Members of the task-group from six countries will follow the same preparative protocol in various laboratories, and the properties of the resulting materials will be compared at the international level. For the colloidal forms, the particle size and polydispersity determined by dynamic light scattering will be the main criterion. The films will be characterized with respect to their thickness, assessed by optical absorption measurements after calibration. The results of the project will contribute to the development of reproducible procedures for forming conducting polymers. Various macroscopic and microscopic substrates coated with conducting-polymer overlayer can find uses in analytical chemistry, separation science, the catalysis of organic reactions, conducting composite materials and in the development of micro-electronics.

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www.iupac.org/projects/2002/2002-019-1-400.html

Highlights from Pure and Applied Chemistry

Presenting recently published IUPAC technical reports and recommendations

Information Essential for Characterizing a Flow-Based Analytical System (IUPAC Technical Report)

by Elias A.G. Zagatto, Jacobus F. van Staden, Nelson Maniasso, Raluca I. Stefan, and Graham D. Marshall
Pure and Applied Chemistry, Vol. 74, No. 4, pp. 585-592 (2002)

Terminology related to classification and definition of analytical methods based on flowing media, as well as terms describing the flow-based analytical procedure or system and its components have been presented in previous publications, including *Pure and Applied Chemistry* and the "Orange Book," 3rd edition. However, a literature survey reveals that a number of such analytical procedures and/or related instrumentation are only partially described. As a proper description of any methodology is essential, it is important to complement the earlier recommendations by taking into account the recent progress in flow analysis. The objective of this report is to provide guidelines for characterizing a flow analyzer and/or related flow-based methods, emphasizing the minimum but adequate information that should be included in scientific or technical reports. Aspects more related to chromatographic procedures are not considered.

According to the report, for a complete description of a flow system, the following elements should be considered and described: flow pattern (technique), stream parameters, sample introduction (with possibility of reagent introduction), manifold, sample processing, and detection. The report also describes the following important performance parameters of a flow-based procedure: sampling rate, analytical characteristics, robustness, and portability.

This report should benefit practitioners and developers by permitting normalized proposals to be presented in the field of flow analysis. The authors intend to use this report to prepare a checklist that will lead to a protocol for reporting results and systems in flow analysis, which would result in the development of systems that are more consistently designed.

www.iupac.org/publications/pac/2002/7404/7404x0585.html

Sulfate-Sensing Electrodes. The Lead-Amalgam/Lead-Sulfate Electrode (IUPAC Technical Report)

by Patrizia R. Mussini and Torquato Mussini
Pure and Applied Chemistry, Vol. 74, No. 4, pp. 593-600 (2002)

It has long been recognized that sensitive and reproducible sulfate-reversible electrodes (e.g., the $Pb|PbSO_4$ or $Hg|Hg_2SO_4$ electrode) are not as readily available as chloride-reversible electrodes (e.g., a widespread $Hg|Hg_2Cl_2$ or Ag|AgCl electrode). In this context, two major features are evident: the activity solubility products of $PbSO_4$ and Hg_2SO_4 are larger than those of Hg_2Cl_2 and AgCl by several orders of magnitude, and in the case of the $Pb|PbSO_4$ electrode, the preparative and operational procedure had not been assessed satisfactorily until recently, so that the electrode in both $Pb|PbSO_4$ and $Pb(Hg)|PbSO_4$ forms proved difficult to use and/or was unsatisfactorily reproducible.

In this report a new, simplified design and a convenient preparation procedure for the $Pb(Hg)|PbSO_4|SO_4^{2-}$ electrode is proposed. This procedure ensures preparation of stable amalgams and reproducible electrode potentials, which make this electrode useful and attractive for both thermodynamic investigations and electroanalytical applications. For these purposes, the electrode prepared according to the proposed procedure has been exhaustively characterized both thermodynamically and as a sulfate-sensing electrode, in different sulfate solutions, including H_2SO_4.

