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Book Reviews

Introduction to Chemical Exposure and Risk Assessment, by W. Brock Neely, CRC Press, Boca Raton, FL, 190 pp., 1994, US$ 49.95, ISBN 1-56670-094-9

This book was written to provide an introduction to the principles involved in assessing the risks from chemical exposure. By highlighting less understood aspects of chemical work, it has succeeded well in the objective. The author, who has devoted most of his life to teaching at major universities, has encouraged his students to make their own assessments of risk, and the procedures.

The idea of Risk Perception as a useful element in evaluation of chemicals is the theme of Chapter 1, while Statistics (often understood) are treated well in Chapter 2. Mammalian Toxicology follows in the real world of Chapter 3, where the dose/effect and various types of exposure are explained. He notes that drawing a line between beneficial and harmful is not always possible; that recognizing degrees of harm and safety is more acceptable. Cancer and Carcinogenic Chemicals is the subject of Chapter 4, which explains in some detail why fear of carcinogenic action by substances or exposures is a major source of concern, since chemicals are not just the known and classified items, but real-world substances which cannot be avoided completely. Since the atmosphere is the source of minute-by-minute life, the discussion in The Atmosphere (Chapter 5) gives an excellent overview of gases so vital to life. In a similar way, Chapter 6 deals with Water, the second major component that becomes a receptable for synthetic chemicals and is a unique chemical. Frequently overlooked aspects, such as average residence time and the global water balance and a realistic economically possible answer to "How Clean is Clean?" have been long debated. Having recognized the potentials of chemicals in improper places and circumstances, Chapter 7 discusses Exposure Assessment. Monitoring, by taking samples and analytical actions, or by mathematical models, are the two approaches which are most frequently used and both have their limitations in time and cost. Chapter 8, Risk Benefits Analysis are often matters of deep concern. To illustrate the complexities of evaluations, Chapter 9, Case Studies deals with four specific widely-discussed "real-world" chemicals, about which years of study and monitoring as well as regulations were required. These four chemicals are: Dioxin, the widely discussed decontaminate in Agent Orange and used as a defoliant; Radon, a radioactive gas which decays by depositing quickly in the lungs several daughter products which are very reactive (radon evolves from rocks, recognized first in mines, but later in other locations, and buildings including homes); Ozone, both a commercial chemical and an essential gas in the stratosphere where its reactions with CFCs are under serious study; and also

Alar, or daminozine, a farm aid to apple growers which attracted major concern when it was widely publicized. Appendix I discusses Statistics; Appendix II, Mathematics, discusses exponential curves. Four pages of general references follow.

The book has very real value, especially for students who seek a more complete understanding of how chemicals can be properly studied. The accuracy and implications of some statements are questioned. In chemical hazard evaluations, more than one reference source should be cited and used. However, the book is recommended by this reviewer.

H.H. FAWCETT

Low-Level Environmental Radioactivity: Sources and Evaluation, by Richard Tykva and Josef Sabol, Technomic Publishing Co., Inc., Lancaster, PA, 1995, $58.00, 331 pp., ISBN: 1-56676-189-1

One of the major health concerns in certain areas of the United States is exposure to radon. Exposure to that chemical as well as to other naturally occurring radionuclides is by far the largest contributor of the radiation dose received by the human body. Of the 2500 radionuclides known, 80 are found in nature.

Radon comes in for further discussion early in the text, thus illustrating its importance:

"Radon is known to enter the atmosphere mainly by crossing the soil–air interface. There are a number of other secondary sources, such as the ocean, groundwater, natural gas, geothermal fluids, and coal combustion, however, which have also to be taken into considerations. The *outdoor radon concentrations* at ground level are usually governed by the source term, i.e., the exhalation rate, and by atmospheric dilution processes. Both of these factors are affected by the local meteorological conditions, which are also to a large extent responsible for the degree of radioactive equilibrium between radon and its daughters."

A second major source of naturally occurring radiation is cosmic rays

"*Cosmic rays* generate a range of stable nuclides and radionuclides in the atmosphere, biosphere, and lithosphere by a variety of nuclear reactions. In these processes a dominant role is played by high-energy *primary cosmic rays*, although even the secondary particles released in their interactions are still very effective in the creation of *cosmogenic nuclides.*

A third source of radionuclides is man-made.

"The utilization of nuclear energy for the generation of electricity, the applications of radionuclides in industry, technology, science, medicine, and consumer products as well as the tests of nuclear weapons result in the release of various radioactive materials into the environment. Assessment of the actual or potential radiological consequences of such releases of radionuclides into air and water, or their disposal in the ground, is a complex procedure."

"The purpose of this book is to provide an introduction to low-level radioactivity assessment and to clarify the nature of its sources, as well as the principal methods