

The cover shows a synthetic processive catalyst, a mimetic of DNA-repair enzymes, reported by Thordarson, Nolte, and Rowan (p. 323).

# AUSTRALIAN JOURNAL OF CHEMISTRY

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## Guest Editorial

### Frontiers in Organic Chemistry—Recent Advances, Future Directions, Multidisciplinary Interactions

Peter J. Duggan

*Aust. J. Chem.* **2004**, *57*, 279–280.



Organic chemistry's horizons are wide, ranging from molecular electronics to natural products, from new methods to natural products, from solid-phase synthesis to biocatalysis, from biological activity to chemical theory. All these topics and more feature in this issue of the *Australian Journal of Chemistry*.

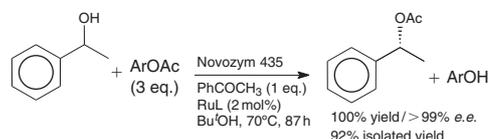
## Reviews

### Biocatalysis for Sustainable Organic Synthesis

Roger A. Sheldon, Fred van Rantwijk

*Aust. J. Chem.* **2004**, *57*, 281–290.

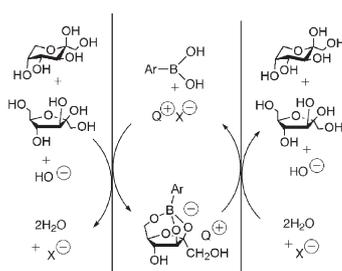
Biocatalysis has many potential benefits—including environmentally attractive catalysts and solvents, high activities, and chemo-, regio-, and stereoselectivities—to afford synthetic routes which are shorter and generate less waste. This review surveys these advances, taking examples from the synthesis of  $\beta$ -lactam antibiotics, the chemoenzymatic dynamic resolution of alcohols, and the use of cross-linked enzyme aggregates as novel biocatalysts.



### Fructose-Permeable Liquid Membranes Containing Boronic Acid Carriers

Peter J. Duggan

*Aust. J. Chem.* **2004**, *57*, 291–299.



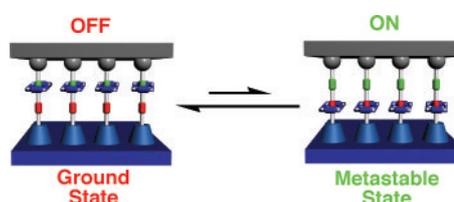
The production of sweeteners such as D-fructose is a highly energy-intensive process and hence practical, low-energy alternatives are highly sought. Described here is work based on membrane technology in which boronic acid carriers are utilized, such as that depicted, to bind multiple equivalents of D-fructose in preference to other sugars.

### Meccano on the Nanoscale—A Blueprint for Making Some of the World's Tiniest Machines

Amar H. Flood, Robert J. A. Ramirez, Wei-Qiao Deng, Richard P. Muller, William A. Goddard III, J. Fraser Stoddart

*Aust. J. Chem.* **2004**, *57*, 301–322.

Bistable molecular switches, based on non-degenerate [2]catenanes and [2]rotaxanes, have been developed along a timeline that began in 1978. These mechanically interlocked compounds have been integrated into electronic devices that can be switched between on and off conductance states. Evidence for a proposed electromechanical mechanism is presented.

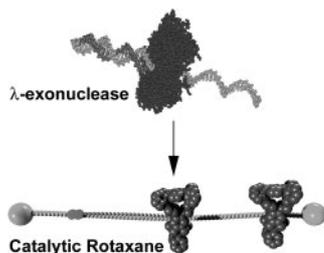


## Current Chemistry

### Mimicking the Motion of Life: Catalytically Active Rotaxanes as Processive Enzyme Mimics

Pall Thordarson, Roeland J. M. Nolte, Alan E. Rowan

*Aust. J. Chem.* **2004**, *57*, 323–327.