The report also proposes a practical standardization procedure. The $Pb(Hg)|PbSO_4|SO_4^{2-}$ electrode can be

structured with a built-in concentrated Li_2SO_4 salt bridge for use as a sulfate-based reference electrode. Li_2SO_4 also has favorable properties as a salt bridge in some mixed aqueous-organic solvents, e.g., acetonitrile-water mixtures, and its combination with the lead-amalgam|lead-sulfate electrode in such solvents is an interesting perspective, for which further accumulation of data is awaited. This electrode can be operated as a reference electrode alternative to the conventional calomel or Ag|AgCl reference electrodes in electroanalytical practice.

www.iupac.org/publications/pac/2002/7404/7404x0593.html

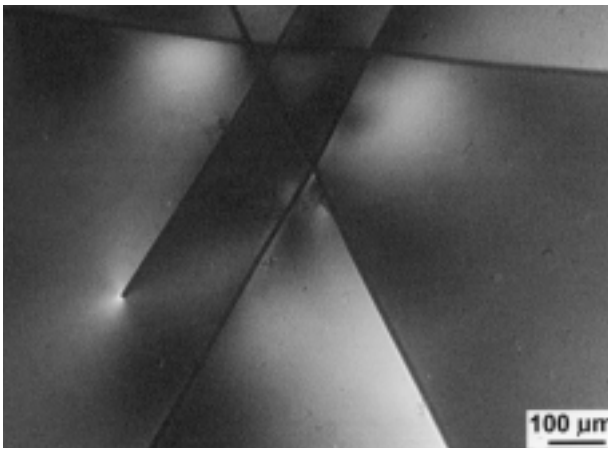
Future Requirements In the Characterization of Continuous Fiber Reinforced Polymeric Composites (IUPAC Technical Report)

by D. R. Moore and A. Cervenka
Pure and Applied Chemistry, Vol. 74, No. 4, pp. 601-628 (2002)

There has been enormous activity in the field of continuous fiber reinforced polymeric composites research, particularly in the period between 1980 and the present. Although there has also been a decline in this activity in the last few years, nevertheless, there is likely to be future expansion for these materials in a range of areas, most of which will be motivated by a specific property per unit weight. Consequently, characterization of composites is likely to remain a key issue.

Much of the historic activity on characterization has been associated with processing, properties, and structure. In addition, there remains plenty yet to explore. A number of the scientists associated with the historic activities are active on the IUPAC Working Party on Structure and Properties of Commercial Polymers, under the chairmanship of Martin Laun. Therefore, this group has considered what activities might be required in the future in order to better characterize continuous fiber reinforced composites and in addition to contemplate some current and future issues.

This report examines the characterization of continuous fiber reinforced composites in terms of processing, properties, and structure. The historic background of five processing and five property topics are then reviewed with the aim of identifying current issues and requirements for the future. The topics covered in the processing section are polymeric matrix, impregnation, interfacial effects, residual stresses, and pre-preg tack. In the mechanical properties section the topics include choice of standard, recycling and re-usability, durability, environmental strength, and toughness. The paper provides a 10-point plan for future requirements.



An example of a complicated stress field illustrated by a photoelastic image of an assembly of long carbon fibers embedded in Araldite epoxy matrix.

In common with this IUPAC Working Party's activities, the contributions for this work come from a wide international group of scientists from both industry and academia and include C. B. Bucknall (UK), R. S. Bailey (UK), B. Pukansky (Hungary), A. Galeski (Poland), D. R. Moore (UK), L. Glas (Belgium), W. Alstadt (Germany), B. Gunesin (Turkey), A. Cervenka (Holland), and J. G. Williams (UK).

www.iupac.org/publications/pac/2002/7404/7404x0601.html

Nomenclature for the C_{60}-I_h and C_{70}-$D_{5h(6)}$ Fullerenes (IUPAC Recommendations 2002)

by W. H. Powell, F. Cozzi, G. P. Moss, C. Thilgen, R. J.-R. Hwu, and A. Yerin
Pure and Applied Chemistry, Vol. 74, No. 4, pp. 629-695 (2002)

Fullerenes are a new allotrope of carbon characterized by a closed-cage structure consisting of an even number of three-coordinate carbon atoms devoid of hydrogen atoms. This class was originally limited to closed-cage structures with 12 isolated five-membered rings, the rest being six-membered rings.

Although it was recognized that existing organic ring nomenclature could be used for these structures, the resulting names would be extremely unwieldy and inconvenient for use. Incorrect von Baeyer ring names have been published. At the same time it was also recognized that established organic nomenclature principles could be used, or adapted, to provide a consistent nomenclature for this unique class of compounds based on the class name fullerene. However, it was necessary to develop an entirely new method for uniquely numbering closed-cage systems.