

## Abstracts

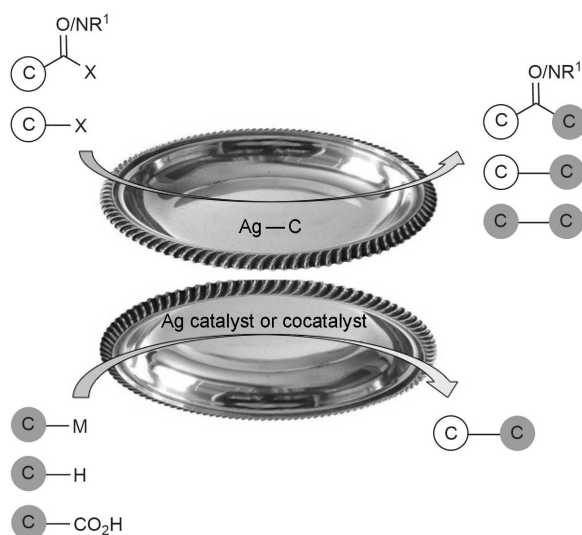
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p 1

## 3.5.13 Silver-Promoted Coupling Reactions

J.-M. Weibel, A. Blanc, and P. Pale

Silver salts or complexes promote a variety of useful C–C bond-forming transformations in organic synthesis, usually under very mild conditions. In these reactions, silver can be engaged either as catalyst or cocatalyst, or as an organometallic reagent. Organosilver species act as mild nucleophiles toward alkyl halides or epoxides, but also toward carbonyl and imine derivatives and related heterocycles such as pyridines or quinolines. Silver can promote the homocoupling of a variety of organometallic reagents, of heterocycles, and of electron-deficient alkenes upon addition of the corresponding fluoride salts. Silver also promotes the cross coupling of alkyl or aryl halides, alkenes and alkynes, and even (het)arenes. Furthermore, silver salts often improve the efficiency of palladium-catalyzed cross-coupling reactions, or coupling reactions involving C–H activation or decarboxylation.



**Keywords:** silver · C–C bond formation · homocoupling · cross coupling · catalysis

2018

p 111

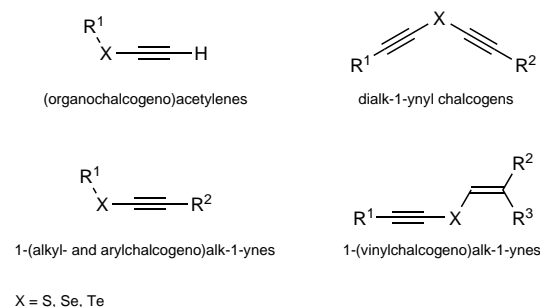
## 24.4.3.5 1-(Organosulfanyl)-, 1-(Organoselanyl)-, and 1-(Organotellanyl)alk-1-yne

A. Ulfkjær and M. Pittelkow

This chapter is an update to the earlier *Science of Synthesis* review (Section 24.4.3) describing the synthesis of 1-(organochalcogeno)alk-1-yne, where the chalcogen is sulfur, selenium, or tellurium. It covers the literature from the period 2005–2016. Many of the approaches to these molecules involve reaction of an acetylide with a suitable chalcogen source, but other methods include the formation of the C≡C bond by elimination, the reaction of a chalcogenide species with alkynes bearing a leaving group at the alkyne ter-

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minus, and various types of coupling reactions. Also covered in this update are the recent applications of the title compounds. The wide range of reactions reported shows the importance of these molecules as building blocks and key intermediates in organic synthesis.



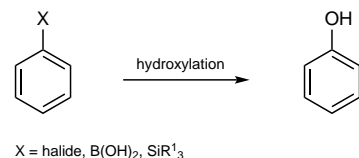
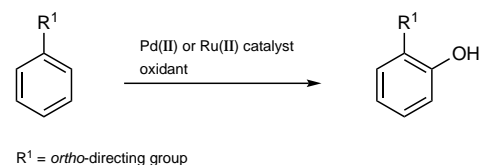
**Keywords:** sulfides · selenides · tellurides · chalcogens · thioethers · alkynes · acetylenes · acetylides · cross coupling · substitution · alkylation · cycloaddition

2018 ————— p 211 —

### 31.5.1.1.18 Synthesis of Phenols and Phenolates by Substitution

C. González-Bello

This chapter is an update to the earlier *Science of Synthesis* review (Section 31.5.1.1) describing the synthesis of monohydric phenols by substitution approaches. It focuses on the literature published in the period 2007–2016, with a particular emphasis on the recent C–H activation methods and hydroxylation by substitution of diverse functional groups, including boronic acids, silanes, and halides.



**Keywords:** phenols · phenolates · hydroxylation · photooxidation · C–H bond activation · metal-catalyzed hydroxylation · arylboronic acids · arylsilanes · alkoxy(aryl)silanes · aryl halides

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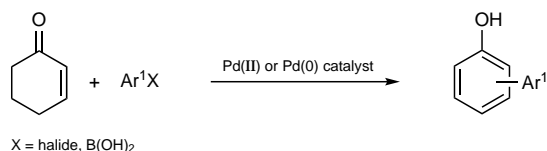
2018

p 233

31.5.1.2.7 **Synthesis of Phenols and Phenolates by Elimination**

C. González-Bello

This chapter is an update to the earlier *Science of Synthesis* review (Section 31.5.1.2), published in 2007, describing the synthesis of monohydric phenols by elimination approaches. It focuses on recent, palladium-catalyzed arylation/aromatization methods as well as the nickel-catalyzed hydrogenolysis of diaryl ethers.



