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Editorial

The Australian Journal of Chemistry – Its New Publishing Concept

Curt Wentrup

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RESEARCH FRONT: Microwave and Green Chemistry

Reviews

A Strategic, ‘Green’ Approach to Organic Chemistry with Microwave Assistance and Predictive Yield Optimization as Core, Enabling Technologies

Christopher R. Strauss

Aust. J. Chem. **2009**, *62*, 3–15.

A technological matrix developed over the past 20 years has assisted the establishment of the now-significant fields of microwave chemistry, green chemistry and reactions in high-temperature water. Key innovations included batch and continuous microwave reactors that have created a global market with annual estimated sales around \$US 90 million, Pd on porous glass catalyst for coupling reactions, at least three green synthetic reactions, a platform technology geared toward phenol/formaldehyde replacement products, the use of dimcarb as a ‘distillable’ protic ionic liquid and unprecedented predictive software for translating reaction conditions and optimising yields. Individually and collectively, these and other developments routinely enable reactions to be carried out orders of magnitude faster than previously, more cleanly, more predictably and in higher yields, thereby generating a paradigm shift in approaches to synthetic organic chemistry.

Microwave-Assisted Chemistry: a Rapid and Sustainable Route to Synthesis of Organics and Nanomaterials

*Vivek Polshettiwar,
Mallikarjuna N. Nadagouda,
Rajender S. Varma*

Aust. J. Chem. **2009**, *62*, 16–26.

Although not quite as popular as its kitchen counterpart, the microwave (MW) oven termed ‘the Bunsen burner of the 21st century’ is rapidly becoming a typical laboratory gadget in the chemical laboratories. This brief review highlights recent developments in the rapid synthesis of organic molecules and nanomaterials using MW irradiation. Encompassing the sustainable attributes of eco-friendly reaction conditions in to expedient MW-assisted processes may pave the way to emergence of new greener chemical pathways.

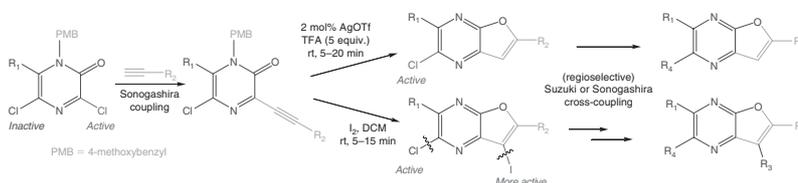
Full Papers

Diversity-Oriented Synthesis of Substituted Furo[2,3-*b*]pyrazines

Vaibhav P. Mehta, Sachin G. Modha,
Denis Ermolat'ev, Kristof Van Hecke,
Luc Van Meervelt,
Erik V. Van der Eycken

Aust. J. Chem. **2009**, *62*, 27–41.

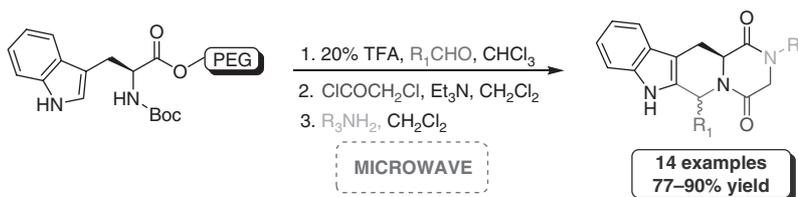
A novel procedure for the generation of difficult to attain diversely substituted furopyrazines is developed. The key step of this sequence is a mild, one step Ag^+ - or iodine-mediated electrophilic cyclization with concomitant cleavage of the protecting *p*-methoxybenzylether. The application of microwave irradiation is shown to be highly valuable for reducing the reaction times.

