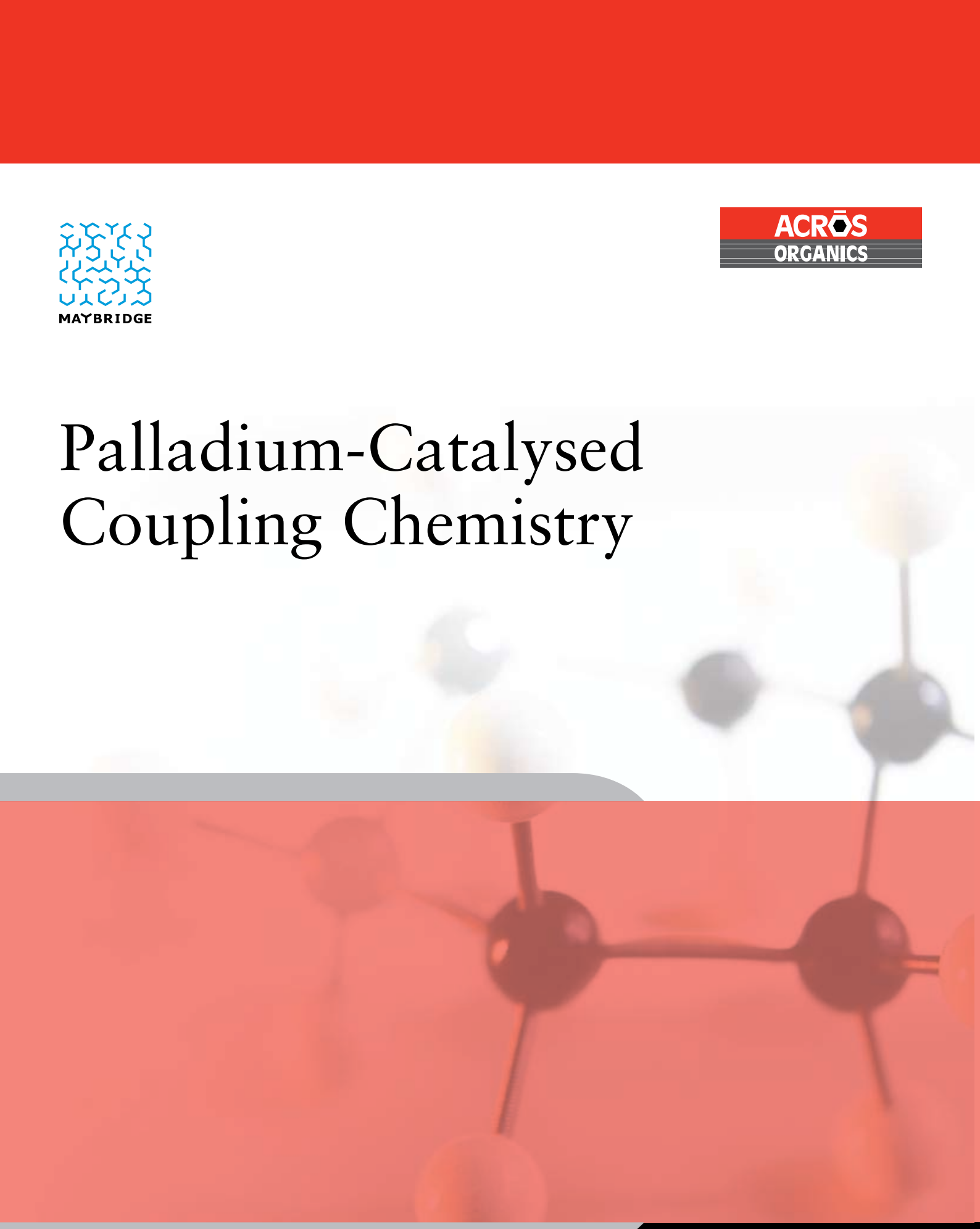
MAYBRIDGE

ACROS ORGANICS

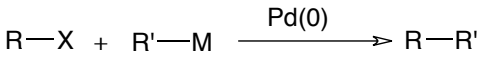
Palladium-Catalysed Coupling Chemistry



Fisher Scientific

Palladium-Catalysed Coupling Chemistry

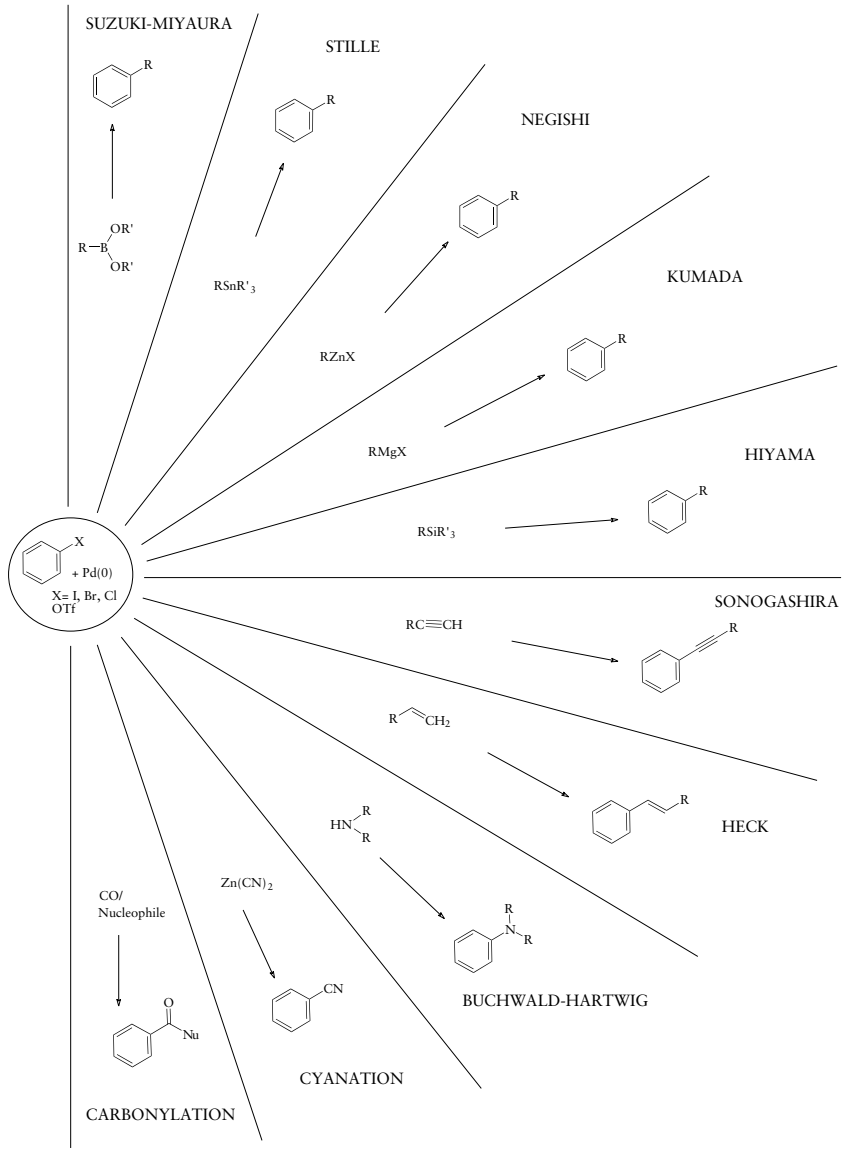
Palladium catalysis has gained widespread use in industrial and academic synthetic chemistry laboratories as a powerful methodology for the formation of C-C and C-Heteroatom bonds.



R = usually sp^2 hybridised carbon
X = usually I, Br, Cl or OTf
The nature of R' and M are dependant upon the specific coupling being performed

