threshold models of dose and response are covered with illustrations from every day life. For example, the risk of highway accident per mile travelled as a function of travel speed is a convex relationship. Whereas, the driver's total number of accidents will grow at a decreasing rate with the miles, indicating a concave relationship, a learning curve. A threshold model is applicable wherein response starts only after a particular level of dose is received. The risk is also quantified as one in a million. Living for two days in New York or Boston increases the risk of death due to air pollution by one in a million. The authors also consider optimum risk levels.

Models are simplified descriptions of how things work in the world. The authors have considered stock-flow as well as cause–effect models and illustrated the same by considering various examples such as indoor radon exposure. The authors further review statistics and Monte Carlo methods and Bayesian statistics. They have used it extensively in the treatment of subject matter. There are two approaches to study the human response to toxic and carcinogenic substances. In one approach, namely toxicology, animals are exposed in the laboratory to controlled doses of these substances and their responses are studied and then extrapolated to human beings. In the other approach of epidemiology, responses to doses are considered in the real world. In the real world, doses may be received constantly or sporadically. Moreover, there may be exposure to multiple toxins. The routes of exposure may be through inhalation, ingestion or through the skin. This makes risk modelling a challenging subject. People are scared of cancer to such an extent that they would like to know about the carcinogenicity of whatever substance they come across and toxicologists are expected to provide the answer by experimentation on a limited number of animals and extrapolation of these results by modelling and using statistical tools. Epidemiologists are also expected to provide the answer by studying the human subjects actually exposed. The relation between cigarette smoking and cancer is studied extensively and risk values established. Humans and animals are exposed to a variety of harmful substances directly, and infants are exposed indirectly through breast milk and adults through eating meat and beef of exposed animals. The authors have studied this aspect in detail by Monte Carlo techniques.

The technological developments have brought with them new risks. Economics demand larger sized chemical and power plants. The failure in containing the large mass of toxic substances is catastrophic. Similarly the large passenger aircrafts are subjected to failures. The efforts are always to minimize the risk. Event trees and fault trees are used to identify the critical factors and common causes towards this. The risk in technology is minimized by engineering quality, reliability, maintainability and testability into the systems. The parts going into the systems are thoroughly tested and qualified for the environment these are expected to face in their life.

Making decisions based on perceived risks is an important activity at personal as well as societal and governmental levels. The problems of global warming, accidents, etc. necessitate legislations. Risk analysis forms a very important tool and guides us towards taking calculated risk in our lives.

The authors have done an excellent job of treating the dry subject of risk analysis by providing the solutions and methodology of solutions to a number of problems one faces in daily life. Daniel Kammen taught the subject at Princeton University for four years. The book is the result of extensive interactions he had with the students and is an excellent textbook. Moreover, study of the book will definitely enable common people to answer the question 'Should we risk it?' in an intelligent way.

Realizing that the subject of risk is not static the authors did not stop at writing the book. They created a website: http://socrates.berkeley.edu/~dkammen/swri, where additional information on the problems, alternate solutions, and new unsolved problems can be found. Moreover, one can interact with the authors in a constructive way. I did visit the site and found it interesting.

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Introduction to Atmospheric Chemistry. Daniel J. Jacob. Princeton University Press, 41, William Street, Princeton, NJ 08540, USA. 1999. 266 pp. Price: US $ 39.50.

Introduction to Atmospheric Chemistry is an excellent textbook on a subject that should be introduced in the curriculum of B Sc/M Sc in chemistry and related sciences everywhere. The author's experience in teaching such a course in Harvard for seven years is evident in every page of the book. This book is remarkably free of typographical errors and the reviewer found just one on page 20, where instead of 'possibly' the print reads 'possible'.

Atmospheric chemistry is an important branch of science that affects not only our day to day life but also the evolution of life on earth over the geological time scale. It is a very practical science and numbers are absolutely important. Both in the text and the meticulously chosen problem sets, the reader is given a wonderful opportunity to calculate and comprehend the numbers. The book starts with a chapter defining measures of atmospheric composition, followed by atmospheric pressure. By then, the reader can deduce the mass of the atmosphere (5.2×10^{18} kg) and the amount of CO_2 added during the years since the beginning of industrial age (180 billion tons). Also, through the problem set, he/she has an opportunity to calculate the thickness (or should I say, thinness) of the all-important ozone layer that protects us from the harmful ultraviolet rays from the sun. The author's emphasis on problem solving is evident from the fact that 63 out of the 260 printed pages have been devoted to problems. The problems have been chosen from recent literature work, often with direct reference to the source. Through these problems most of the current issues such as the effect of Montreal protocol, polar stratospheric cloud formation, true acidity of rain, residence times of aerosols and helium in the atmosphere and oxidizing power of the atmosphere have been adequately dealt with.

