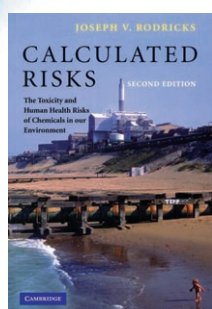




## Calculated Risks



The Toxicity and Human Health Risk of Chemicals in our Environment. 2nd ed. Edited by Joseph V. Rodricks. Cambridge University Press, Cambridge 2007. 339 pp., softcover £ 22.99.—ISBN 0 517-78878-1

This interesting and most valuable book focuses on the conditions, requirements, and procedures of risk assessment and its consequences, and provides clear information for the risk manager. It explains the scientific reasons for concerns about chemicals, the strengths and weaknesses of the scientific approach to risk management, and the interplay between science and public policy. A reader who is already familiar with the first edition of the book will obtain a better and deeper insight into risk assessment and its role in risk management.

The author addresses and describes the two major tasks of the risk assessment process: exposure assessment and hazard identification, including the search for appropriate data to describe the mode of action, dose response, identification of the NOAEL (No Observed Adverse Effect Level), and, in cases of no-threshold compounds, the procedures for extrapolating from the risks identified at high doses in animals to the much lower doses in the exposed human population.

About one-third of the book is dedicated to carcinogens. This includes

some historical information, cancer statistics, and human cancer incidences based on the Doll and Peto table (1981), which indicates that the main avoidable human causes of cancer are: tobacco and diet (65 %), occupational exposure (4 %), and industrial products (less than 1 %). The carcinogenic mechanisms are described, including the multistage theory, the role of electrophiles and genotoxicity in the initiation process, and the role of “promoters” as agents that accelerate the process of tumor development. The author gives information about the tools for identifying carcinogens—epidemiology and animal studies—and discusses the increasing uncertainties that arise when moderate and small risks are reported by epidemiologists, with particular attention to the many difficulties that affect the outcome of epidemiology, the high tumor incidence in the general population, and the annual death rates associated with some activities and exposures. The discussion of the Bradford Hill criteria that define factors to judge causality is especially important. Details of the other tool, the laboratory studies, are given, including the scope of the studies and sample sizes, dose response, MTD (Maximum Tolerated Dose), and the role of predictive tests. The reliability of predictions based on laboratory studies is discussed, including the relevance of high dose effects. The central part, “Risk Assessment”, addresses four aspects: I. Concepts and Principles, II. Applications, III. New Approaches and New Problems, and IV. The Courtroom.

In Part I, the requirements and different stages of risk assessment are described, starting with data from research and testing, such as epidemiology, clinical and toxicology studies, environmental and human exposure, then moving on to hazard identification and exposure assessment, leading to the compilation of this information for risk assessment, which then is forwarded to the risk manager.

Part II describes in detail the data requirements, the steps of risk assessment for substances acting through threshold mechanisms, preferably using the NOAEL of the most sensitive target as the starting point. For carcinogens, the common no-threshold models and

their consequences for low-dose extrapolation are described. It is stressed, however, that the estimated effects and the exposed individuals are hypothetical, not actual. Since the risk assessment process is based not only on scientific data, but also on various sets of assumptions and extrapolation models, a considerable degree of uncertainty about the outcome is inherent and needs to be specified. However, to postpone risk-control measures until the hypothesized risk becomes real is unacceptable.

Part III describes recent attempts to improve the accuracy of risk assessment by including pharmacokinetic and pharmacodynamic data (more accurate terms would be toxicokinetic and toxicodynamic), as well as the use of uncertainty factors to fill data gaps. Hormesis, the not yet fully understood effects of endocrine-disrupting chemicals, the increasing relevance of nanotechnology, and the possible health threats of microbial pathogens are also addressed.

In IV, the author discusses the consequences of the right of individuals to bring lawsuits against parties whose actions are believed to have caused harm to them, with all the problems involved in proving causality. Arguments for and against causation come in numerous forms, and present a challenge to judges and juries. This becomes even more complicated because many toxicologists only accept epidemiological data as a proof for causality, and use animal data as supporting evidence. Regulators mostly rely on animal data, and operate on the assumption that such data are sufficiently predictive.

