

Book Reviews

The Maillard Reaction. Consequences for the Chemical and Life Sciences. Ed. R. Ikan. John Wiley, 1996. ISBN 0 471 96300 3. 214 pp. Price: £55.00.

Apart from the proceedings of the five international symposia that have been held on the Maillard reaction to date, it is unusual to find an entire volume devoted to this most important subject. Therefore, this book is very welcome. The stated aim of the author is to provide an up-to-date description of what is known about the Maillard reaction. It also reveals the interdisciplinary nature of the reaction and discusses topics including ageing, aroma generation, geochemistry, anti-carcinogenic effects, microwave-induced reactions and the biological recognition of reaction products.

The book comprises nine chapters, a list of contributors, a preface, a list of the main abbreviations, a useful subject index and an author index. The latter is a composite list of all the authors of papers cited by each contributor. This gives the book added value, since it provides an indication of the areas in which other Maillard researchers are (or have) worked.

The first chapter, by Ikan *et al.*, covers geochemical aspects of the Maillard reaction and deals, in particular, with recent research on the polymeric reaction products (melanoidins) formed in sugar–amino acid model systems, and their relationship to humic substances. The role of phenols in forming brown materials in soils is also discussed.

There are five chapters which are directly related to food, nutrition and toxicology. In the first of these, C.-T. Ho discusses the role played by the Maillard reaction in thermal aroma generation. The reaction products that are specific to certain amino acids, including cysteine and proline are reviewed, the major classes of heterocyclic reaction products are discussed and lipid–Maillard interactions are summarised. V. Yaylayan discusses the Maillard reaction during microwave heating, including methods that have been tried to overcome the lack of desirable colour and flavour in food processed using microwave radiation. M. Friedman deals with the impact of the Maillard reaction on the nutritional value of food proteins. The chapter includes relevant analytical methods, the nutritional and physiological effects, mainly on rats, of consuming glycated proteins and characterised Maillard products, the nutritional value of Maillard products, and the prevention of browning. F. Hayase reviews the role played by melanoidins in scavenging active oxygen, including hydroxyl radicals, hydrogen peroxides and superoxides. Glycated proteins also show strong scavenging activity. In the final food-

related chapter, J. Wong and T. Shibamoto discuss the formation of mutagenic (genotoxic) Maillard reaction products and methods of testing for them in model and food systems. Topics reviewed include the mutagenicity of isolated reaction products and their precursors, the formation of aromatic heterocyclic amines and methods to detect and quantify mutagens associated with the Maillard reaction from foods.

The remaining three chapters deal with the Maillard reaction in the human body. J. Baynes discusses the role of oxidation on the Maillard reaction *in vivo*, including the role of oxygen as a catalyst for the Maillard reaction, advanced glycation end-products (AGEs) and glycoxidation products, and glycoxidation and oxidation of lipoproteins. S. Wolff reviews glycation theory and the role of free radicals. The role of transition metals in the reactions concerned is given particular prominence. Finally, R. Bucala and A. Cerami review the biochemical and genetic consequences resulting from interactions between reducing sugars and DNA nucleotides. Items covered include the structures of some chemically-defined AGEs, DNA-advanced glycosylation in prokaryotic and eukaryotic systems, structural studies of DNA-AGEs and the biological consequences of DNA-advanced glycosylation.

The contributing authors are all at the forefront of their respective research areas. The book is well produced and the editing is tight. It should be read by all those involved in researching the Maillard reaction, whatever their specialist field and there is much to be gained by all from reading this book from cover to cover. It provides excellent and concise reviews of the most important topics in this diverse research area, which should be of great value to the non-specialist, e.g. food processors and physicians. It is very good value for money.

J. M. Ames

Food Chemicals Codex. Institute of Medicine of the National Academy of Sciences, 1996 (4th edn). ISBN 0 309 05394 3. xxxii + 882 pp.

Fifty two new monographs (i.e. individual additive entries) are added to the third edition of this indispensable book making a total of 967 monographs. Previously I had only possessed the second edition with 639 monographs so the fourth edition is now a mighty and heavy book.

In the course of the four editions, *Food Chemicals Codex* has been expanded to include not only food additives, but also substances that come into contact with food and substances that are food (e.g. fructose and dextrose). However, three previous monographs have now been deleted (i.e. carrageenan, cinnamyl antranilate and methyl formate) due to altered circumstances and special emphasis is now placed on reducing contaminants, particularly lead. The book therefore contains several quantitative procedures for measuring low lead levels (e.g. lead in water-soluble sweeteners <0.1 mg/kg). Limits for lead in many monographs included in this edition have been reduced by at least one half.

A very important section of the book relates to flavour chemicals, their test methods, gas chromatography and infrared spectra and a final section on general assays and then an index.

The *Food Chemicals Codex* has always enjoyed "quasi legal status" particularly in the USA since the famous FDA statement, "The FDA will regard specification in the FCC as defining appropriate food grade". Regulation viewpoints in Australia, New Zealand and Canada are evidently now similar and there is probably no more reliable volume in the world for specifying and identifying food chemicals.

G. Birch