The peaks and metals allude to analytical chemistry, a field to which T. Mark Florence (1934–2003) made many valuable contributions.

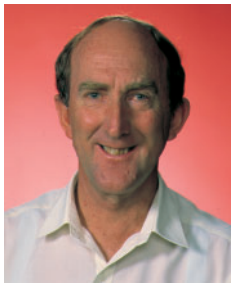
AUSTRALIAN JOURNAL OF CHEMISTRY
AN INTERNATIONAL JOURNAL FOR CHEMICAL SCIENCE
www.publish.csiro.au/journals/ajc

Foreword

T. Mark Florence

Graeme E. Batley

Aust. J. Chem. **2004**, *57*, 899–902.



Mark Florence's 45-year research career was founded principally on analytical chemistry but encompassed the applications of chemistry to environmental, occupational hygiene, and health science. This issue contains contributions from colleagues and associates with whom he interacted during his career.

Review

Speciation and Bioavailability of Trace Metals in Water: Progress Since 1982

Graeme E. Batley, Simon C. Apte, Jennifer L. Stauber

Aust. J. Chem. **2004**, *57*, 903–919.

Anodic stripping voltammetry
Ion-selective electrodes
Microelectrodes
Coated electrodes
Medium exchange
Potentiometric stripping analysis and stripping chronopotentiometry
Cathodic stripping voltammetry
Ligand competition
Dialysis
Diffusion gradients in thin films
Permeation liquid membranes
Chelating resins
Geochemical modelling

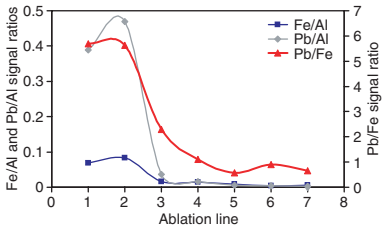
There are many challenges that face the area of trace metal speciation research. This review examines the advances in the last 20 years (pictured) in studies of trace metal speciation and bioavailability since Mark Florence's landmark review of the topic in 1982.

Rapid Communication

Micrometer-Resolved Binding of Lead to Iron in Urban River Sediments

Sebastien Rauch, Gregory M. Morrison

Aust. J. Chem. **2004**, *57*, 921–924.



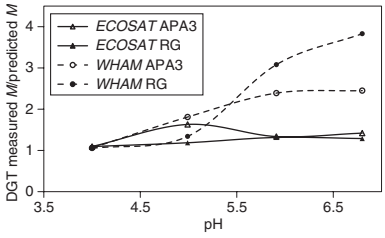
Sediments are an important sink for trace metals, and it is therefore important to provide a better understanding of the association of metals to sediment particles. Laser ablation coupled with inductively coupled plasma–mass spectrometry was used to show that Pb has a clear association to Fe coatings at the surface of particles.

Full Papers

Measurements of Lead Complexation with Organic Ligands using DGT

Shaun Scally, Hao Zhang, William Davison

Aust. J. Chem. **2004**, *57*, 925–930.

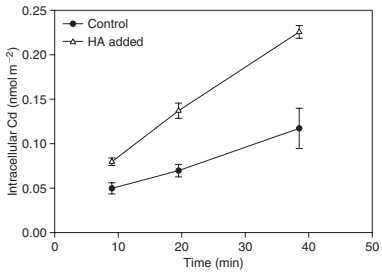


Determination of metal speciation in natural waters is an important area of development. The authors here investigate the technique of diffusive gradients in thin films, which involves using diffusive gels of different pore sizes to selectively measure inorganic metal species. They found that the extent of Pb speciation agrees well with the values predicted by the *ECOSAT* model of chemical equilibrium.

Uptake of Neutral Metal Complexes by a Green Alga: Influence of pH and Humic Substances

Amiel Boullemant, Bernard Vigneault, Claude Fortin, Peter G. C. Campbell

Aust. J. Chem. **2004**, *57*, 931–936.



This paper examines the short-term uptake of the neutral, lipophilic metal complex cadmium diethyldithiocarbamate by a unicellular freshwater alga *P. subcapitata* in the presence and absence of humic substances at different pH values (as shown). The results demonstrated an unprecedented influence of low pH, with the uptake of the lipophilic complex decreasing by more than an order of magnitude at pH 5.5.

Determination of Inorganic Selenium Species in Marine Waters by Hydride Generation–AFS

Bronwyn D. Wake, Edward C. V. Butler, Alison M. Featherstone, Patti Virtue, Bernard Averty, Pierre Michel

Aust. J. Chem. **2004**, *57*, 937–943.

Selenium is an essential trace element, but a fine line exists between deficiency and levels that constitute it as an environmental contaminant. The method described here offers a low detection limit and the ability to measure both Se^{IV} and Se^{VI} concentrations, while the system itself offers portability, which is a fundamental issue when field use is required.