In a review on atmospheric ozone[1], H. S. Johnston made a couple of observations that I was reminded of when reading this book. The first was about how the biospheric nitrogen cycle affects the global ozone balance. Johnston felt it should be part of all college biology text-books. I am glad to see a chapter on geochemical cycles in this book and the author refers the reader to this chapter when discussing the ozone loss by nitrogen oxide radicals in chapter 10. There are thirteen chapters in the book, all of which have been carefully chosen and written. The chapters on simple models, atmospheric transport, continuity equation and aerosols will be very useful to those with a general chemistry background to understand the intricacies of atmospheric chemistry.

Another observation made by Johnston[1] in his review was about how the history of global ozone balance gives an excellent example of the scientific method: observation, postulate, test of postulate, etc. As the author points out in the preface, atmospheric chemistry is very much an observational science. The issues involved, such as acid rain, ozone depletion by commercial products such as halons and freons, smog formation by pollutants, etc. have large social, business and political implications. A scientist should avoid sensationalism and report the observation and postulates and the results of the tests of postulates. The chapter on greenhouse effect is a very good example of writing science. Figure 7.2 adapted from another source[2], shows the effect of global warming by greenhouse gases with the surface temperature increasing by 0.6 K in the last 150 years. It also shows how the surface temperature has been fluctuating by almost 6 K over the past 150,000 years. The author concludes by saying that 'our best understanding from climate models is that the warming is in fact due to increase in greenhouse gases'.

Atmospheric chemistry is an active field of research and it is likely to continue in that way. While the book discusses the Antarctic ozone hole, there are recent reports on Arctic ozone loss as well[3]. Also, a group of scientists has discovered that a new molecule identified in the atmosphere, SF_5-CF_3, may be the most potent greenhouse gas, though its concentrations are still very small[4]. There are several good books, monographs and treatise available on atmospheric chemistry (for example refs 5–7). However, the book under review really fills a void that exists in the literature: a suitable textbook on atmospheric chemistry.

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The Earth in Turmoil: Earthquakes, Volcanoes, and their Impact on Humankind. Kerry Sieh and Simon LeVay. W.H. Freeman, New York, USA. ISBN 0-7167-3151-7. 1998. 324 pp. $ 24.95.

Although most earth-processes have impact on the evolution and survival of the human race, these are rarely illustrated in ways that can be appreciated by layman. There may be excellent illustrations of these processes in the visual media, but when it comes to books, most of them are too technical that even an inquisitive reader may be unwilling to take a plunge. Of late, there have been some changes in this approach, resulting in a few off-beat books that are enjoyable to both technical as well as non-technical readers.

The book under review belongs to the latter class of books, that treats science with the kind of sensitivity that might impress even the most dispassionate reader. The sensitivity is so absorbing that an attentive reader can almost feel the pulse of the earth as he reads through this book. In the process, he may also learn to comprehend the varying moods of the earth and the inevitability of its outbursts. This book deals with two of the most awesome and devastating natural processes – earthquakes and volcanic eruptions – based on examples from the United States.

A major part of this book is devoted to a virtual field trip across the United States, visiting sites of some devastating earthquakes and volcanic eruptions during the last century. Portraying the impact of earthquakes and volcanoes on America's landscape and its inhabitants, the journey starts from the Pacific Northwest, takes us through California to the Mississippi Valley, the Atlantic coast and finally, to Hawaii. The sites are carefully chosen, to explain varied tectonic processes at work in the plate boundaries, far from them and in the heart of volcanoes. Earthquake mechanisms at converging boundaries, subduction zones and along sliding plates are also illustrated at these sites. At the Cascadia subduction zone, we learn about how a decade of research has dug up giant, unknown earthquakes from the past. Travelling further south, we visit the San Andreas fault, which has given us a wealth of information on earthquakes and remains the basis for many fundamental theories on their origin and recurrence. Three chapters of this book are devoted to this structure. Relatively less understood inland processes are explained at New Madrid and Charleston, both of which have experienced devastating earthquakes during the 19th century. During this cross-country trip, we also get to see snapshots of spectacular landforms caused by earthquakes and learn about their evolutionary secrets.

This book is a careful blend of scientific expositions, interesting anecdotes and eyewitness accounts. Accounts of people who have been through these disasters portray their human side – some of them very moving. The image of the California highway patrol officer who drove off to death on the collapsed highway during the 1994 Northridge earthquake leaves an unsettling image of urban devastation (this picture of the highway is on the cover of the book). The experience of the two geologists who flew out of the erupting Mt. St. Helens (and out of death), in a matter of microseconds is a gripping account of human encounters with the forces of nature. An earthquake can save lives too – like that of the elk that