



The cover depicts selected organometallic reactions possible in deep space, reported by Simon Petrie (p. 259). The background picture comes courtesy of the ESO.

# AUSTRALIAN JOURNAL OF CHEMISTRY

AN INTERNATIONAL JOURNAL FOR CHEMICAL SCIENCE

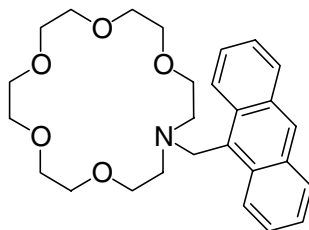
[www.publish.csiro.au/journals/ajc](http://www.publish.csiro.au/journals/ajc)

## Reviews

### Functionalized Macrocyclic Compounds: Potential Sensors of Small Molecules and Ions

Paul V. Bernhardt, Evan G. Moore

*Aust. J. Chem.* **2003**, 56, 239–258.



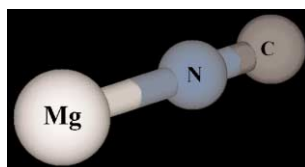
The applications of macrocycles in chemistry, biology, and physics as receptors and sensors for small molecules and ions continue to emerge. Focussing on recent examples employing complexation as the binding mechanism, some of the systems presented in this review have already found real-world applications. For example, the belyingly simple structure shown can act as a molecular AND gate, becoming fluorescent in the presence of both  $\text{Na}^+$  and acid conditions.

## Current Chemistry

### Deep Space Organometallic Chemistry

Simon Petrie

*Aust. J. Chem.* **2003**, 56, 259–262.



The cold depths of interstellar space contain many strange molecules, including a recently discovered and little-understood family of metal-containing compounds typified by  $\text{MgNC}$ . This manuscript presents an overview of efforts to explain the formation of molecules containing magnesium, or other metals, under conditions which differ drastically from those of the terrestrial laboratory.

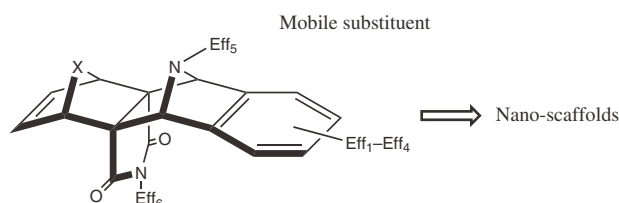
## Rapid Communications

### Position-Addressable Nano-Scaffolds. I. The Preparation of *N,O*-, *N,C*- and *N,N*-Bridged Sesquinorbornadiene Succinimides as Compact, Highly Functionalized Addressable Building Blocks

Ronald N. Warrener, Davor Margetic, Guangxing Sun, Richard A. Russell

*Aust. J. Chem.* **2003**, 56, 263–267.

Highly functionalized norbornenes containing at least one *N*-bridge can be produced by the Diels–Alder addition of five-membered 1,3-dienes or heterocycles to benzo-7-azanorbornadienes (not described heretofore) or by the addition of *N*-substituted isoindole to norbornadienomaleimides. Such norbornene blocks can contain up to six different effector groups, which can be introduced site-selectively to nanoscale scaffolds.

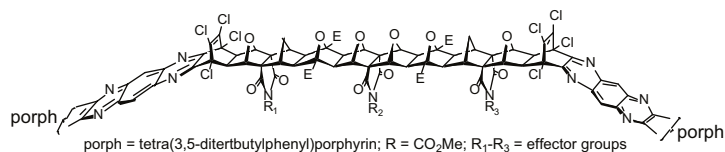


**Position-Addressable Nano-Scaffolds. II. The Introduction of One, Two, or Three Addressable Succinimide Linkage Points onto the Under-Surface of ‘Southern’ Cavity Bis-Porphyrins**

Ronald N. Warrener, Hongsui Sun,  
Martin R. Johnston

*Aust. J. Chem.* **2003**, 56, 269–273.

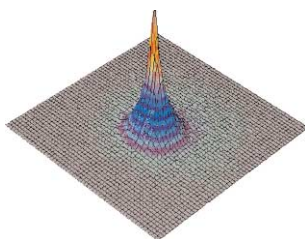
Novel cavity bis-porphyrins are formed in a short convergent strategy involving 1,3-dipolar addition of porphyrin-functionalized norbornenes with alicyclic bis-epoxides. The norbornene components are prepared in two steps from a readily available *O*-bridged sesquinorbornadienosuccinimide. Up to three effector groups can be located, position addressable, as succinimide *N*-substituents at the underface of the nano-scaffolds.



**The Dissociation Energy of the Benzene–Argon van der Waals Complex Determined by Velocity Map Imaging**

Rebecca K. Sampson,  
Warren D. Lawrance

*Aust. J. Chem.* **2003**, 56, 275–277.



