

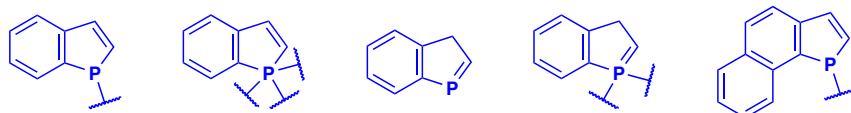
## Abstracts

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10.17 **Benzo[*b*]phospholes**R. A. Aitken 

This chapter is a complete revision and update of the earlier *Science of Synthesis* contribution from 2000 describing methods for the synthesis of benzo[*b*]phospholes. About half of the references cited describe newer methods reported between 2000 and 2021 and, as well as extensions to the previously described approaches, several completely new approaches are included. Among the strategies covered are reactions of metalated phenylalkyne derivatives with phosphorus halides, cyclizations of (2-alkynylphenyl)phosphorus compounds, direct reactions of phenylphosphorus compounds with alkynes, and aromatization of dihydro derivatives. In addition, the initially obtained compounds can be converted into a variety of derivatives by modification at phosphorus by oxidation, substitution, or reduction.



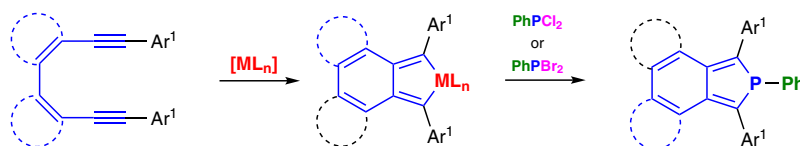
**Keywords:** heterocycles · benzophospholes · phospholes · phosphorus compounds · ring closure · aromatization

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10.18 **Benzo[*c*]phospholes**R. A. Aitken 

This chapter is a complete revision and update of the earlier *Science of Synthesis* contribution from 2000 describing methods for the synthesis of benzo[*c*]phospholes. A third of the references describe newer methods reported between 2000 and 2021 and several completely new approaches are included. Synthetic strategies for preparing these ring systems include metal-mediated reactions of 2,2'-bis(aryalkynyl)biaryls with phosphorus dihalides, reaction of *ortho*-disubstituted benzenes with phosphorus compounds, and aromatization of dihydrobenzo[*c*]phospholes.



**Keywords:** heterocycles · benzophospholes · phospholes · phosphorus compounds · ring closure · aromatization

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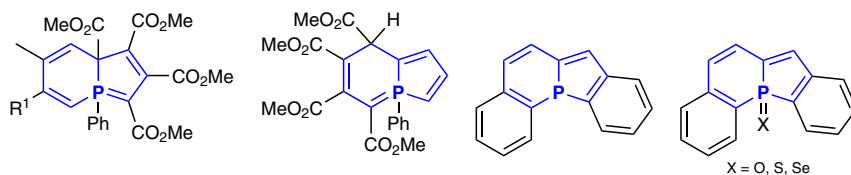
Completely Revised Contributions ·

New

New Contributions

**Phosphorus Analogues of Indolizines**R. A. Aitken 

This chapter is a complete revision and update of the earlier *Science of Synthesis* contribution from 2000 describing methods for the synthesis of phosphorus analogues of indolizines. The previous route to this rare ring system, reaction of a phosphole with dimethyl acetylenedicarboxylate, has now been joined by a metathesis-based method leading to the parent dibenzophosphindolizine and its chalcogen derivatives.



**Keywords:** heterocycles · phosphindolizines · phospholes · phosphorus compounds · ring closure · alkene metathesis

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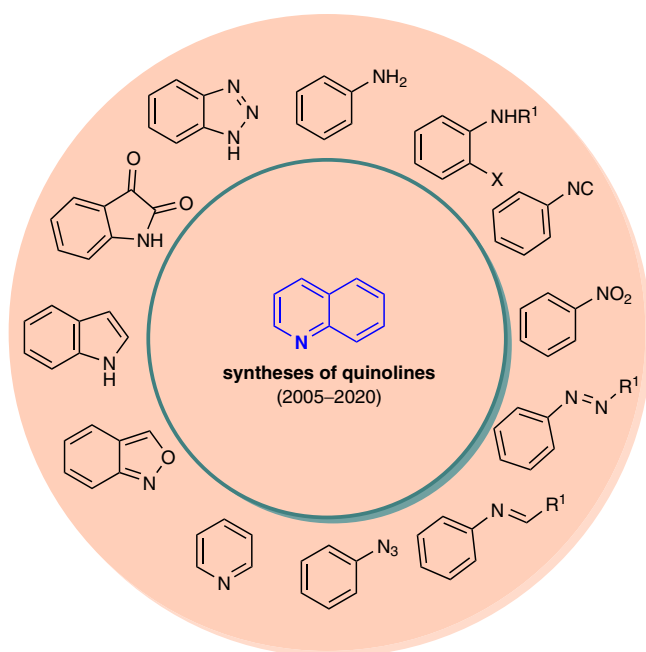
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15.3.4