**Microwave-Assisted Synthesis of Tetracyclic 2,5-Diketopiperazines on a Soluble Polymer Support: A Structural Analogue of Tadalafil**

Wong-Jin Chang, Kaushik Chanda,
Chung-Ming Sun

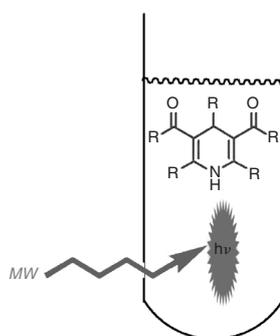
Aust. J. Chem. **2009**, *62*, 42–50.

Structural analogues of tadalafil are synthesized from a soluble polymer support by employing a Pictet–Spengler reaction using focused microwave irradiation. Subsequently immobilized tetrahydro β -carboline underwent intramolecular N-heterocyclization in a traceless fashion to generate tetracyclic 2,5-diketopiperazines. The present method can be applied for the generation of several molecules that closely resemble biologically active natural products.

**Microwave Heating in Conjunction with UV Irradiation: a Tool for the Oxidation of 1,4-Dihydropyridines to Pyridines**

Chad M. Kormos, Rachel M. Hull,
Nicholas E. Leadbeater

Aust. J. Chem. **2009**, *62*, 51–57.

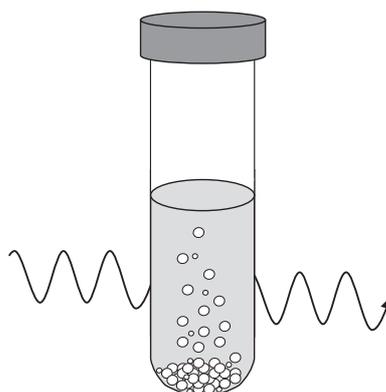


Zap it with light and microwaves. In this paper, microwave heating in conjunction with UV irradiation is used to oxidize 1,4-dihydropyridines to the corresponding pyridines. Oxidation using singlet oxygen generated in situ offers a clean methodology.

Simplifying the Free-Radical Polymerization of Styrene: Microwave-Assisted High-Temperature Auto Polymerizations

Tina Erdmenger, C. Remzi Becer,
Richard Hoogenboom,
Ulrich S. Schubert

Aust. J. Chem. **2009**, *62*, 58–63.



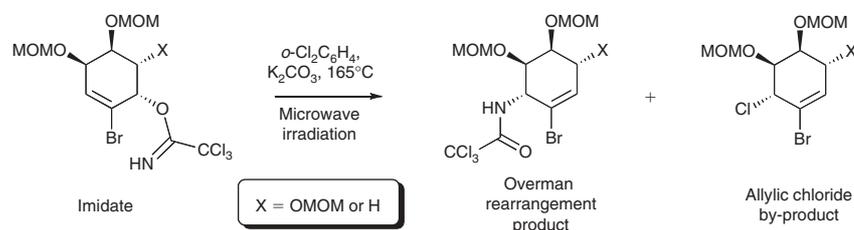
Thermally auto-initiated free radical and precipitation polymerizations have been combined for a fast and environmentally friendly approach to produce polystyrene. Use of a commercially available stable free nitroxide allowed control of the molecular weight of the polymer by changing the ratio of styrene to free nitroxide and moderate polydispersity indices could be obtained.

The Regio- and Stereo-Selective Formation of Allylic Chlorides During the Overman Rearrangement of Trichloroacetimidates Derived from Certain Brominated Conduritols

Maria Matveenko, Anthony C. Willis,
Martin G. Banwell

Aust. J. Chem. **2009**, *62*, 64–68.

Microwave irradiation of the illustrated imidates at 165°C leads to mixtures of the illustrated Overman rearrangement products and novel allylic chloride by-products. Such reactions have been employed previously to prepare various halogenated conduramines required for the synthesis of certain *Amaryllidaceae* alkaloids.