Copper Speciation in Glacial Stream Waters of Rutor Glacier (Aosta Valley, Italy)

Damiano Monticelli, Constant M. G. van den Berg, Andrea Pozzi, Carlo Dossi

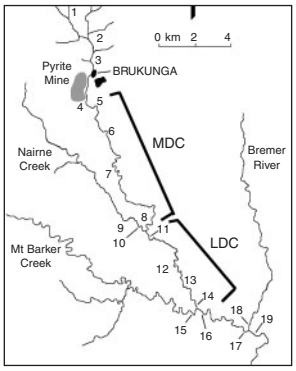
Aust. J. Chem. **2004**, *57*, 945–949.

Glacial streams are an unusual water source in that interactions with soils and biological matter have been minimal, and thus may lack many of the strong metal-binding ligands found in 'typical' surface waters. Cathodic stripping voltammetry is used in the speciation of copper in these ligand-deprived waters.

Risk-Based Assessment of the Impact of Aluminium on a Riverine Ecosystem

Paul L. Brown, John M. Ferris

Aust. J. Chem. **2004**, *57*, 951–955.

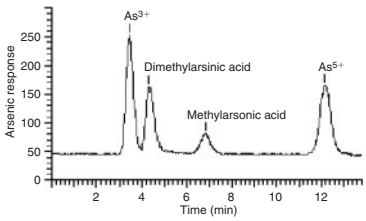


A geochemical model predicting water quality and an ecological risk assessment code are coupled and the results assessed against an actual field study. Measurements from the Dawesley Creek–Bremer River drainage system (pictured) revealed the model to be in good accord, and prompted suggestion of a single water-quality guideline value for the main contaminant, aluminium.

Arsenic Species Determination in Biological Tissues by HPLC–ICP–MS and HPLC–HG–ICP–MS

Jason Kirby, William Maher, Michael Ellwood, Frank Krikowa

Aust. J. Chem. **2004**, *57*, 957–966.

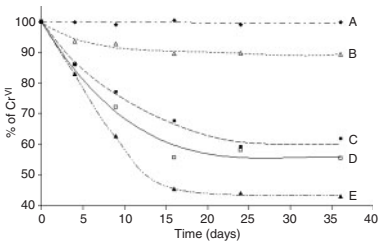


The title techniques have been optimized (e.g. eluent pH and buffer concentration) to provide routine techniques for analyzing arsenic species in biological tissues. Application of these techniques to the identification and quantification of arsenic species in various macroalgae and sushi seaweed is presented to highlight potential human effects and the need for certified materials for arsenic analysis.

Microbial Reduction of Hexavalent Chromium in Landfill Leachate

Yarong Li, Gary K.-C. Low, Ying Lei, Cheryl E. Halim, Rose Amal

Aust. J. Chem. **2004**, *57*, 967–970.

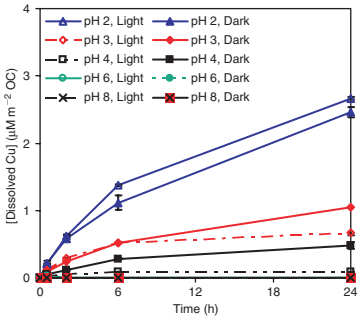


Regulatory limits for the leached concentration of contaminants in solid waste landfills are currently governed by the total concentration of contaminant. Here, questions are raised as to the efficacy of this approach on the basis of findings that chromium(VI) undergoes microbial reduction to chromium(III) in landfill leachates.

Metal Mobilization from Complex Sulfide Ore Concentrate: Effect of Light and pH

Jeffrey J. Tsang, David L. Parry

Aust. J. Chem. **2004**, *57*, 971–978.

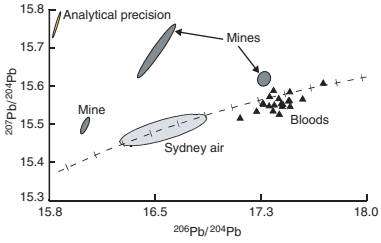


The importance of light and pH in metal mobilization from semiconducting metal sulfides (PbS, ZnS, CdS, FeS_2, and $CuFeS_2$) in a complex sulfide ore concentrate is demonstrated here. An increase in mobilization of Zn, Fe, and Cd under light was observed with decreasing pH, whereas mobilized Pb and Cu were greater in darkness at pH >2.

Comparison of Isotope Dilution and a Portable Anodic Stripping Voltammetry Device for Blood Lead Measurements: Source of Lead in Blood of Female Adults from Bangalore

Brian L. Gulson, Thuppil Venkatesh, Jacqueline Palmer, Herman Suil D'Souza, Michael Korsch

Aust. J. Chem. **2004**, *57*, 979–982.

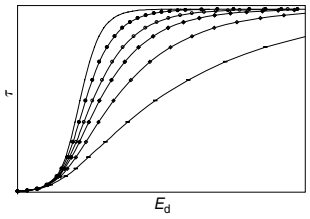


Lead, an oft present and well-known neurotoxin, poses a major health issue in many developing countries. A six-year study of at-risk groups in Bangalore, India, provided an opportunity to compare two separate measurement techniques. The portable ASV method provides reliable measurements of blood lead levels, while lead isotope speciation indicates leaded petrol is its major source.

