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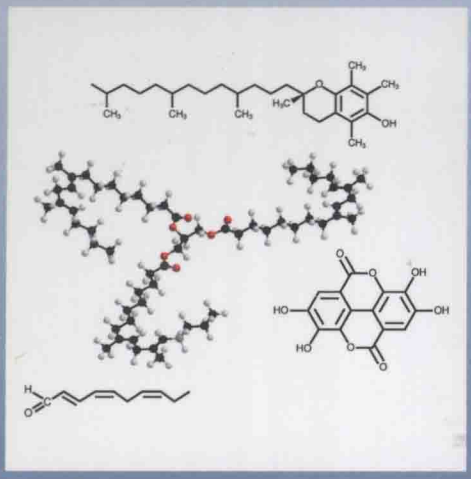

Oxidation in foods and beverages and antioxidant applications

Volume 1: Understanding mechanisms of oxidation and antioxidant activity

Edited by Eric A. Decker, Ryan J. Elias and D. Julian McClements

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WOODHEAD PUBLISHING

Woodhead Publishing Series in Food Science, Technology and Nutrition:
Number 199

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WOODHEAD
PUBLISHING

Oxford Cambridge Philadelphia New Delhi

Published by Woodhead Publishing Limited, Abington Hall, Granta Park,
Great Abington, Cambridge CB21 6AH, UK
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www.woodheadpublishingindia.com

First published 2010, Woodhead Publishing Limited

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library.

ISBN 978-1-84569-648-1 (print)
ISBN 978-0-85709-044-7 (online)
ISSN 2042-8049 Woodhead Publishing Series in Food Science, Technology and Nutrition (print)
ISSN 2042-8057 Woodhead Publishing Series in Food Science, Technology and Nutrition (online)

The publisher's policy is to use permanent paper from mills that operate a sustainable forestry policy, and which has been manufactured from pulp which is processed using acid-free and elemental chlorine-free practices. Furthermore, the publisher ensures that the text paper and cover board used have met acceptable environmental accreditation standards.

Typeset by Godiva Publishing Services Limited, Coventry, West Midlands, UK
Printed by TJI Digital, Padstow, Cornwall, UK

Oxidation in foods and beverages and antioxidant applications

Related titles:

Oxidation in foods and beverages and antioxidant applications Volume 2 Management in different industry sectors
(ISBN 978-1-84569-983-3)
Oxidative rancidity is a major cause of food quality deterioration, leading to the formation of undesirable off-flavours as well as unhealthy compounds. The two volumes of *Oxidation in foods and beverages and antioxidant applications* review food quality deterioration due to oxidation and methods for its control. The second volume concentrates on oxidation and its management in different industry sectors. Part I discusses animal products, with chapters on the oxidation and protection of red meat, poultry, fish and dairy products. Part II reviews oxidation in plant-based foods and beverages, including edible oils, wine and fried products. The final chapters examine encapsulation to inhibit lipid oxidation and antioxidant active packaging and edible films.

Chemical deterioration and physical instability of foods and beverages
(ISBN 978-1-84569-495-1)
For a food product to be a success in the marketplace, it must be stable throughout its shelf-life. Changes due to food chemical deterioration and physical instability are not always recognised by food producers, who are more familiar with microbial spoilage, yet can be just as problematic. This book provides an authoritative review of key topics in this area. Chapters in Parts I and II focus on the chemical reactions and physical changes that negatively affect food quality. The remaining chapters outline the likely effects on different food products, for example baked goods, fruit and vegetables and beverages.

Antioxidants in food: practical applications
(ISBN 978-1-85573-463-0)
Antioxidants are an increasingly important ingredient in food processing, as they inhibit the development of oxidative rancidity in fat-based foods, particularly meat and dairy products and fried foods. Recent research suggests that they play a role in limiting cardiovascular disease and cancers. This book provides a review of the functional role of antioxidants and discusses how they can be effectively exploited by the food industry, focusing on naturally occurring antioxidants in response to the increasing consumer scepticism over synthetic ingredients.

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Preface

Even though the involvement of peroxides in lipid oxidation has been known for over 100 years and the free radical mechanism of autooxidation was proposed over 60 years ago, many challenges still exist in controlling oxidative rancidity in foods. These challenges exist because the lipid oxidation process is influenced by a huge number of factors, many of which are specific for different food items. As was identified in the earliest studies on oxidative rancidity, these chemical pathways are dependent on temperature, oxygen concentrations and lipid type. In addition, the reactions often do not simply undergo autooxidation pathways, as they are also accelerated by various prooxidants which include enzymes, transition metals and reactive oxygen generators. Once the reaction starts, its rate is influenced by antioxidants that are endogenous to the food. These antioxidant systems can include free radical scavengers, metal chelators, singlet oxygen quenchers and antioxidant enzymes. Some of these antioxidant systems have been specifically designed by biological systems to inhibit lipid oxidation such as tocopherols, iron binding proteins (e.g. transferrin) and antioxidant enzymes. However, there are also numerous compounds in foods that were not specifically designed to inhibit oxidation but contain functional groups that can interact with free radicals and prooxidants. For example, proteins contain amino acids that can both scavenge free radicals and chelate transition metals. In addition, anthocyanidins and carotenoids, which are important in food color, can also scavenge free radicals, bind metals and inactivate singlet oxygen. These endogenous antioxidants are critical in the natural 'oxidative resistance' of foods.

The susceptibility of foods to lipid oxidation is increasing as food product developers attempt to make foods healthier by adding more polyunsaturated fatty acids, and by removing synthetic antioxidants that are causing consumer