engineers with an appropriate introduction to the fundamental information obtainable from modern experimental techniques. As implied in the title these goals are achieved by a discussion of both the fundamentals and practical applications within the three main sections of the book: *(I) Applied Technologies; (II) Fundamentals of Colloid–Polymer Interaction; and (III) Methods for Investigating Polymer Adsorption Studies*.

In Section I, important applications centre on solid–liquid separations in, for example, water treatment, paper making and mineral processing. Further discussion is presented of modifying the properties of suspensions in, for example, food and agricultural technologies, pharmaceuticals and paints.

The areas covered by Section II include an examination of the diffusion of a polymer to a surface, ranging from a simple Langmuir model to a more complex self-consistent mean-field theory for single or multiple species; aggregation of initially stable colloidal dispersions by addition of macromolecules using the bridging and depletion mechanisms; the theory of adsorption of polyelectrolytes to charged (planar or spherical) surfaces; and how small-angle neutron scattering may be applied in determining the volume fraction profiles of adsorbed polymers to surfaces.

The methods covered in the third section are wide and various, occupying seven of the 15 chapters of the book. All start with a suitable background followed by typical results and discussion, and as such are a very good introduction into the technique. The areas discussed are: NMR of surface polymers; radiochemical methods; atomic force microscopy; interferometric surface force measurements; scanning angle reflectometry; total internal reflectance fluorescence (TIRF); and the use of oscillating optical tweezers for direct measurements of colloidal forces.

Each chapter throughout the volume begins with a tutorial to inform the non-expert reader of the basics and current state of affairs in a particular subject area. In some chapters, the tutorial content could be used at a late undergraduate/early postgraduate level. For example, an early chapter gives a good discussion of DLVO theory, useful for polymer-free systems, which is then extended to include the effects of polymer addition to the system, by other authors in chapters later in the volume. Each article concludes with a good summary of its contents and very extensive referencing to provide the reader with a starting place for further study.

This book addresses the fundamental problem of how to obtain an accurate picture of the behaviour of polymer chains at interfaces. What are their configurations? It is only by obtaining such knowledge that the useful properties of colloid–polymer systems may be exploited; for example, will the system be stabilized or flocculate? It is only from a full understanding of this basic information that researchers, technologists and scientists can develop solutions both to their own individual problems and to industrial applications in the real world. This book aims to bridge the areas of theory and simulations, model systems and technology within one volume. This it achieves in an eminently satisfactory manner and should prove to be a valuable addition to any polymer or colloid chemist's library.

DEREK M. BLOOR
University of Salford, UK

Free Radicals and Iron: Chemistry, Biology and Medicine

M. C. R. Symons and J. M. C. Gutteridge
Oxford University Press, Oxford, 1998, xii + 242 pages. £65
ISBN 0-19-855892-9

In their preface to this book, whose publication is timely in view of the increasingly strident claims concerning the role of free radicals in illness and disease, the authors are admirably candid. They warn the reader that it represents the personal views of a chemist and a biochemist, that they will present different views of the subject, with minimal references, with a text kept as simple as possible, so that 'ferrophiles, scientists and medical workers' can select topics of interest with a view to consulting more specialized works; inevitably, they say, results are biased towards their own prejudices and published data. The reader who starts thus warned on the text will, I suspect, not be disappointed once the discontinuities in its rather colloquial style have been recognized and the obvious limitations acknowledged.

Following an introduction and dedication (to Fenton, of the eponymous reaction fame), Martyn Symons brings to bear his knowledge of ESR spectroscopy, radical behaviour and structure and bonding in O_2, H_2O_2, $HO^{\cdot}$ and O_2^{-} — as well as the fundamentals of aqueous iron chemistry; to accompany this section (Part I) are provided appendices concerning H. J. H. Fenton himself (a list of publications, the famous paper on Fe(II)/H_2O_2/tartaric acid), a brief review of ESR spectroscopy (including applications, radicals, spin-traps and iron chemistry) and a survey of reduction potentials. The whole approach is often idiosyncratic, in places there are distracting personal asides, and a number of errors and inconsistencies have crept in; the text is dense and most concepts will certainly need the further reading and study suggested. But an excitement and authority shows through and the mechanistic possibilities of the Fe(II)/H_2O_2 reaction are interestingly explored: $HO^{\cdot}$ and ferryl species are discussed at length.

