LIQUID SCINTILLATION COUNTING
Recent Applications and Development

Edited by
CHIN-TZU PENG
DONALD L. HORROCKS
EDWARD L. ALPEN

Volume 1
PHYSICAL ASPECTS

LIQUID SCINTILLATION COUNTING

RECENT APPLICATIONS AND DEVELOPMENT

Volume I. Physical Aspects

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PREFACE

This book contains the proceedings of the International Conference on Liquid Scintillation Counting, Recent Applications and Development, held on August 21–24, 1979 at the University of California, San Francisco, and attended by approximately 180 scientists from fifteen countries who share a common interest in promoting a better understanding of liquid scintillation science and technology. Liquid scintillation counting is one branch of nuclear metrology that many scientists of various disciplines use in tracing and quantification in their investigatory studies. One cannot imagine scientific achievement in many areas without its involvement.

In recent years advances in liquid scintillation instrumentation and liquid scintillators have been remarkable, and the application of liquid scintillation detection method to biomedical investigation and environmental monitoring has substantially increased. Many problems in the field remain. This conference was conceived on the premise that an exchange of ideas and discussion of existing difficulties would be fruitful, and this proved to be correct judging from the proceedings of the conference. The task of selecting topics for discussion was facilitated by a group of internationally distinguished experts who kindly advised us regarding the program and assisted us in reviewing it. This group consisted of S. Apelgot (Foundation Curie-Institut du Radium 11, France), E. D., Bransome, Jr. (Medical College of Georiga), G. D. Chase (Philadelphia College of Pharmacy and Science), L. J. Everett (Packard Instrument Company), B. W. Fox (Paterson Laboratories, England), J. A. B. Gibson (Atomic Energy Research Establishment, Harwell, England), B. E. Gordon (Lawrence Berkeley Laboratory), W. E. Kisieleski (Argonne National Laboratory), D. A. Kalbhen (University of Bonn, Germany), J. Noakes (University of Georgia), A. A. Noujaim (University of Alberta, Canada), K. Painter (Colorado State University), H. H. Ross (Oak Ridge National Laboratory), E. Schram (Vrije Universiteit Brussel, Belgium), and P. Stanley (The Queen Elizabeth Hospital, Woodville, South Australia).

The proceedings, consisting of 14 sections, include 76 of the 77 invited and contributed papers presented at the conference. It is published in two volumes with the first volume containing 37 papers and the second volume, the remainder. Volume I contains mainly papers dealing with the physical aspects of liquid scintillation science and technology, and Volume II with sample preparation and applications. Unfortunately, space limitations preclude the inclusion of discussions that occurred after each presentation.

The proceedings is the dedicated effort of all contributors, to whom we extend our sincerest thanks. We are deeply appreciative of the following who gave their time and expertise to serve as program session chairmen: I. B. Berlman (Hebrew University of Jersulam, Israel), E. D., Bransome, Jr., J. L. Everett, B. W. Fox, J. A. B. Gibson, B. E. Gordon, D. A. Kalbhen, J. E. Noakes, A. A. Noujaim, H. H. Ross, and P. E. Stanley.

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We greatly appreciate the support and encouragement of F. A. Sooy, M. D., Chancellor, and J. E. Goyan, Dean of the School of Pharmacy, University of California, San Francisco, without whom this conference would not have been possible. Our special thanks to Professor Glenn T. Seaborg for speaking at the banquet for the conference participants on his visits to the People's Republic of China.

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LIQUID SCINTILLATION COUNTING
RECENT APPLICATIONS AND DEVELOPMENT
VOLUME I. PHYSICAL ASPECTS

SOME HISTORY OF LIQUID SCINTILLATION DEVELOPMENT AT LOS ALAMOS[1]

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I. INTRODUCTION

Liquid scintillation counting, as we know it today, is the result of continuing work in numerous laboratories by a large number of investigators, many of whom are attending this conference. Development of apparatus and methods has depended on input from almost all fields of science and technology--physics, chemistry, mathematics, biology, engineering, medicine, and many more. A fortunate combination of talents, technology, knowledge, inspiration, and need all seemed to come together at the right time to provide for the rapid development of liquid scintillation counting in the early 1950s.

At the Los Alamos Scientific Laboratory, the quiet competence of F. Newton Hayes formed the basis of a program that continued formally throughout the decade and encompassed essentially all aspects of the field--synthesis of new solutes; characterization and evaluation of solutes, solvents, quenchers, optics, and electronics; chemistry and physics of the scintillation process; development and practical applications of both small-volume internal-sample and large-volume external-sample counters; and enthusiasm for collaboration with other investigators from many and varied disciplines. This article will review the early developments made in

[1] *This work was performed under the auspices of the U. S. Department of Energy.*

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