Dynamic Speciation Analysis of Heterogeneous Metal Complexes with Natural Ligands by Stripping Chronopotentiometry at Scanned Deposition Potential (SSCP)

Raewyn M. Town, Herman P. van Leeuwen

Aust. J. Chem. **2004**, *57*, 983–992.



SSCP allows straightforward determination of parameters to describe labile metal complexation by heterogeneous ligands. Signals controlled or partly controlled by complex dissociation/formation kinetics can be well approximated within certain limits. The approach is applied to interpretation of Cu(II), Pb(II), and Cd(II) complexation by humic substances.

Chemical Speciation of Hg(II) with Environmental Inorganic Ligands

Kipton J. Powell, Paul L. Brown, Robert H. Byrne, Tamas Gajda, Glenn Hefter, Staffan Sjöberg, Hans Wanner

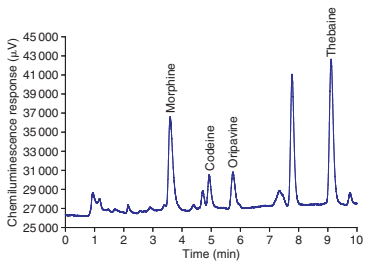
Aust. J. Chem. **2004**, *57*, 993–1000.

Critically evaluated stability constants for the formation of Hg(II) complexes with the inorganic ligands OH^-, Cl^-, CO_3^{2-}, PO_4^{3-}, and SO_4^{2-} are presented. The inorganic speciation of Hg(II) in environmental systems is governed by pH and $[Cl^-]$ and dominated in freshwater by the two-coordinate uncharged species $HgCl_{2(aq)}$, $Hg(OH)_{2(aq)}$, and $Hg(OH)Cl_{(aq)}$.

Preliminary Evaluation of Dual Acidic Potassium Permanganate and Tris(2,2′-bipyridyl)ruthenium(II) Chemiluminescence Detection for the HPLC Determination of *Papaver somniferum* Alkaloids

Claire E. Lenehan, Neil W. Barnett, Simon W. Lewis, Kevin M. Essery

Aust. J. Chem. **2004**, *57*, 1001–1004.

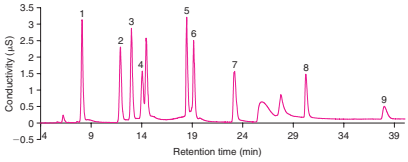


The use of a dual chemiluminescent reagent consisting of acidic $KMnO_4$ and tris(2,2′-bipyridyl)ruthenium(II) for the post column detection of morphine, codeine, oripavine, and thebaine in *P. somniferum* extracts is demonstrated, giving rise to a possible new industrial detection method.

Simultaneous Determination of Fluoroacetates, Chloroacetates, and Bromoacetates in Soil Samples by Ion Chromatography

Fang Wang, Greg W. Dicinoski, Yan Zhu, Paul R. Haddad

Aust. J. Chem. **2004**, *57*, 1005–1010.

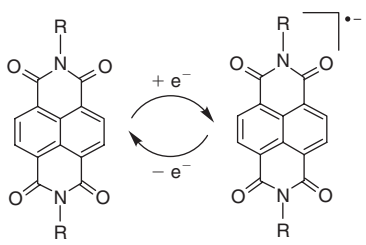


Due to the toxicity and wide existence of haloacetates in the environment, federal regulation for their monitoring is being considered, and reliable quantification methods for these species will be required. The use of anion-exchange chromatography resulted in a simple and rapid method for the simultaneous determination of nine haloacetic acids.

Spectroscopy of Naphthalene Diimides and Their Anion Radicals

Goja Andric, John F. Boas, Alan M. Bond, Gary D. Fallon, Kenneth P. Ghiggino, Conor F. Hogan, James A. Hutchison, Marcia A.-P. Lee, Steven J. Langford, John R. Pilbrow, Gordon J. Troup, Clint P. Woodward

Aust. J. Chem. **2004**, *57*, 1011–1019.

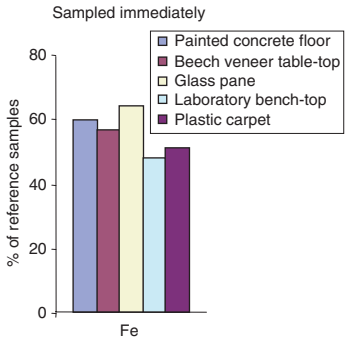


Of current interest are new functional systems, constructed from suitable molecular components and capable of mimicking functions executed by macroscopic electronic devices. Naphthalene diimides are candidates for such systems, and the significant stability of some of their reduced anion radicals suggests that the parent compounds could be developed as on–off molecular switching devices.

Validation and Application of Wipe Sampling and Portable XRF Analysis as an On-Site Screening Method for Assessment of Deposited Aerosols in Workplaces

Olle Nygren, Oscar Aspman

Aust. J. Chem. **2004**, *57*, 1021–1028.



Validation of the sample collection and analysis techniques (by X-ray fluorescence) for the determination of metals in deposited aerosols, and hence the pattern of aerosol dispersion, is reported here. Worked examples of the distribution of welding fumes in a welding workshop and of a cytotoxic drug in a drug preparation room are given.

Author Index