

Abstracts

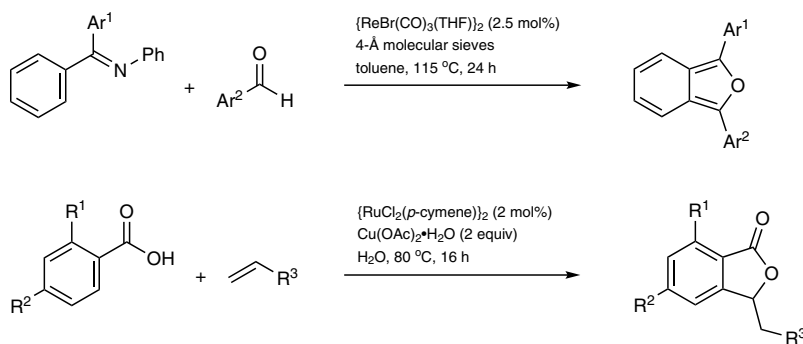
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10.2 Product Class 2: Benzo[c]furan and Its Derivatives

H. Kwiecień

This chapter is a revision of the earlier *Science of Synthesis* contribution describing methods for the synthesis of benzo[c]furans (isobenzofurans), and has been expanded to include 1,3-dihydrobenzo[c]furan-1(3*H*)-ones [1,3-dihydroisobenzofuran-1(3*H*)-ones, phthalides]. Various methods for the in situ generation of the very reactive benzo[c]furans and their trapping with dienophiles through Diels–Alder reactions, as well as approaches to the preparation of stable 1,3-diarylbenzo[c]furans, are presented. Classical routes to 1,3-dihydrobenzo[c]furan-1(3*H*)-ones involve the disproportionation of 1,2-diacylbenzenes or formation of the lactone ring from 2-functionalized benzoic acid derivatives. More recent developments that involve other approaches are also included.

R³ = CN, CO₂Me

Keywords: benzo[c]furans · isobenzofurans · 1,3-dihydrobenzo[c]furan-1(3*H*)-ones · phthalides · organometallic reagents · transition-metal catalysts · cyclization · Diels–Alder cycloaddition · retro-Diels–Alder reaction · lactonization · pyrolysis · asymmetric reaction · ring transformation · aromatization

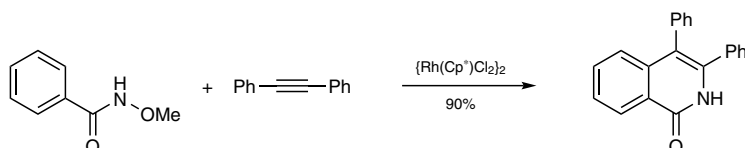
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15.6.3 Isoquinolinones

V. A. Glushkov and Yu. V. Shklyaev

This chapter is an update to the earlier *Science of Synthesis* contribution describing methods for the synthesis of isoquinolin-1(2*H*)-ones and isoquinolin-3(2*H*)-ones. The focus is on the literature published in the period 2005–2015, and includes new cyclization reactions, C–H activation methods, and catalysis by metal complexes of nickel, ruthenium, rhodium, and palladium.



Keywords: isoquinolines · isoquinolinones · benzamides · cyclization · lactamization · C–H bond activation · annulation · acetylenes · transition-metal catalysis · nickel · ruthenium · rhodium · palladium

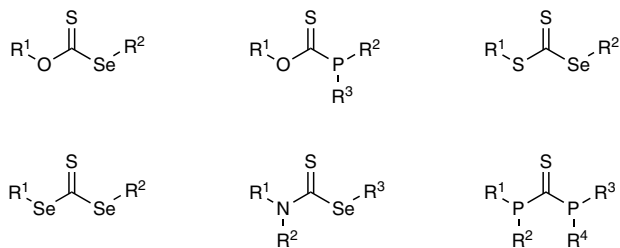
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18.10.15 Thiocarbonic Acids and Derivatives

R. A. Aitken

This chapter is an update to the earlier *Science of Synthesis* contribution (Section 18.10) describing methods for the synthesis of thiocarbonic acids and derivatives and their applications in organic synthesis. In addition to new methods and applications for the more common derivatives covered in the original chapter, synthesis and applications of several less common systems are included for the first time.



Keywords: sulfur compounds · selenium compounds · tellurium compounds · thiocarbonyl compounds · thiocarbamates · thionyl compounds · thioureas · dithiocarbonates · dithiocarbamates

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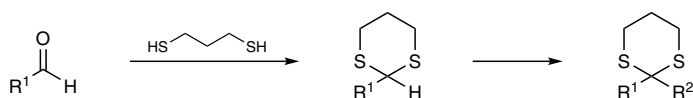
New Contributions

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30.3.4.3 **1,3-Dithianes***Y. Saikawa and M. Nakata*

1,3-Dithianes are widely used as carbonyl protecting groups as they are stable under both acidic and basic conditions. They are intermediates in desulfurization reactions and they also enable carbonyl umpolung by metalation. This chapter discusses advances in 1,3-dithiane synthesis published since 2007, including solid-supported thioacetalization reactions.



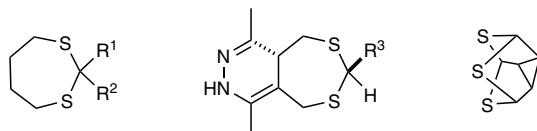
Keywords: acetalization · umpolung · dithianes · metalation · dithiols

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30.3.5.3 **1,3-Dithiepanes***Y. Saikawa and M. Nakata*

1,3-Dithiepanes are less common than 1,3-dithiolanes or 1,3-dithianes, but are also used in the thioacetalization of carbonyl compounds. This chapter covers methods published since 2007, including fused rings with hidden 1,3-dithiepane substructures.