In Part II, John Gutteridge is concerned with biological aspects of the 'Fenton reaction'. He starts with a review of the natural ligands for iron and shows how, in some cases (e.g. haem iron), reaction with lipid peroxides gives free radicals; with these and in other cases, iron must be released before reaction with H_2O_2 gives the potentially

damaging $HO^{\cdot}$. The body's 'protective defences' (enzymes, storage proteins and biological antioxidants) are next discussed, in chapters which describe the control of O_2^{-} and H_2O_2 in biological systems. Discussion of the role of added ligands (such as EDTA, DTPA) provides a bridge to topics described in Part I.

With appetite whetted, the interested reader may well thumb through the pages to get to Chapter 9, 'Iron and human disease', to find out about iron overload, iron and cancer ('no experimental link established in humans'), iron and anti-tumour antibiotics (speculation on $HO^{\cdot}$ formation and DNA damage via reduced iron), iron and heart disease (where there is speculation on the possible relationship between iron levels and mortality), iron and neurodegenerative diseases (with sections on Parkinson's disease and Alzheimer's disease) and rheumatoid arthritis. No clear picture emerges, though in many cases experiments involving vitamin E and other antioxidants point to a role for free-radical damage. The book ends with a review of methods (colorimetric, spectroscopic), which may be used for detecting $HO^{\cdot}$ damage to proteins, DNA and lipids.

The book is written in a combination of styles which is sometimes distracting though rarely dull: it is likely to stimulate further reading, argument or — even better — experiment. Do not expect any definitive answers; but if you want to know more about the fascination of the simple Fenton reaction, and the complexity of biological analogues, or of developing interdisciplinary research where chemistry, biology and medicine interact, then read on.

B. C. GILBERT
University of York, UK

Handbook of Chiral Chemicals

David J. Ager (ed.)
Marcel Dekker, New York, 1999
x + 382 pages. $165 ISBN 0-8247-1058-4

Handbook of Chiral Chemicals is an excellent book, providing a very useful account/overview of the problems faced in producing single enantiomers on a commercial scale. Almost all of the chapters avoid the pitfall of including too much detail of the chemistry and mechanism and so concentrate admirably on the main discussion theme namely which processes are commercialisable for the production of enantiomerically pure fine chemicals.

The introductory chapter sets the scene by outlining the methods currently contemplated commercially for producing single enantiomers, and the types of reactions that are robust enough for scale-up operations. The chapter is refreshingly succinct and the colloquial use of terms such as 'chiral compound' (for single enantiomers) and 'optical purity' (for enantiomeric excess) does not detract from the main purpose.

Chapter 2 provides a useful list of non-racemic compounds that are available on a significant scale, and their suppliers. Chapter 3 describes the synthetic routes to 16 top-selling enantiomerically pure compounds (ten pharmaceuticals, three food additives and three agricultural products). Chapter 4 describes the various procedures that have been deployed to synthesize D- and L-phenylalanine and provides an interesting insight into the evolution of commercial processes. Chapter 16 repeats the process for L-aspartic acid.

Chapters 5 and 6 demonstrate strategies from chiral-pool starting materials (carbohydrates and terpenes). Chapters 7, 9–12, 14, 15 and 18 describe the main reactions used in the production of non-racemic materials by asymmetric synthesis, including substitution reactions, redox processes and catalysis, isomerizations, pericyclic reactions and application of chiral auxiliaries. Chapter 8 discusses case studies on large-scale chemical and enzymic resolutions. Chapter 13 describes the role of biotransformations for the production of fine chemicals by asymmetric synthesis and by resolution. Chapter 17 describes how one small company can tackle a range of custom syntheses employing a variety of techniques such as resolution, chiral-pool methodologies and biotransformations.

The order of the chapters chosen by the editor is curious in several instances. For example, the overview chapters (4 and 16) on routes to phenylalanine and aspartic acid are not together, nor are the general case studies (Chapters 3 and 8). This does not detract from the usefulness of the book, however, since each chapter stands alone. As a whole, the book provides an interesting and useful overview of the current state of one part of the fine chemical industry. It is to be recommended as an excellent addition to all industrial and academic libraries, although it would be difficult to justify its purchase for individual collections.

STEPHEN G. DAVIES
University of Oxford, UK

Introduction to Fluorescence Spectroscopy

Ashutosh Sharma and Stephen G. Schulman
Wiley–Interscience, New York, 1999 xiv + 173 pages. £38.95
ISBN 0-471-11098-1

This book is part of the series *Techniques in Analytical Chemistry*, edited by Frank A. Settle, of which the specific objectives are to provide an overview of the methods of analysis, including an introduction to the principles but with an emphasis on the actual usage of the techniques, to provide an insight into the capabilities and