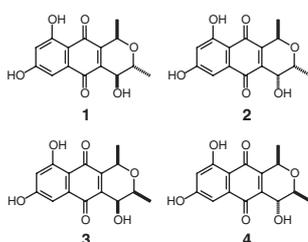


The toroidal motif is found in all living organisms, where it is a vital architectural element of processive catalysts that synthesize and repair DNA. In spite of this utility, few synthetic mimics exist; this paper describes the development of a molecular machine that runs along a polymer thread and carries out oxidation in a processive manner.

### The Diastereoselective Syntheses of Enantiopure Benzo- and Naphtho-pyrans Related to the Aphid Insect Pigments

Robin G. F. Giles

*Aust. J. Chem.* **2004**, *57*, 329–333.

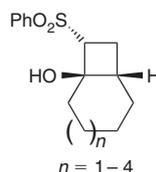


The derivatives quinone **1** and quinone **A'** **2** of aphid insect pigments are examples of potential bio-reductive dialkylating agents. The first syntheses of these quinones, as well as those of their naturally occurring C3 epimers **3** and **4**, using lactate from the chiral pool as the source of asymmetry, are outlined.

### A Facile Approach to Bicyclo[*n*.2.0]alkan-1-ols: An Overview

Wendy A. Loughlin

*Aust. J. Chem.* **2004**, *57*, 335–338.



Bicyclo[*n*.2.0]alkan-1-ols are an integral part of various frameworks of natural products. The reaction of the lithium enolates of simple ketones with (±)-phenyl vinyl sulfoxide and the controlled formation of bicyclo[*n*.2.0]alkan-1-ols was investigated. Facile access to bicyclo[*n*.2.0]alkan-1-ols (*n* = 3–6) bearing a bridgehead hydroxyl group was obtained.

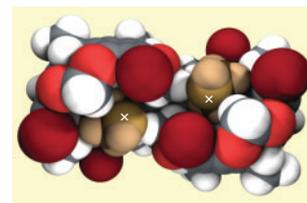
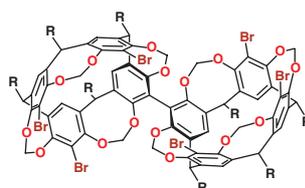
## Rapid Communications

### Chiral Conjoined Cavitanths

Jacob L. Irwin, David J. Sinclair, Alison J. Edwards, Michael S. Sherburn

*Aust. J. Chem.* **2004**, *57*, 339–343.

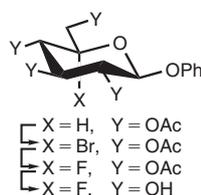
The synthesis and crystal structures of rim-linked cavitanth bowl dimers are described. These new conformationally restricted, double-cavity chiral hosts bind two ethanol molecules in the solid state (marked spheres).



### The Fluorination (at C5) of Some Derivatives of D-Glucose

Brian W. Skelton, Robert V. Stick, Keith A. Stubbs, Andrew G. Watts, Allan H. White

*Aust. J. Chem.* **2004**, *57*, 345–353.



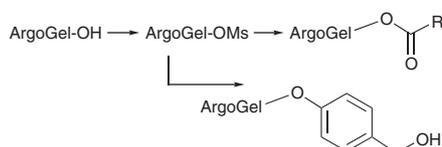
Fluoro sugars can act as potent, mechanism-based inhibitors of various glycosidases and glycanases. This paper reports the development of methods towards such molecules, for example through the photobromination at C5 of a pyranos(id)e, followed by fluorine exchange using silver tetrafluoroborate in ether/dichloromethane.

### Synthesis and Properties of a Mesylated ArgoGel Resin

Christine Le Sann, Andrew D. Abell

*Aust. J. Chem.* **2004**, *57*, 355–358.

