Valid Analytical Measurement: looking to the next programme

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The "VAM Programme" or to give it its full title, the Valid Analytical Measurement Programme of the National Measurement System Directorate (NMS) of the UK Department of Trade and Industry (DTI), has been running since 1988. Over the years it has become a valued, respected source of knowledge and information for analytical chemists, due in large part to the excellent web site and newsletter (www.vam.org.uk).

The VAM Programme is organised in three-year cycles and at the mid-point of the present programme it is time to start looking forward to the next VAM Programme, which is expected to start in 2006 and run through until the end of September of 2009.

But before looking forward, it is worth looking back to see where the VAM Programme came from and what it is supposed to achieve. At the top of the tree is the DTI which is responsible for the NMS. The NMS is there to underpin the provision of world-class measurement standards and calibration facilities to the UK. A review of the rationale of the NMS undertaken in 1999 showed that measurement in the UK delivers a significant positive impact into the UK economy, directly or indirectly underpinning and enabling about 0.8% of GDP p.a., some £5 billion.

The NMS oversees 18 main Work Programmes (see Table 1). Each of the NMS Programmes stems from a formulation, with major contributions made by stakeholders (the research base, industrial users and public organisations). Independent advice, from industrialists, academics and government representatives and delivered through a committee responsible for each programme, is used to set priorities. For more information, visit www.dti.gov.uk/nms where there is an overview and link to the individual programme websites.

Table 1. The NMS programmes.

Programme	Approx. share	Website
Acoustics	4%	yes
Electrical	9%	yes
Flow	5%	yes
Government Chemist and International	3%	no
Ionising Radiation	11%	yes
Knowledge Transfer	4%	no
Legal Metrology	4%	yes
Length	5%	yes
Mass	5%	yes
Materials	12%	yes
Measurements for Biotechnology	5%	yes
Optical	4%	yes
Photonics	2%	yes
Quantum	4%	yes
Software Support for Metrology	2%	yes
Thermal	5%	yes
Time & Frequency	2%	yes
Valid Analytical Measurement	11%	yes

The VAM Programme is split into two parts: Chemical and Physical. Both are closely involved with reference materials and metrology and, for the readers of *Spectroscopy Europe*, are likely to be of greatest interest. In this article we look at the Chemical side of VAM, what it has done in the current programme and what might be in the next. The aim of the VAM programme echoes that of the NMS: to underpin the reliability and integrity of chemical and physical metrology in the UK by supporting the development and maintenance of reference methods and standards required for the traceable, quantitative measurement of chemical and biochemical species and the determination of composition of materials and compounds. It also allows the UK to demonstrate the comparability of analytical measurements of its trading partners. In short, VAM provides working labs with the tools needed to implement "best practise".

The present 2003–2006 Chemical VAM Programme comprises three main themes:

Chemical Metrology, a set of projects to develop methods, capabilities and facilities to provide reference materials and standards. These enable the analyst to make measurements that are traceable to internationally recognised standards, essential for the proper functioning of the international Mutual Recognition Agreement and the universal acceptance of data produced by ISO 17025 accredited laboratories. One project, the delivery of traceable measurements, has been expanded to include work on the use of

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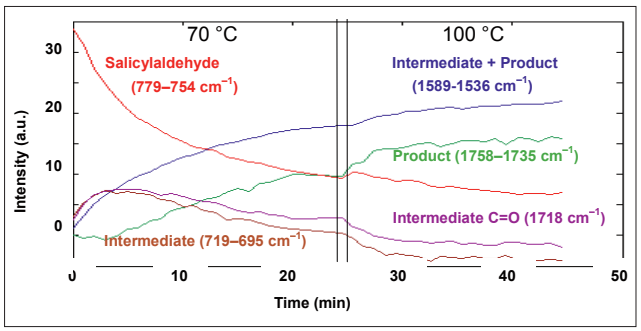

Figure 3. Profile plot of significant bands. (Reprinted with permission from Reference 1. Copyright © 2004 Society for Applied Spectroscopy.)

