Media Reviews

Air Pollution and Health. By R. E. Hester and R. M. Harrison, Eds., Royal Society of Chemistry, Cambridge, U.K., 1998. 129 pp, 246 × 189 mm, Price £22.50, ISBN 0-85404-245-8.

The problem of air pollution is not new, but in recent years the quality of the air we breathe and the risks of possible adverse health effects from "polluted air" have been drawing increasing public attention. *Air Pollution and Health* is a comprehensive review of the nature of air pollutants considered to be hazardous to human health, and the manner by which acceptable levels for these pollutants may be determined. The book consists of six papers by different authors; each paper deals with a particular area of air pollution ranging from the mechanism by which PM10 particles (those less than 10 microns in diameter) may lead to heart attacks to the process by which the U.S. Environmental Protection Agency (EPA) arrives at ambient air quality standards. The style used throughout the book is such that anyone with a general scientific background may easily follow the arguments presented.

The first of the six papers is written by J. G. Ayres. The paper begins by giving a break down of the health effects caused by the major gaseous air pollutants, namely NO_2, CO, SO_2, and O_3. The types of studies that can be conducted to assess a possible health effect, and the information that each type of study may yield, are discussed. The author then goes on to consider which studies have been conducted for the various pollutants and the conclusions that can be drawn from these studies.

The following paper, by K. Donaldson and W. MacNee, deals with a particular group of air pollutants currently attracting much interest, namely PM10 pollutants. The adverse health effects of these pollutants are not related to the exact chemical composition of the pollutants but rather to the specific size of the particles. The way in which PM10 pollutants can eventually lead to heart attacks or strokes is discussed, along with the unnerving finding that there is no safe threshold level for PM10 pollutants, i.e., there is no level that has not been found to result in an adverse health effect.

The paper by J. Larsen and P. Larsen concerns various chemical carcinogens found in the atmosphere: benzene, 1,3-butadiene, formaldehyde, and polynuclear aromatic hydrocarbons. The paper deals with each species in turn, assessing the sources of the chemicals in the atmosphere and the mechanism by which each chemical may lead to an increased cancer risk, not forgetting the fact that the most significant risk is still posed by cigarette smoking.

Once a substance has been found to cause a significant adverse health effect, it is necessary to determine a maximum allowable concentration of the species in ambient air. The way in which acceptable levels of potentially dangerous species in atmospheric air are set is the question addressed by R. Harrison. The author describes the various stages involved in deciding upon emissions standards. The way in which exposure–response relationships are understood and what is considered an acceptable level of effect on the population in general are discussed. The author points out that any sensible air quality standard must give both the concentration limit for the pollutant and the averaging time over which this level is allowed; though high concentrations of *irritant* species tend to give acute effects over short time scales and little or no effects at low levels persisting over long periods of time, the opposite is often true for *carcinogens*.

The paper by M. Lippmann deals with the current EPA standards for particulate matter and O_3; it begins by showing the previous and the 1997 revisions of the U.S. Ambient Air Quality Standards (NAAQS). The method by which these standards are determined is briefly mentioned, with the interesting point that although the EPA must investigate the cost that any standard it sets will incur on society, it is not required to take this cost into consideration when setting the standards. Detailed explanations are given for the levels which have been set as, although it may be generally suspected that much tighter regulations are required to protect members of the public, without more experimental evidence insufficient grounds exist to impose more stringent regulations.

The final paper, by P. T. C. Harrison, deals with the particular case of indoor pollutants, for, as the author points out, many of us spend more than 90% of our time indoors. The sources and levels of NO_2, CO, PM10, and formaldehyde in indoor air are discussed along with more specific indoor problems, namely fungi, bacteria, and house dust mites.

The main focus of the book is on the health effects of caused by the pollutants, rather than on the sources and atmospheric chemistry that ultimately govern the ambient concentrations of the pollutants in the atmosphere. The copious statistics and experimental results given in the book, however, ensure that it will be an important reference for anyone interested in air pollution. Although no section of the book deals with how, in real life, the levels of pollutants, especially levels of secondary pollutant such as O_3, may be reduced, the section that covers the logistics of imposing air quality standards makes an extremely interesting starting point.

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