**Quinolines**

U. Sharma, R. Kumar, S. S. Gupta, and D. Chandra

The quinoline structure (also referred to as benzo[b]pyridine or 1-azanaphthalene) is the most explored heteroaromatic ring system, with compounds having this unit exhibiting pharmacological activities and featuring in several marketed drugs. Therefore, in this contribution, an update to the previous *Science of Synthesis* chapter on quinolines has been compiled, covering the literature reported between 2005 and 2020. Diverse routes to access the quinoline core, as well methods for the preparation of functionalized quinolines, have been collated, which originate from a wide array of starting materials. The strategies covered include condensations, annulations, metal-catalyzed approaches, oxidations, cyclizations, tandem reactions, and many more.



**Keywords:** quinolines · heterocycles · annulation · cyclization · transition metals · anilines · condensation

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Completely Revised Contributions ·

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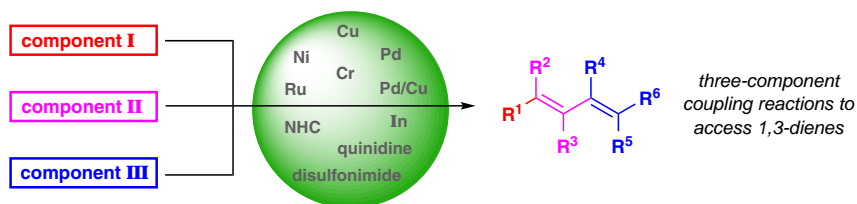
New Contributions

New

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46.5.7 **Three-Component Coupling Reactions that Generate 1,3-Dienes**S. E. Sloane, K. T. Behlow, M. D. Mills, and J. R. Clark<sup>ORCID</sup>

Three-component coupling reactions have emerged as an atom-economical approach to generate a wide variety of new molecular architectures containing a 1,3-diene. While a variety of methods exist to generate 1,3-dienes, three-component coupling reactions permit stereoselective access to unique substitution patterns within this privileged functionality. Dienes are ubiquitous in natural products and bioactive molecules, and also serve as important building blocks in organic synthesis. Transition-metal-catalyzed three-component couplings that employ a nickel, copper, palladium, ruthenium, palladium/copper, chromium, or indium catalyst can provide access to a diverse array of 1,3-dienes. Organocatalytic three-component coupling reactions offer an alternate route to 1,3-dienes without the use of a metal catalyst. The multiple synthetic methods to generate 1,3-dienes using a three-component coupling approach bring diversity to the organic chemistry toolbox, and these methods are discussed in this chapter.



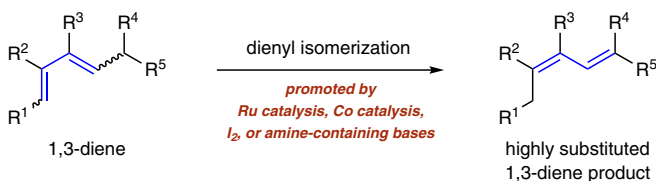
**Keywords:** 1,3-dienes · three-component coupling · transition-metal catalysis · organocatalysis · stereoselective synthesis · multicomponent reactions

New

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46.14 **Conjugated Diene Synthesis by Rearrangement of 1,3-Dienes to 1,3-Dienes**M. D. Mills and J. R. Clark<sup>ORCID</sup>

The ubiquity of 1,3-dienes in natural products remains an inspiration for developing new reactions to access conjugated diene functionality, with controlled substitution at various positions within the diene. Isomerization of 1,3-dienes has emerged as a unique approach to access highly substituted 1,3-diene functionality in small organic molecules. This review covers classical and modern synthetic strategies to accomplish dienyl isomerization reactions, including the transition-metal-catalyzed and metal-free transformations of 1,3-dienes, to afford more stabilized and sometimes more highly substituted 1,3-diene functionality.



**Keywords:** 1,3-dienes · dienyl isomerization · ruthenium hydride catalysis · cobalt hydride catalysis · conjugated dienes · rearrangements · transition-metal catalysis

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Completely Revised Contributions ·

New

New Contributions