**Keywords:** phenols · aromatization · arylation · tandem reaction · hydrogenolysis · cyclohexanones · cyclohexenones · diaryl ethers · palladium · nickel

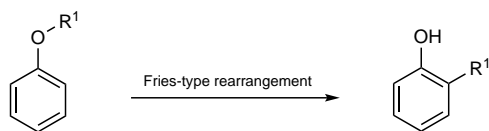
2018

p 239

31.5.1.3.6 **Synthesis of Phenols and Phenolates by Rearrangement**

C. González-Bello

This chapter is an update to the earlier *Science of Synthesis* review (Section 31.5.1.3) describing the synthesis of monohydric phenols by rearrangement. It focuses on the literature published in the period 2007–2016, with a particular emphasis on anionic and Lewis acid mediated Fries-type rearrangements.



**Keywords:** phenols · Fries-type rearrangement · arylation · tandem reaction · hydrogenolysis · dienones · allyl aryl ethers · Lewis acids · C-glycosylphenols · chlorosilanes · O-arylcarbamates

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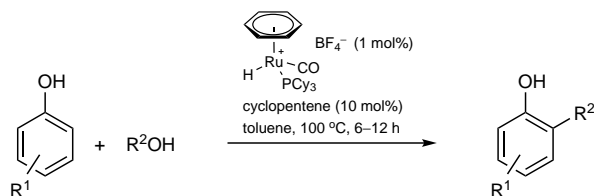
2018

p 245

31.5.1.4.3 **Synthesis of Phenols and Phenolates with Retention of the Functional Group**

C. González-Bello

This chapter is an update to the earlier *Science of Synthesis* review (Section 31.5.1.4) describing the functionalization of monohydric phenols. It focuses on the literature published in the period 2007–2016, with a particular emphasis on metal-catalyzed alkylation methods as well as trifluoromethylsulfanylation approaches.



**Keywords:** phenols · halogenation · metal-catalyzed alkylation · trifluoromethylsulfanylation · hydrogenolysis · chlorophenols · C–H alkylation

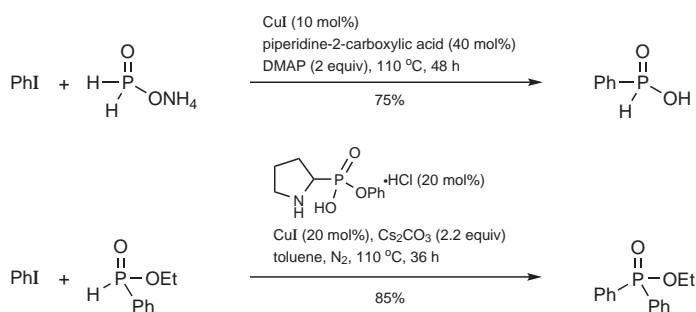
2018

p 255

31.40.3 **Arylphosphinic Acids and Derivatives**

D. Virieux, T. Ayad, J.-L. Pirat, and J.-N. Volle

This chapter is an update to Section 31.40 and describes published methods for the synthesis of arylphosphinic acids and derivatives reported from 2007 to early 2016. Reports on the syntheses of arylphosphinic acids and derivatives are limited to arylphosphinic acids and arylphosphinates [Ar<sup>1</sup>R<sup>1</sup>P(O)OH and Ar<sup>1</sup>R<sup>1</sup>P(O)OR<sup>2</sup>, respectively], for which R<sup>1</sup> and R<sup>2</sup> are a hydrogen atom or any kind of hydrocarbon substituent (e.g., alkyl, aryl, hetaryl).



**Keywords:** arylphosphinic acids · arylphosphinates · phosphines · phosphonites · phosphorus · phosphine oxides · arylation · transition-metal catalysis · esterification

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2018

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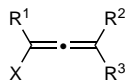
2018

p 347

32.2.6 **Monofunctionalized Allenes**

A. S. K. Hashmi

This chapter is an update to *Science of Synthesis* Section 32.2, covering the synthesis of allenes bearing one heteroatom substituent on the cumulated diene core. It covers the literature from 2008 to 2016. Many routes to these allenes start from alkynes, enynes, or propargylic systems and the syntheses proceed through substitution/rearrangement, but reactions involving the modification of an existing allene core are also included. In recent years, the synthesis of enantiomerically pure allenes has been of particular interest.



X = F, Br, Cl, I, O, S, Se, N, P, Si, Sn

**Keywords:** allenes · haloallenes · allenyl ethers · allenyl sulfides · allenylamides · allenylamines · allenylphosphorus compounds · allenylsilanes · rearrangement · isomerization · alkynes · enynes · propargylic systems

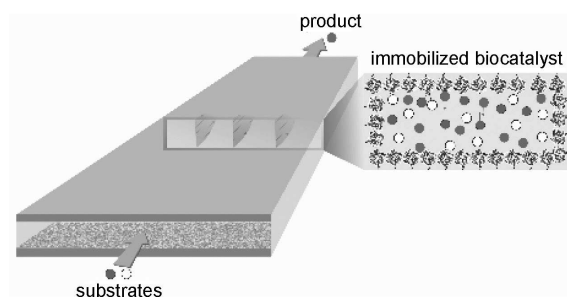
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p 397

3.12 **General Aspects of Immobilized Biocatalysts and Their Applications in Flow**

M. Bajić, P. Žnidaršič-Plazl, M. Kingston, and V. Hessel

This chapter is a comprehensive review of methods for the immobilization of biocatalysts, namely enzymes and whole cells, in microflow reactors. Immobilization on microchannel surfaces, in monoliths, hydrogels, membranes, or other internal structures within microreactors are described. The characteristics of packed-bed and magnetic-field-assisted microreactors and two-liquid-phase flow systems with immobilized biocatalysts and some applications are presented.



**Keywords:** enzymes · biocatalysis · immobilization · microfluidics · microreactors · miniaturized packed-bed reactors

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