The aim of risk management is to evaluate whether the risk is excessive, what the control options are, and whether applicable legal standards and optimal solutions exist. Tables of annual risks of death associated with some activities and exposures, and of risks that increase the chance of death by 1 part in 1 million, exemplify the need for rational and objective risk management decisions. Moreover, it is stressed that risk assessment should not be confused with risk-benefit or risk-cost analysis. Risk assessment provides information about risks to public health, and can provide information as to what kind of

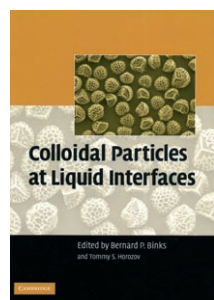
health benefits can be expected when specific actions are taken. Evaluations of the economic consequences of risk management options are separate activities and require specific experts.

Generally, those who have to apply the results of risk assessment will find that this book provides a wealth of information to improve their understanding. Those who are directly involved in the process will enjoy the interesting examples, and will appreciate the discussions of the difficulties and the comments of other colleagues about cases where their work is hampered by having insufficient data. However, the book would have been further improved by a discussion about the need for specific risk assessments for sensitive populations.

*Helmut Greim*  
Institut für Toxikologie und  
Umwelthygiene  
Technische Universität München  
Freising-Weihenstephan (Germany)

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## Colloidal Particles at Liquid Interfaces



Edited by *Bernard P. Binks* and  
*Tommy S. Horozov*.  
Cambridge University Press, Cambridge 2006. 503 pp.,  
hardcover  
£ 80.00.—ISBN  
0-521-84846-6

The behavior of colloidal particles at liquid interfaces is one of the classical subjects of colloid and interface science.

The first important studies on emulsions and foams date back to the beginning of the 20th century, and emulsions stabilized by particles—the so-called Pickering emulsions—were described as early as 1907.

In recent years this area of research has experienced a kind of renaissance, and many new studies on this classical subject have been published. This is certainly related to the advances in the control and design of colloidal particles with new properties. One example is the Pickering emulsions stabilized by thermoresponsive poly(*N*-isopropylacrylamide) microgels. These emulsions break down on heating and can form again when cooled down, which makes them interesting for extraction and separation techniques or for controlled release of active agents. Other interesting new stabilizers for Pickering emulsions are light-sensitive particles, and also the recently synthesized Janus particles.

The book edited by Binks and Horozov covers all subjects related to this rapidly evolving field, and contains chapters from authors who are experts in their respective areas. The first chapter, written by the editors, gives a good overview and contains a short, but nevertheless sufficient, introduction to the thermodynamics of particle adsorption at liquid interfaces. It also reviews most of the important early literature in the area. After this essentially introductory chapter, the book is divided into two main parts. The first deals with adsorption at flat interfaces and the second focuses on curved interfaces. In Chapter 3, Hidalgo Alvarez and co-authors give a more detailed theoretical description of the physics related to the field. Chapter 4 by Goedel gives a comprehensive overview about the use of interfacial self-assembly of colloidal particles for templating purposes, which is aimed at the preparation of mem-

branes with a well-defined pore-size distribution and a low incidence of defects. Personally, I very much like the chapter by Velikov and Velev (Chapter 7), which gives an enormous number of references on the very active topic of “New Materials Derived from Particles Assembled on Liquid Surfaces”. In addition to the chapters that one would expect in a book on particles at liquid interfaces, there are also some on topics that are rather exotic from the point of view of a colloid scientist, such as the chapter about metal foams (Chapter 11). However, this shows that the book really aims to embrace all aspects of the subject.

The collection of contributions presented here is certainly not a beginner's textbook for undergraduate or even first-year graduate students, since there are no chapters introducing the basics of the most commonly used experimental methods, and there is hardly any cross-referencing between the chapters. One has to rely on the index to find related points in the different contributions. It appears that most of the authors were not aware of the content of the other chapters. This weakness of the book with regard to its use as a standard textbook can, on the other hand, also be an advantage, since the chapters can be read independently as reviews of their specific areas.

I would not recommend the book for undergraduate students. However, for researchers already working in the area of colloidal particles at liquid interfaces, and also for those who want to enter this fascinating field, this book is a must.

*Thomas Hellweg*  
Physical Chemistry  
University of Bayreuth (Germany)