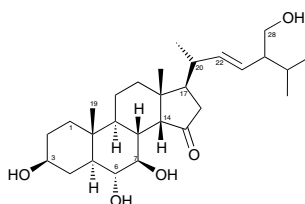
A fundamental understanding of condensed-phase chemistry requires an understanding of intermolecular interactions, which can be probed through studies of van der Waals molecules. The benzene–argon complex has become the prototype system for studying dispersion interactions involving aromatic  $\pi$ -systems. Reported here is the first experimental measurement of the binding energy of this complex.

**Short Communications**

**Clathriol B, a New 14 $\beta$  Marine Sterol from the New Zealand Sponge *Clathria lissosclera***

Robert A. Keyzers, Peter T. Northcote,  
Michael V. Berridge

*Aust. J. Chem.* **2003**, 56, 279–282.

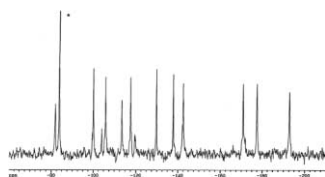


Marine sponges continue to be a rich source of structurally novel sterols with interesting biological activities. The authors here report the isolation and structure determination of clathriol B (shown), which was isolated from the New Zealand sponge *Clathria lissosclera*. Clathriol B has moderate anti-inflammatory activity, and was found to possess the rare 14 $\beta$  C/D *cis*-ring fusion stereochemistry.

**Tungsten NMR Spectra of the  $\alpha$ - and  $\beta$ -Isomers of Na<sub>8</sub>[SiW<sub>11</sub>O<sub>39</sub>]**

Bradley J. Smith, Vincent A. Patrick

*Aust. J. Chem.* **2003**, 56, 283–286.



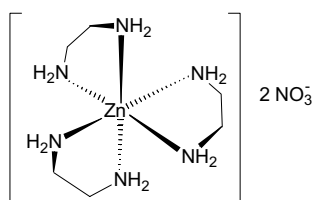
NMR spectroscopy is useful for identifying specific tungstate anions in complex solution equilibria. The <sup>183</sup>W NMR spectra of the isomers of the  $\beta$ -[SiW<sub>11</sub>O<sub>39</sub>]<sup>8-</sup> anion have been determined in solution. The spectra are consistent with the solid-state structures for these anions.

**Full Papers**

**Structural Definition of the Low-Temperature Phase Transition of Tris(ethane-1,2-diamine)zinc(II) Dinitrate**

Paul V. Bernhardt, Mark J. Riley

*Aust. J. Chem.* **2003**, 56, 287–291.

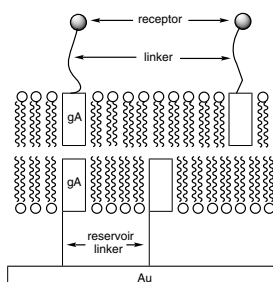


The 93 K X-ray crystal structure of tris(ethane-1,2-diamine)zinc(II) dinitrate resembles that of the room temperature structure, except the crystallographic *D*<sub>3</sub> symmetry of the complex cation (296 K) is lowered to *C*<sub>2</sub> (below 144 K) by subtle, reversible changes in cation–anion H-bonding. No change in the conformation of the cation or its bond lengths and angles was found, and the implications for the work of others who have utilized this inert host lattice in spectroscopic studies is discussed.

## Syntheses of New Gramicidin A Derivatives

Doreen Bali, Lionel King, Sungho Kim

*Aust. J. Chem.* **2003**, 56, 293–300.

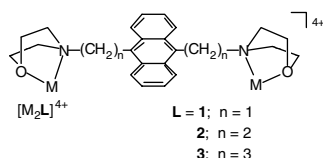


Gramicidin A is a linear peptide which, upon formation of head-to-head dimers, is capable of selectively facilitating the transport of monovalent cations across lipid bilayer membranes. Described here is the synthesis of a number of hapten-linked gramicidins, which can then be incorporated into the tethered lipid membranes of a diagnostic biosensing device that is currently under development.

## The Formation of Fluorescent Alkaline Earth Complexes by 4-{2-[10-(2-Morpholinoethyl)-9-anthryl]methyl}morpholine and its -Ethyl}morpholine and -Propyl}morpholine Analogues in Acetonitrile

Jason P. Geue, Nicholas J. Head,  
A. David Ward, Stephen F. Lincoln

*Aust. J. Chem.* **2003**, 56, 301–307.

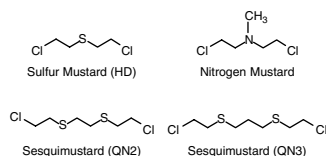


Complexation by the alkaline earths ( $M^{2+}$ ) modulates photoinduced electron transfer and enhances the fluorescence of  $L = (1)-(3)$  in  $[M_2L]^{4+}$  in acetonitrile. The precursor complexes are less fluorescent and exist in an equilibrium, where  $M^{2+}$  is either complexed by a single morpholine receptor,  $[ML]^{2+}$ , or by two in a sandwich complex,  $[ML']^{2+}$ , to extents varying with the identity of  $M^{2+}$  and  $L$ .

