

Preface

The tenth volume of this series, whose first volume was published in 1985, can be taken as an opportunity to review the situation and try to foresee the future. Even more so, as this volume is the first to be published under a new title as part of the new international reference series "The MAK-Collection for Occupational Health and Safety".

In the previous volumes of the series, published under the title "Analyses of Hazardous Substances in Biological Materials", 175 procedures for assaying approximately 200 substances in blood and urine have appeared. The publication of each procedure was preceded by discussion of the method and the results of the experimental test procedure. Thus, these are procedures which can be directly adopted and used for laboratories as laboratory regulations in the sense of Standard Operating Procedures. For many hazardous materials they have made the analysis of the amounts of toxic substances absorbed, and therewith biomonitoring, first possible and contributed much to the current importance of biomonitoring in the prevention of adverse effects on health.

The possibilities of instrumental analysis have continually increased over the years. This means greater safety with many hazardous substances during their qualitative and quantitative determination in blood and urine. In this context, it is fitting that this tenth volume also presents, in a very well-substantiated chapter, new ways to use gas chromatography-mass spectrometry. The importance of this in biological monitoring, also for the future, cannot be emphasized enough. The combination of apparatuses for liquid chromatography-mass spectrometry/mass spectrometry has been presented in this tenth volume as another possibility for the use of mass spectrometry. The methods for the detection of manganese, methyl mercury and titanium published in this volume demonstrate that the advances in instrumental analysis have enabled the determination of blood levels or blood and urine levels (titanium) even for these hazardous substances.

The methods published in this volume point out possibilities for future development. The methods previously published and their acceptance in the international scientific community entitle one to hope that, despite apparent shortages in personnel and equipment, the development of such methods, which are indispensable for health protection, will continue to be possible. I would like to thank the head and members of the Working Group Analytical Chemistry for their work and wish them success in their future activities.

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Commission for the Investigation of Health Hazards
of Chemical Compounds in the Work Area

Foreword

This 10th volume, now published under the new title “The MAK-Collection for Occupational Health and Safety, Part IV: Biomonitoring Methods” contains another 11 reliable and tested methods for biological monitoring as well as a general chapter on the application of an instrumental analysis method in the field of biomonitoring, in this case the combination of gas chromatography with mass spectrometry.

Publication of this 10th volume as part of a new international reference series presents an appropriate opportunity to point out that international distribution and use of the methods developed by the Deutsche Forschungsgemeinschaft's Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area has been widespread since the first volume was issued in English in 1985 under the title “Analyses of Hazardous Substances in Biological Materials”. To quote just one example, this collection of methods is cited regularly in the monographs of the working group to establish Biological Exposure Indices (BEI) of the American Conference of Governmental Industrial Hygiene (ACGIH). The rising incidence of citations in international publications confirms that the decision taken 25 years ago to issue a version in English was the right one.

This has enabled biological monitoring (BM) of many important hazardous substances that are absorbed by man at the workplace or in the environment. BM has thus been established as an important measure in preventive medicine in addition to the determination of contaminants in environmental media such as air, water, the soil, etc. As BM reflects the quantity of noxious substances actually absorbed by humans, it is of even greater significance in estimating the risk to their health than the monitoring of hazardous substances in the ambient air. It is therefore advisable to use BM wherever possible, i.e. whenever analytical methods such as those published here are available.

For the medical practitioner the availability of a method in this collection indicates that BM is possible and necessary. For laboratories the methods in this collection represent analytical instructions in the form of Standard Operating Procedures (SOPs) that can be taken over directly and applied. Therefore this collection of methods not only makes an important contribution in preventing damage to health but also in ensuring the reliability of results.

This 10th volume also continues the trend to determine substances of relevance to environmental medicine in body fluids (e.g. perfluorooctanoic acid and perfluorooctane sulphonic acid, methylmercury). The continuous expansion in the range of parameters is possible only as a result of the steady increase in the possibilities offered by analytical instruments. Thus a description of the LC-MS/MS instrumental combination has also been included in the collection of methods published here.

I extend my hearty thanks to the members and guests of the “Analyses of Hazardous Substances in Biological Materials” working group who continue to demonstrate great commitment to BM and thus to preventive health care despite ever-shrinking

resources. However, all this would not be possible without the Deutsche Forschungsgemeinschaft's continuing support of our efforts. Thanks to this organisation, Germany plays a leading role in the field of biomonitoring. My grateful thanks are also due to Dr. Krawisch and Ms. Rosita Müller of the DFG office for the continual assistance they provide to me and the "Analyses of Hazardous Substances in Biological Materials" working group. I particularly wish to thank Mr. Thomas Schettgen (food chemist) and Ms. Jeannette Konhäuser of the secretariat of the "Analyses of Hazardous Substances in Biological Materials" for their dedicated and competent support.

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