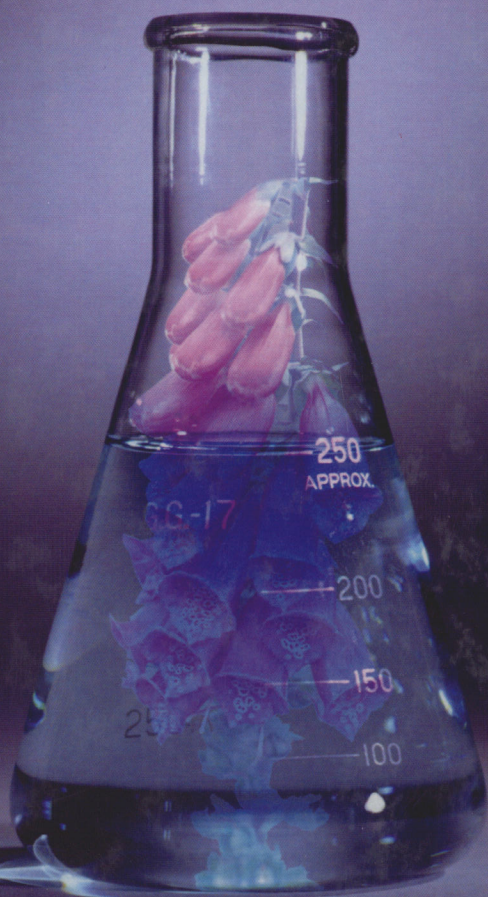


Fundamental **TOXICOLOGY**

Edited by John H Duffus and Howard G J Worth



RSC Publishing

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Fundamental Toxicology

Preface

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江苏工业学院图书馆
藏书章

RSC Publishing

ISBN 0-85404-614-3

A catalogue record for this book is available from the British Library

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Published by The Royal Society of Chemistry,
Thomas Graham House, Science Park, Milton Road,
Cambridge CB4 0WF, UK

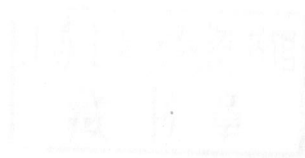
Registered Charity Number 207890

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Typeset by Macmillan India Ltd, Bangalore, India
Printed by Biddles Ltd, King's Lynn, Norfolk, UK

Fundamental Toxicology

Scientist Consultant
This book is our most recent and dangerous chemical and is part of our
series of books in our series and in our place of work
(H. G. W. The King's Mill Centre for Health Care Services
London, UK)





Frontispiece *Potentially toxic and dangerous chemicals are now part of our everyday life, both in our homes and in our places of work.*

(Photo: Courtesy of H.G.J. Worth, The King's Mill Centre for Health Care Services, Sutton-in-Ashfield)

Preface

When the first edition of *Fundamental Toxicology for Chemists* was published in 1996, we recognised the increasing awareness of safety and a growing consciousness of the need for safety standards. This had resulted in legislation concerned with safe practice in the work place, which was led by Europe and North America and other developed countries and which had spread to many other areas of the world.

In the United Kingdom the trend was spearheaded by the Health and Safety at Work Act in 1974, followed by legislation in 1978 concerned with safe practice of work in clinical laboratories and post mortem rooms, and then by regulations for the Control of Substances Hazardous to Health (COSHH). At the international level, the International Programme on Chemical Safety (IPCS), a joint activity of the World Health Organisation (WHO), the United Nations Environmental Programme (UNEP) and the International Labour Organisation (ILO) have published many valuable documents on chemical safety in conjunction with the Commission of the European Communities (CEC). This is merely one example of international collaboration. At present, the European Union is about to introduce a new regulatory framework in the form of the Registration Evaluation and Authorisation of Chemicals (REACH) proposals, which will cover all the constituent countries.

