

## Preface and Introduction

The importance of this topic can be seen from a statement by *Paul de Bièvre*, one of the forerunners concerned about analytical results and their use in widespread applications:

***Chemical measurements are playing a rapidly expanding role in modern society and increasingly form the basis of important decisions.***

Acceptability of food is dependent on a knowledge of its ingredients e.g. how pure is the drinking water or is there acrylamide in french fries or other fried food preparations, how much vitamin C or  $\beta$ -carotene is there in juices, what preservatives are there in bread, sausages or other food preparations? Alloys have to meet certain specifications to be used in tools, machinery or instruments. The price of platinum ores or used catalytic converters from cars depends on the platinum content. There are many more examples. This shows the importance of correct analytical results.

The question is: Why are correct analytical results so important today? The following statements help to understand why:

*For correct decisions one needs regulations (e.g. ISO standards).*

- *Regulations mean limits have to be set and controlled.*
- *Regulations have an impact on commercial, legal or environmental decisions.*
- *Quality of traded goods depends on measurements that in turn can be trusted (Measurements have to be of good quality and reliable).*
- *Good measurements require controllable and internationally accepted and agreed procedures.*

High quality measurements require qualified specialists. A specialist need not necessarily have a university degree in chemistry. Anyone who is well trained and familiar with the field can become a specialist. However specialists need re-training and their knowledge updating on a regular basis. To help with understanding the different topics involved and to provide a sound basis for quality assurance in an analytical laboratory and also to provide material for teaching and (self) training we have compiled a series of chapters by different authors covering the most important topics. The transparencies are intended for teaching purposes but might also be suitable to give an overview of the subject. We hope that our work will reduce the burden of finding all this information yourselves.

This material provided has been collected from different sources. One important source is the material available from EURACHEM.

Let us briefly also introduce you to the goals of EURACHEM

They are to:

- Promote best practice and develop networks for collaboration
- Develop international comparability of chemical measurements



**Eurachem**  
A FOCUS FOR  
ANALYTICAL CHEMISTRY  
IN EUROPE

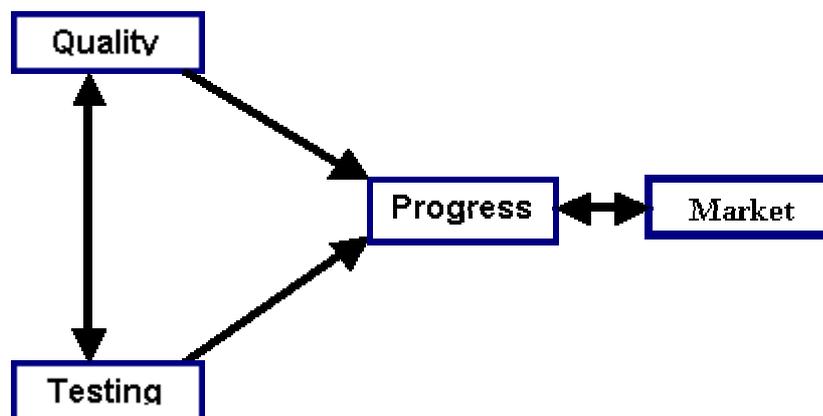
- Provide a framework for co-operation in establishing traceability
- Establish national EURACHEM groups and provide input to other international organisations
- Raise awareness amongst decision makers and develop broadly based education and training

You can find more information about EURACHEM on the internet via “Eurachem - A Focus for Analytical Chemistry in Europe” (<http://www.eurachem.ul.pt/>). In particular the site contains a number of different guides, which might help you to set up a quality system in your laboratory.

The importance of quality assurance in analytical chemistry can best be described by the triangles depicted in figures 1 + 2. Quality is checked by testing and testing guaranties good quality. Both contribute to progress in QA (product control and quality) and thus to establishing a market share. Market success depends on quality, price, and flexibility. All of them are interconnected.

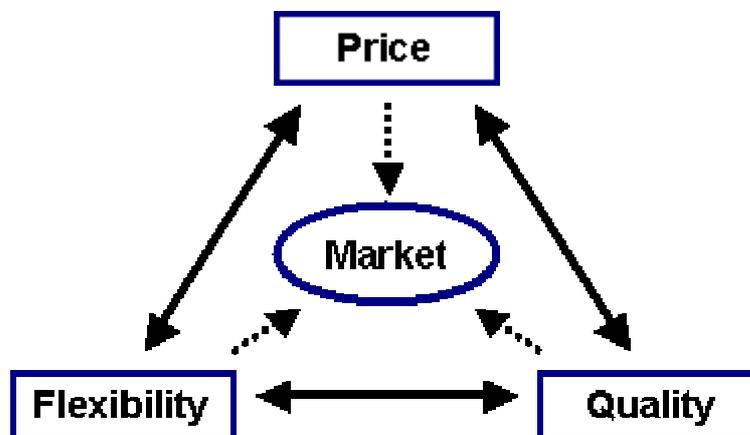
**Figure 1**

*Factors that influence the market*



**Figure 2**

*Factors that influence market success*



Before you can analyse anything the sample must be taken by someone. This must be of major concern to any analytical chemist. There is no accurate analysis without proper sampling. For correct sampling you need a clear problem definition.

**There is no correct sampling without a clear problem definition**

This is just the beginning of the analytical process. On the way from sampling to the test report a lot of different requirements for high quality measurements have to be considered. There are external quality assurance requirements on the quality management system (e.g. accreditation, certification, GLP), internal quality assurance tools (e.g. method validation, the use of certified reference material, control charts) and external quality assurance measures (e.g. interlaboratory tests).

The aim of this book is to deal with all of these topics in a form that can easily be used for self-training and also for teaching in educational institutions and for in-house training. Teachers that intend to use this material to introduce the presented topics to their students or an audience are advised to study and digest the material before they use it in their presentations. The slides could then be customized to meet the needs of the teacher. It is important to note that the material provides the *basis* for presentations by third parties rather than exhaustive and fully comprehensive material.

The intention is to give an overview of all topics relevant for quality assurance in chemical measurement. For details on single topics we refer the reader to the relevant specialized literature.

The editors hope that they can contribute to a better understanding of quality assurance tools and the quality assurance system as a whole. They wish to promote the use of these tools in order to achieve world wide comparable measurement results.

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