## Hydrolysis of Sesquimustards

Timothy D. St Quintin,  
D. Ralph Leslie, J. Grant Collins

*Aust. J. Chem.* **2003**, 56, 309–313.

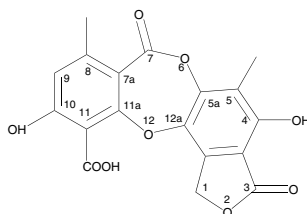


Sesquimustards have the potential to be used as persistent, liquid-contact, chemical warfare agents. It is important to develop an understanding of their reactions with water and various biomolecules, in order to develop antidotes and/or pretreatments. This paper presents the results of a NMR study of the hydrolysis of two sesquimustards, 1,2-bis(2-chloroethylthio)ethane and 1,3-bis(2-chloroethylthio)propane.

## Neotricone and Norperistictic Acid, Two New Depsidones from the Lichen Genus *Phaeographis*

John A. Elix, Klaus Kalb,  
Judith H. Wardlaw

*Aust. J. Chem.* **2003**, 56, 315–317.

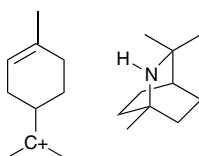


The structures of two new lichen-extracted depsidones, one of which is shown, were elucidated using a combination of partial syntheses, chromatographic comparisons, and spectroscopic data.

## Azacineole (1,3,3-Trimethyl-2-azabicyclo[2.2.2]octane)

Raymond M. Carman,  
Roger P. C. Derbyshire

*Aust. J. Chem.* **2003**, 56, 319–322.

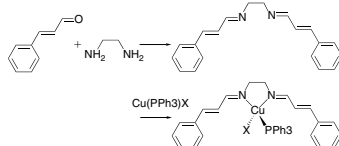


Biosynthesis of cineole, the most abundant and widespread component of eucalypt leaf oils, is postulated to occur through the cation depicted. This same cation might also be trapped by ammonia to provide azacineole, as shown. The synthesis of azacineole in four steps from limonene was undertaken in an effort to seek its presence in various trees.

## Synthesis, Characterization, and Crystal Structures of $[Cu(ca_2en)(PPh_3)(X)]$ ( $X = Cl, Br, I, NCS, N_3$ ) Complexes

Guido Kickelbick, Mehdi Amirnasr,  
Aliakbar D. Khalaji,  
Saeed Dehghanpour

*Aust. J. Chem.* **2003**, 56, 323–328.

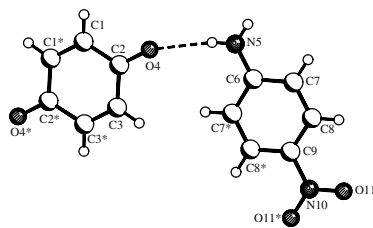


The steric, electronic, and conformational effects imparted by coordinated ligands in organometallic complexes play an important role in modifying the properties of the complexes. A thorough understanding of these effects will serve as the basis for a rational design of complexes with specific, predictable, and useful properties. This paper contributes towards this objective by reporting on the synthesis, characterization, and crystal structures of five copper(I) complexes.

### Solid-State Complexation Reaction between *p*-Benzoquinone and *p*-Nitroaniline

*N. B. Singh, Aradhana Pathak,  
Roland Fröhlich*

*Aust. J. Chem.* **2003**, 56, 329–333.



Solvent-free solid-state reactions are of special interest to industry. *p*-Benzoquinone penetrates the lattice of *p*-nitroaniline and a 1 : 1 hydrogen bonded complex forms with little distortion of the molecular geometry. The kinetics of the reaction was studied, the complex isolated, and its crystal structure determined.

### Unique Tetradentate Coordination of 2,2'-Bipyridyl-3,3'-Dicarboxylate (bpdc). Hydrothermal Synthesis and Crystal Structure of A Novel Polymeric Supramolecule [Co(bpdc)(H<sub>2</sub>O)<sub>2</sub>]<sub>n</sub>

*Ben-Lai Wu, Hong-Quan Zhang,  
Hong-Yun Zhang, Qing-An Wu,  
Hong-Wei Hou, Yu Zhu,  
Xiang-Yu Wang*

*Aust. J. Chem.* **2003**, 56, 335–338.

Binicotinic acid is an attractive molecule due to its bioactivity and is a potential multi-dentate ligand. However, its insolubility in most solvents makes the formation of metal complexes and their crystals difficult. Here the synthesis and X-ray crystal structure of a novel two-dimensional polymeric supramolecular complex of binicotinic acid and cobalt(II), where the acid uses its two nitrogen and two oxygen atoms to link a pair of cobalt atoms in a rare tetradentate fashion, as shown.