Much safety legislation and safe practice is concerned with the correct handling and use of chemicals. It is expected that chemists should be aware of the dangers of the chemicals that are used in their laboratories, and that there should be documentation and legislation to help this safety process. But the use of chemicals is not confined to the laboratory or the factory. Chemicals are used increasingly in domestic and non-technical environments, where their safe handling is no longer solely the concern of qualified chemists. For instance, consider the use of domestic cleaners, solvents and detergents, weed killers and pesticides and proprietary medicines. The question is asked, therefore, who is the person to whom the public might turn to seek help and advice in the safe handling of these chemicals? As like as not, the answer that comes back is, the chemist. It is not unreasonable that the chemist is seen as the person who can give help and advice on the handling of chemicals, on the toxic effects associated with them, and on how to deal with an incident if and when it occurs. However, the need is still not recognised in the curricula for the training of chemists, and indeed, apart from what they pick up indirectly during their educational progress, there is usually no formal training in toxicology. This makes the chemist very vulnerable as a result of being given new responsibilities without adequate training to handle them. Thus, this book was written originally with the chemist in mind.

The above was the situation when we edited the first edition of *Fundamental Toxicology for Chemists*, but things have moved on. Even my daughter (HGJW) who appears in the Frontispiece of both editions is no longer a little girl! Legislation has increased. It has become more detailed and more complex, and even more widespread across the world. The public are better informed about toxic effects and their rights in relation to any consequential adverse effects. The scientific understanding of toxicology has increased and so, hopefully, has the knowledge of non-toxicologists, but it is unlikely to have kept up with the advances in toxicology. Thus, it has become necessary to produce a second edition of this book, not just for chemists, but for all those scientists who work with chemicals and now have to take the responsibility for any harm that may arise from their use. We are gratified that the Royal Society of Chemistry (RSC) has invited us to do this, and that it is again carried out under the auspices of the International Union of Pure and Applied Chemistry (IUPAC).

Every chapter has been reviewed and updated. As a result many have undergone a major restructuring, and some have been rewritten. Four new chapters have been added namely, 'Introduction to Toxicogenomics', 'Pathways and Behaviour of Chemicals in the Environment', 'Toxicology in the Clinical Laboratory' and 'Pharmaceutical Toxicology'. These have made the text a far more comprehensive guide to current toxicology than it was. The appendices include a 'Curriculum of Fundamental Toxicology for Chemists' and a 'Glossary of Terms used in Toxicology'. These were both in the previous edition, but have been revised. The glossary of terms is based on two IUPAC publications: J.H. Duffus, Glossary for Chemists of Terms Used in Toxicology (IUPAC Recommendations, 1993), *Pure Appl. Chem.*, 1993, **65**, 2003–2122; M. Nordberg, J.H. Duffus and D.M. Templeton, Glossary of Terms Used in Toxicokinetics (IUPAC Recommendations, 2004), *Pure Appl. Chem.*, 2004, **76**, 1033–1082. In addition, we have added a further appendix of commonly used abbreviations. This includes terms that are familiar to toxicologists such as lifetime average daily dose (LADD), for example, but are not so familiar to other scientists. It also includes the names of international bodies and pieces of legislation that are commonly abbreviated and may appear in other textbooks without definition.

Chemistry has had a poor press in recent decades partly because the public has the misconception that manmade chemicals are inherently bad and therefore toxic, while naturally occurring substances are inherently good and healthy. Nothing of course is further from the truth as may be illustrated by a survey of the use of animal and plant extracts over the centuries. It is well known that Cleopatra committed suicide by the administration of snake venom. Roman ladies distilled belladonna, which means beautiful woman, and used it as eye drops to make their pupils dilate. Belladonna is extracted from the plant known as deadly nightshade. Lucrezia Borgia made use of an extract from *Nux vomica* whose active ingredient is strychnine. This is to say nothing of Shakespeare's characters who took or administered an impressive range of animal and plant toxins. Hopefully, the explanation of the science of toxicology in this book will go some way to redressing the balance and putting manmade and natural chemicals into a proper perspective as parts of a total group of substances, and even micro-organisms, which must be considered as a whole in order to ensure their safe use.

Again, we thank IUPAC for their support of this project. In particular, we thank the committee of Division VII, Chemistry and Human Health, and the Subcommittee on Toxicology and Risk Assessment, for their encouragement and assistance. Finally, our thanks go to our team of internationally recognised authors without whose expertise and effort this book could not have been published.

John H. Duffus
Howard G.J. Worth
(Editors)

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