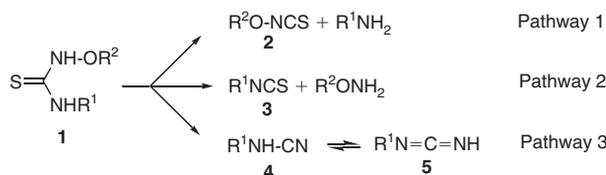


Alkoxy Isothiocyanates as Intermediates in the Flash Vacuum Pyrolysis of Alkoxythioureas

Carl Th. Pedersen, Frank Jensen,
Robert Flammang

Aust. J. Chem. **2009**, *62*, 69–74.

Alkoxy isothiocyanates are an elusive group of compounds. Their formation by flash vacuum pyrolysis of alkoxy-substituted thioureas is demonstrated. The usefulness of a combination of IR matrix isolation technique, online mass spectrometry, and theoretical calculations is shown.

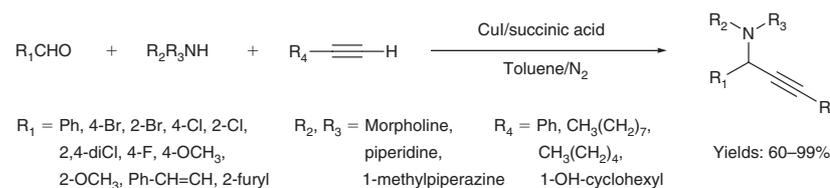


A Simple and Economic Synthesis of Propargylamines by CuI-Catalyzed Three-Component Coupling Reaction with Succinic Acid as Additive

Gerui Ren, Jinli Zhang, Zheng Duan,
Mengjun Cui, Yangjie Wu

Aust. J. Chem. **2009**, *62*, 75–81.

A practical and efficient method was developed for the synthesis of propargylamines in a one-pot procedure from aldehydes, amines, and alkynes. This procedure was catalyzed efficiently by easily available CuI/succinic acid. By using this protocol, a wide range of propargylamines was obtained in high yields.

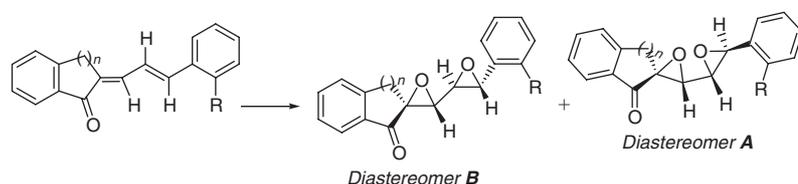


Dimethyldioxirane Oxidation of Exocyclic (E,E)-Cinnamylideneketones

Albert Lévai, Artur M. S. Silva,
Clementina M. M. Santos,
José A. S. Cavaleiro, József Jekő

Aust. J. Chem. **2009**, *62*, 82–89.

The epoxidation of exocyclic (*E,E*)-cinnamylideneketones with an excess of dimethyldioxirane provides a diastereomeric mixture of the $\alpha,\beta,\gamma,\delta$ -diepoxides and in the case of *ortho*-nitrocinnamylidene, derivatives the α,β -monoepoxides as minor products. The structures of all new compounds and the stereochemistry of the monoepoxides and diepoxide diastereomers were fully established by NMR studies. These types of compounds can have potential biological or industrial applications as some of their derivatives are the starting materials of several heterocyclic compounds.



Focus

Confocal Microscopy: Exploring the Cellular Uptake and Intracellular Distribution of Fluorescent Metal-Based Drugs*Ryan J. E. Harrison**Aust. J. Chem.* **2009**, 62, 90.

At the present, there is much research focussed on the use of transition metal-based drugs, particularly ruthenium(II)-based complexes, as diagnostic agents. Despite the wealth of knowledge surrounding the synthesis and other various properties of these drugs, there is a lack of information regarding the mechanisms of their cellular uptake and intracellular distribution. This article proposes the use of confocal microscopy to evaluate these mechanisms in an attempt to shed some light on this particular area of research.
