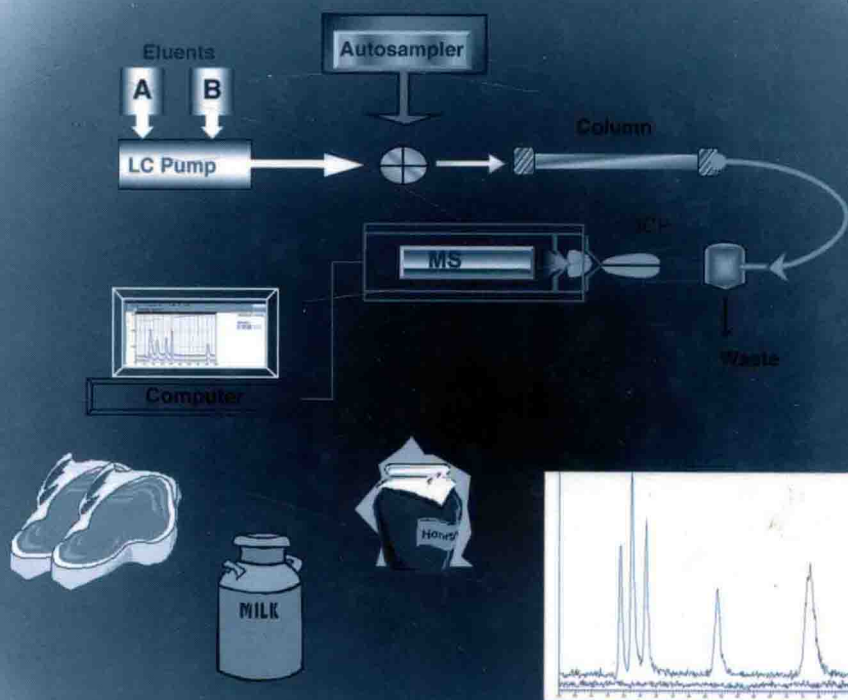


# The Determination of Chemical Elements in Food

Applications for Atomic and Mass Spectrometry

*Edited by Sergio Caroli*



# THE DETERMINATION OF CHEMICAL ELEMENTS IN FOOD: APPLICATIONS FOR ATOMIC AND MASS SPECTROMETRY

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**THE DETERMINATION  
OF CHEMICAL  
ELEMENTS IN FOOD**



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# PREFACE

Confidence in the quality and safety of food is an undisputed priority worldwide. The presence in food of undesired chemicals (basically residues and contaminants) as well as the lack of essential chemical substances at the required concentrations can pave the way to very serious consequences for human health. Chemical elements (be they major, minor, or trace elements) have a place of their own in this context. Needless to say, assessing the safety of food from both viewpoints demands entirely reliable experimental information, which in turn is based on the availability of fit-for-purpose powerful analytical techniques.

This multiauthored book aims at highlighting the role played by atomic and mass spectrometry (with particular reference to atomic absorption spectrometry, inductively coupled plasma atomic emission spectrometry and inductively coupled plasma mass spectrometry) in supporting and promoting research and control of foodstuffs and food commodities as regards both essential and potentially toxic chemical elements. The progress made so far in this field is overviewed and emphasis is put on the open problems that require further investment and development in the public and private sectors.

The 22 chapters that form this book are written by prominent scientists and cover primary issues such as: (1) fundamental aspects and method development, also as regards sampling, sample storage, and sample pretreatment; (2) challenges posed by the quantification of chemical elements (mostly trace elements) in food matrices; (3) existing legal provisions at the national, community and international level; (4) expected development of instrumental spectrometric techniques that can be exploited to better protect consumers' health, with a full account of the most promising trends of spectrometric instrumentation and ancillary apparatuses in food analysis; (5) quantification of the various chemical species of elements in foodstuffs primarily through hyphenation of spectrometric equipments with chromatographic instrumentation; and (6) adoption of quality schemes along with the proper use of reference materials and proficiency testing schemes. All these topics are subdivided into three main sections, namely: *Fundamentals and*

*method development*, *Selected applications*, and *Speciation analysis*, where the various aspects listed above are approached in a holistic manner so as to be of interest to the widest readership.

This book greatly benefits from the enthusiastic participation and support of all authors who patiently collaborated with the Editor and tolerated his endless requests. A special word of thanks goes to Monica Brocco<sup>1</sup> for revising the style of the various versions of each chapter and to Paola De Castro,<sup>1</sup> Cosimo Curianò,<sup>1</sup> and Marco Cornacchia<sup>1</sup> for their precious assistance in preparing artwork.

Last, but by no means least, the generous support of PerkinElmer Italiana in planning this book is gratefully acknowledged: without their assistance this project would have never been possible.

SERGIO CAROLI

*Editor*

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## **SECTION 1**

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# **FUNDAMENTALS AND METHOD DEVELOPMENT**