Conclusion

A major roadblock to the acceptance of microwave-assisted reactors—lack of *in situ* analytical tools—is overcome by Raman spectroscopy. The combination of Raman spectroscopy and microwave-assisted synthesis expands the repertoire for the synthetic organic chemist for fast reaction screening. The high information content of Raman spectroscopy provides a means of characterising reaction intermediates, which yields increased mechanistic information for methods development and process understanding.

Acknowledgement

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Reference

1. D.E. Pivonka and J.R. Empfield, "Real-Time in Situ Raman Analysis of Microwave-Assisted Organic Reactions", *Appl. Spectrosc.* **58(1),** 41 (2004).

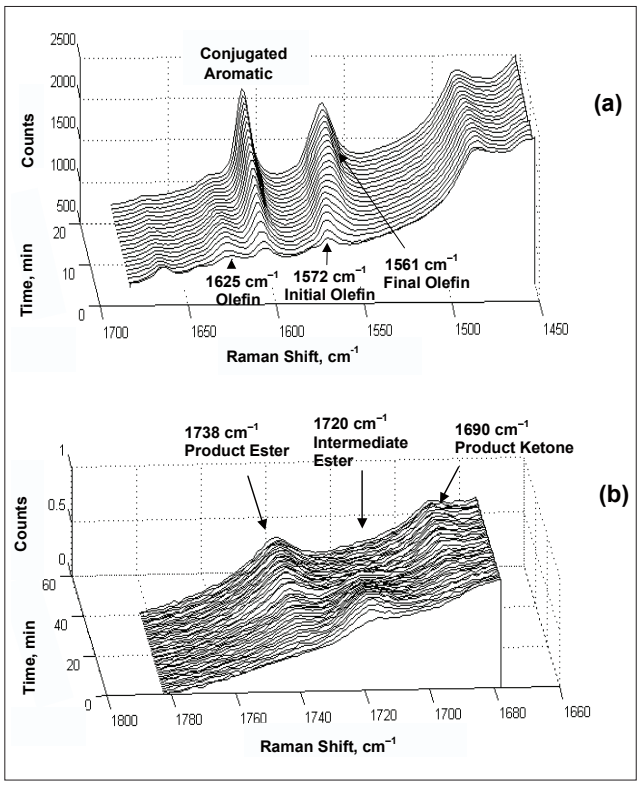

Figure 4. Waterfall plots of the 1450–1700 cm^{-1} and 1680–1780 cm^{-1} spectral regions. (Reprinted with permission from Reference 1. Copyright © 2004 Society for Applied Spectroscopy.)

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new technologies to analyse complex systems, such as nutraceuticals. This will facilitate the uptake of new technology in an area where indications suggested that the UK was lagging.

The Knowledge Transfer theme is focused on support for the professional analyst, including the *VAM Bulletin* and UK Reference Materials Working Group. There is work to evaluate the technical performance of UK laboratories, identify areas where support is required and provide a benchmark against which initiatives to improve performance can be measured.

The Nucleic Acid Measurements theme was designed to put key measurement technologies emerging from the science base on a sound footing and included topics including GMO content of food, viral load in clinical applications and highly multiplexed array-based technologies, used in drug discovery. At the end of March 2004 this work was transferred to the Measurement for Biotechnology program (MfB) and future VAM programmes will exclude such work. For more information about the MfB programme go to www.mfbprog.org.uk

What will the 2006 to 2009 Chemical Programme include? It is too early to say with any certainty, but the following main trends have been identified as having attracted the interest of those involved with shaping the next VAM Programme.

Regulatory Issues: the impact of REACH, Contaminated Land Analysis, Safety of Herbal Medicines, Chemical Diagnostics and analysis associated with crime prevention and security.

Social Issues: indoor air quality and food packaging, age-related issues and the need for earlier and "DIY" diagnosis.

Technological Issues: the consequences on analysis of linking and miniaturising known analytical processes through the use of micro technology and nano-level science.

Economic Issues: support of the MRA and the "once measured, accepted everywhere" dictum.

To keep up to date on what is happening, visit the DTI's NMS website and follow the many and detailed links that start at www.dti.gov.uk/nms