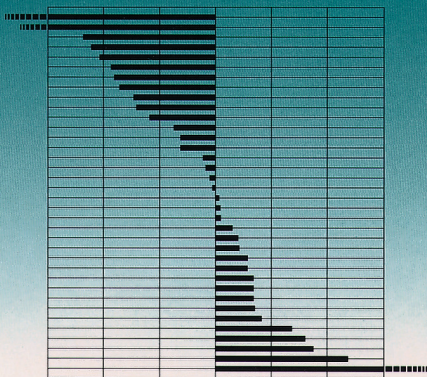


PROFICIENCY TESTING IN ANALYTICAL CHEMISTRY



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and Ronald F. Walker



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Preface

This book has been produced as part of the Valid Analytical Measurement (VAM) Initiative, a programme funded by the UK Department of Trade and Industry. The VAM Initiative seeks to improve the quality of analytical data and to facilitate the mutual recognition of analytical results by promoting six key principles of good analytical practice. The VAM principles are:

1. Analytical measurements should be made to satisfy an agreed requirement.
2. Analytical measurements should be made using methods and equipment which have been tested to ensure that they are fit for their purpose.
3. Staff making analytical measurements should be both qualified and competent to undertake the task.
4. There should be a regular and independent assessment of the technical performance of a laboratory.
5. Analytical measurements made in one location should be consistent with those made elsewhere.
6. Organisations making analytical measurements should have well-defined quality control and quality assurance procedures.

The present work addresses the requirement for a regular and independent assessment of technical performance set out in principle 4, such assessments being one of the prime objectives of proficiency testing schemes.

The purpose of the book is to provide information on the proper use of proficiency testing as an analytical quality assurance measure, to all parties with an interest in the production and use of valid analytical data. As such it considers separately and specifically the needs and roles of the following groups:

- organisers of proficiency testing schemes;
- laboratories participating in proficiency testing schemes;
- end-users of analytical data.

Because of this approach there is some duplication in the coverage of certain aspects of the subject. For example, the role and objectives of proficiency testing are discussed in terms of organisers of schemes, participants in schemes and the ultimate end-users of analytical data, *i.e.* the customers of analytical laboratories. It is hoped that this feature will prove acceptable, enabling the reader with a specific interest in proficiency testing, whether as organiser, participant or end-user, to access readily those parts of the text of most relevance.

The material in this book has been enhanced by unique information obtained from extensive survey and investigative work carried out by the authors as part of the VAM Initiative. The surveys involved detailed discussions with the organisers of 18 UK proficiency testing schemes and an evaluation of questionnaire

responses from over 200 participants in 13 UK schemes. The authors are very grateful to those organisations and individuals that contributed to the study.

It is hoped that the book will assist in the operation of proficiency testing schemes that actively promote the production of valid analytical data. In order to achieve these objectives, the essential principles of valid analytical measurement must be incorporated into the organisational structure of proficiency testing schemes. For example, the following aspects are emphasised: (i) the importance of establishing the traceability and uncertainty of the property values assigned to test materials used in proficiency testing schemes; (ii) the need for laboratory performance to be 'fit for purpose', which is not necessarily the same as stipulating that the highest possible accuracy must be obtained; and (iii) the role of proficiency testing in reinforcing other key components of VAM, such as the production of reference materials, the evaluation of analytical methods and internal quality control.

The design features of an effective proficiency testing scheme are described, but it is, of course, recognised that difficulties may sometimes arise in adopting certain features in practice. The options available for scheme operation are presented and their relative merits and shortcomings are discussed. The underlying philosophy is to assist in the operation of schemes to the highest standards possible within the constraints of any particular test sector. The types of scheme covered are those dealing with chemical analyses where a quantitative result is produced that is expressed either as a concentration (*e.g.* mg kg⁻¹) or as some other chemical measurement on a continuous scale (*e.g.* pH).

A further role of this book is to give particular attention to those aspects of proficiency testing schemes that are critical in securing improvements in the quality of analytical results. Effective feedback mechanisms between scheme organiser and participant laboratory are therefore discussed. It is also hoped that the information presented will assist in the implementation of existing guides and protocols on proficiency testing, such as the International Harmonized Protocol for the Proficiency Testing of (Chemical) Analytical Laboratories and ISO Guide 43 (Proficiency Testing by Interlaboratory Comparisons⁴⁷). The book is able to present a wider and more general discussion of the important principles, and the side issues, of proficiency testing than is possible in the necessarily limited confines of international standards.

The work is envisaged as having an educational role for analytical chemists, end-users of analytical data and students of analytical chemistry, in respect of the contribution that proficiency testing can make to the quality of analytical data. In particular, we seek to encourage analysts to participate in proficiency testing schemes and to do so in an appropriate and effective manner.

Finally, the book concludes with a brief 'forward look' at some of the issues likely to be of importance to proficiency testing in the future.

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