiny. In the wake of those fires, NIBS, which was created by Congress in 1974 to organize and improve the heterogeneous network of U.S. building codes, was asked to examine whether combustion toxicity tests could be incorporated into building codes. And, at about the same time, the New York legislature contracted Arthur D. Little to evaluate the various published methods for testing combustion product toxicity and to determine whether they could be incorporated into any type of regulation.

The Arthur D. Little study, conducted by Rosalind C. Anderson and colleagues, concluded that the most useful test is one developed by Yves Alarie and Anderson when she was at the University of Pittsburgh. (Anderson told SCIENCE NEWS that she saw no conflict of interest in recommending a test that she helped design. Anderson said she also helped develop another combustion toxicity test that was rejected in the Arthur D. Little study.) In the Pittsburgh test, mice are placed in special chambers where they are exposed to smoke from burning test materials. The test is designed to indicate an LC_{50} — the weight of a test sample that is lethal to 50 percent of exposed animals. Using the Pittsburgh test, the LC_{50} of Douglas fir, for example, is 31 grams, while that of polytetrafluoroethylene (Teflon)-coated wire is 3 grams.

Anderson and colleagues recommend that manufacturers submit such LC_{50} data to a state agency, where they would be accessible to architects, engineers and the general public.

Not surprisingly, the Arthur D. Little study has met with mixed reviews. Gordon Vickery of the Foundation for Fire Safety in Seattle, Wash., says Anderson and associates "are to be complimented." G. R. Munger, president of the Society of Plastics Industry, on the other hand, says that because the Pittsburgh test does not take into account several fire safety factors such as resistance to ignition, flame spreadability and extinguishability, it could give negative marks to materials that have good overall fire safety qualities.

The New York state legislature now must decide whether to adopt laws to implement the recommendations of the Arthur D. Little study. The study also could play a role in four other state legislatures considering similar laws and in congressional fire safety hearings scheduled for July. —*L. Garmon*

Scanning the receptors in human brains

Keener observation of living brain chemistry from outside the skull is becoming possible. Scientists now report a method to visualize in the human brain, by a non-invasive means, receptors implicated in a variety of neuropsychiatric disorders, including Parkinson's disease.

For several years positron emission tomography (PET) has been used to measure energy consumption, and therefore general activity, of nerve cells (SN: 1/31/81, p. 76). In the technique, a scanning device detects within the body specially prepared chemicals, injected or inhaled, containing radioactive atoms that emit positrons.

The new work, tested on one human volunteer, employs a radioactive derivative of an antipsychotic drug. This chemical binds to receptors for a nerve signal chemical, dopamine, in the brain. Michael Kuhar of Johns Hopkins Medical Institutions in Baltimore says the newfound ability to label receptors is "an important turning point,"enabling scientists to determine more specific characteristics of intact cells.

At a conference this week at the National Institutes of Health in Bethesda, Md., Kuhar and Henry Wagner reported that the drug derivative called ^{11}C-*N*-methyl spiperone concentrated in those areas of the human subject's brain known to contain nerve endings that release dopamine. These areas are the caudate and putamen of the basal ganglia.

In earlier experiments with baboons, Kuhar and colleagues also observed preferential accumulation of spiperone in the basal ganglia and demonstrated that the accumulation resulted from specific binding to receptors. This binding, as measured, reflects both the number of receptors and their affinity for the radioactive material. Kuhar and colleagues plan soon to examine with PET the receptors of patients with Parkinson's disease, who are thought to have a deficit in dopamine receptors.

At the NIH meeting, Arnold M. Friedman of the University of Chicago and Michael Welch of Washington University School of Medicine in St. Louis also reported animal experiments showing specific binding of spiperone derivatives to brain areas containing dopamine receptors. "We are just about to put it into a human," Welch says.

Dopamine receptors are not the only brain sites being targeted with the PET technique. J. James Frost of Johns Hopkins is attempting to use the method to study the sites that bind opiate-like substances. He and colleagues have made positron-emitting analogs of two substances, called diprenorphine and lofentanil, that bind to opiate receptors. Frost says, "We will soon carry out *in vivo* experiments in baboons and humans." —*J. A. Miller*

Study links coffee to high cholesterol

A new study reports that heavy coffee drinking increases serum cholesterol and may provide a link between coffee consumption and increased risk of heart disease. Researchers Dag S. Thelle, Egil Arnesen and Olav H. Førde of the University of Tromsø in Norway examined the relationship between coffee consumption and levels of serum cholesterol, high density lipoprotein cholesterol and triglycerides in more than 14,500 men and women. After subtracting for the effects of other factors that might cause high cholesterol, such as age, weight, amount of exercise, smoking and alcohol consumption, the researchers revealed an "unexpected finding" — the more coffee the subjects drank, the higher their serum cholesterol levels, the researchers report in the June 16 NEW ENGLAND JOURNAL OF MEDICINE.

For those who drank one to four cups per day, serum cholesterol was more than 5 percent higher than for non-coffee drinkers. And "heavy" drinkers, subjects drinking nine or more cups per day, had serum cholesterol levels 11 percent or more higher than non-coffee drinkers. The