Keywords: dithiepanes · Lewis acid catalyzed reactions · acetalization · fused-ring systems · dithiols

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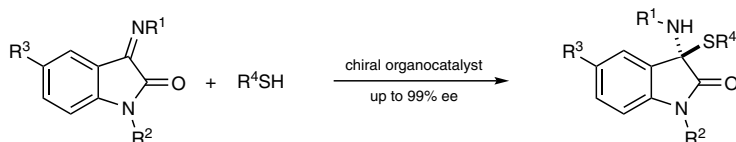
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30.4.3 **S,N-Acetals (α -Amino Sulfur Derivatives)**

Y. Mutoh

This chapter is an update to the earlier *Science of Synthesis* contribution (Section 30.4) describing methods for the synthesis of *S,N*-acetals (also known as *N,S*-acetals or α -amino sulfur derivatives) that have been reported since 2003. One of the major recent developments involves the enantioselective synthesis of *S,N*-acetals by organocatalysis.



Keywords: *S,N*-acetals · α -amino sulfur derivatives · alkylation · nucleophilic addition · phase-transfer catalysis · asymmetric catalysis · acid catalysts · electrophilic additions · cycloadditions · sulfur compounds · thiols · iminium salts

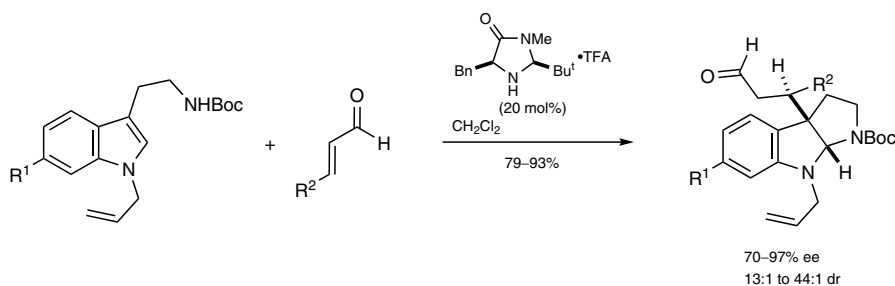
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30.6.3 **N,N-Acetals (Aminals)**

Y. Mutoh

This chapter is an update to the earlier *Science of Synthesis* contribution (Section 30.6) describing methods for the synthesis of *N,N*-acetals (also known as aminals) that have been reported since 2003. The major recent advances include methods for the enantioselective synthesis of *N,N*-acetals by organocatalysis and by transition-metal catalysis.

R¹ = H, Br; R² = H, Bz, CO₂Me

Keywords: *N,N*-acetals · aminals · alkylation · nucleophilic addition · asymmetric catalysis · acid catalysts · electrophilic additions · cycloadditions · hetero-Diels–Alder reactions · imines · palladium catalysts · iridium catalysts

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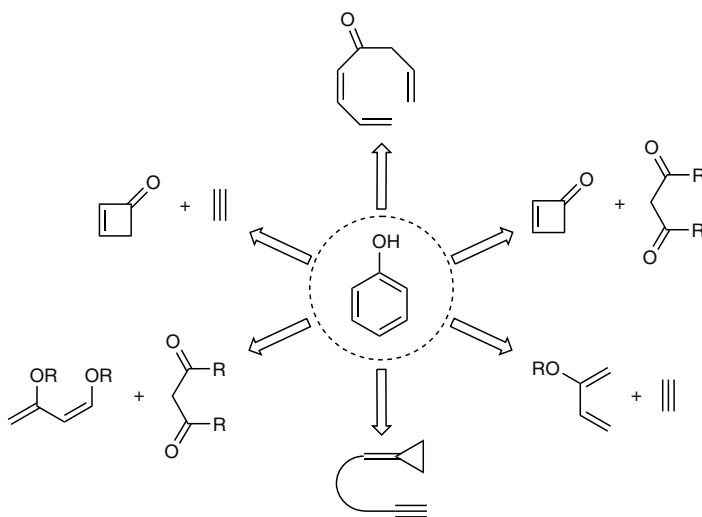
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31.5.1.5.12 **Synthesis of Phenols from Nonaromatic Precursors**

C. González-Bello

The introduction, or chemical modification, of substituents on an existing aromatic ring is probably the most widely employed strategy for the synthesis of phenols, and these methods are summarized in Sections 31.5.1.1 to 31.5.1.4. However, with such transformations, it is sometimes difficult to achieve satisfactory regiocontrol. Furthermore, the required precursors may be expensive, difficult to synthesize, or simply unavailable. The direct construction of a phenol ring from acyclic precursors that already bear the required substituents at the appropriate positions represents a good alternative. This strategy is particularly useful for the synthesis of highly substituted phenols. In this chapter, an update of the reported methods for this approach, which were originally described in Section 31.5.1.5 of *Science of Synthesis* in 2007, is provided, and includes methods for benzannulation, cycloaromatization, cyclocondensation, and ring-closing metathesis.



Keywords: phenols · benzannulation · cycloaromatization · cyclizations · cyclocondensation · ring-closing metathesis · Diels–Alder reactions

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