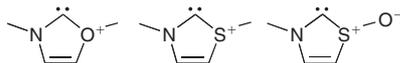
Treatment of the commercial resin ArgoGel-OH with methanesulfonylchloride and triethylamine gives ArgoGel-OMs, to which can be coupled—as shown in the graphic—a salt derived from a hydroxycarboxylic acid, an amino acid, or 4-hydroxybenzyl alcohol.



### Increased Stability of NO and NS Heterocyclic Carbenes?

David C. Graham, Brian F. Yates

*Aust. J. Chem.* **2004**, *57*, 359–364.

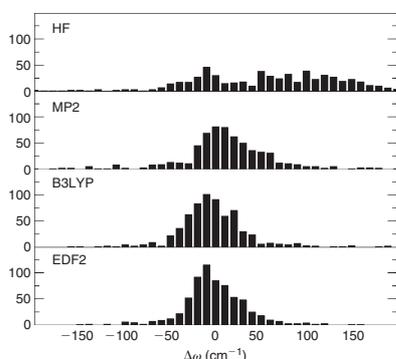


Can alkylation or oxidation increase the stability of heterocyclic carbenes?

### EDF2: A Density Functional for Predicting Molecular Vibrational Frequencies

Ching Yeh Lin, Michael W. George, Peter M. W. Gill

*Aust. J. Chem.* **2004**, *57*, 365–370.



A new density functional model (EDF2), explicitly designed to yield accurate harmonic frequencies, is introduced. The EDF2 model is found to be significantly more accurate than other DFT models and competitive with the computationally expensive CCSD(T) method for calculating vibrational spectra for a wide range of molecules.

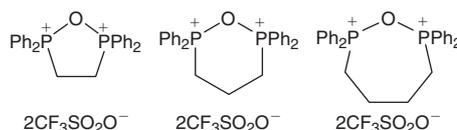
## Full Papers

### Cyclic Analogues of the Hendrickson ‘POP’ Reagent

Kathryn E. Elson, Ian D. Jenkins, Wendy A. Loughlin

*Aust. J. Chem.* **2004**, *57*, 371–376.

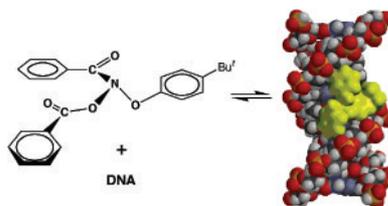
The synthesis of novel cyclic analogues of the Hendrickson reagent and their use in simple dehydration reactions are described. The rate of esterification is considerably increased when the five-membered ring analogue is employed. The use of non-polar solvents with the Hendrickson reagent also increases the rate of ester formation.



### Mutagenic *N*-Acyloxy-*N*-alkoxyamides: Probes for Drug–DNA Interactions

Luke E. Andrews, Tony M. Banks, Antonio M. Bonin, Samuel F. Clay, Ashley-Mae E. Gillson, Stephen A. Glover

*Aust. J. Chem.* **2004**, *57*, 377–381.



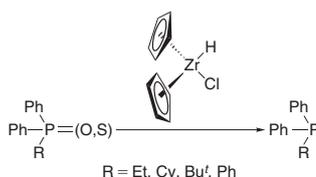
The title compounds are direct-acting mutagens towards *Salmonella typhimurium* TA100. From extensive mutagenicity data a QSAR has been derived that predicts activity based upon hydrophobicity, reactivity, and steric effects. Deviations from this QSAR highlight structural features such as planar polycyclic aromatics or sterically bulky groups that can enhance or impede association of small molecules with DNA.

## Focus

### Chemoselective Reduction by Cp<sub>2</sub>Zr(H)Cl (Schwartz’s Reagent)

Heedong Yun

*Aust. J. Chem.* **2004**, *57*, 383.



Organozirconocenes mediate a wide variety of organic transformations, in particular, Schwartz and coworkers pioneered the use of hydrozirconation for the functionalization of organic compounds. Recently, however, it has been recognized that the title reagent is also especially useful for effecting chemoselective reductions of carbonyl groups and other compounds.

## Book Review

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