Several coupling reactions have been developed with different substrates:

1. SUZUKI-MIYAURA
2. STILLE
3. NEGISHI
4. KUMADA
5. HIYAMA
6. SONOGASHIRA
7. HECK
8. BUCHWALD-HARTWIG
9. CYANATION
10. CARBONYLATION

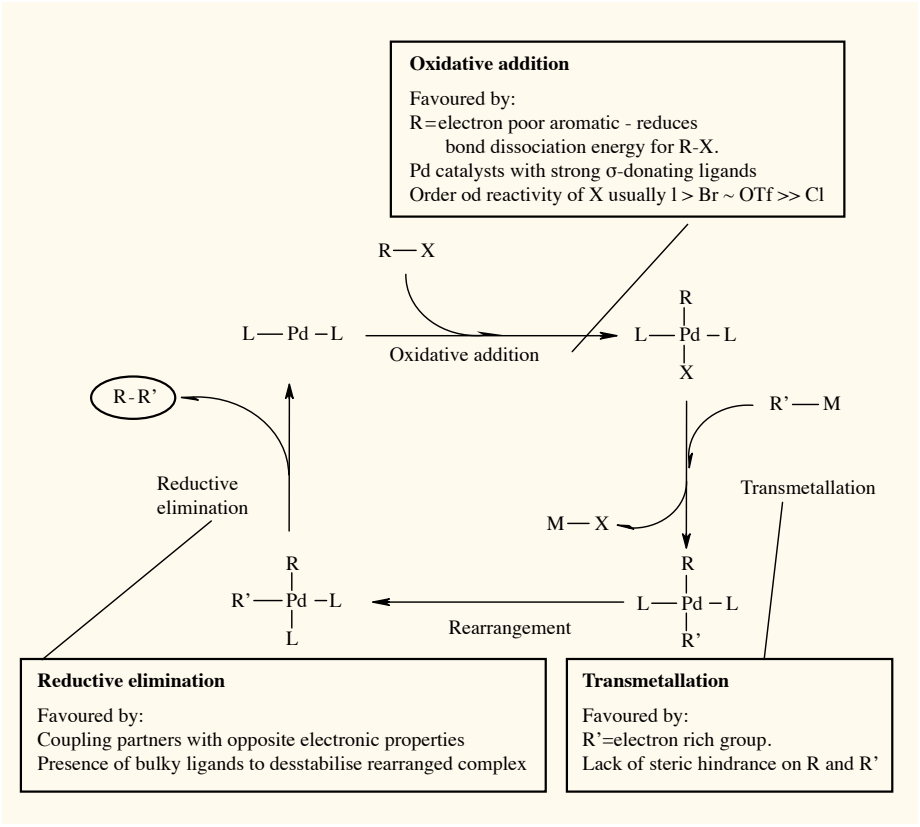


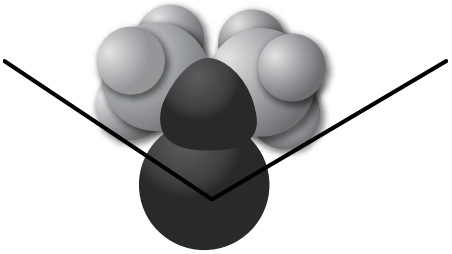
Understanding the catalytic cycle

Most palladium catalysed reactions are believed to follow a similar catalytic cycle.

The catalytic species can be formed *in situ* using a palladium source, such as $Pd_2(dba)_3$ or $Pd(OAc)_2$ and the necessary ligand, or introduced as a preformed catalyst such as $Pd(PPh_3)_4$ or $Pd(P^tBu_3)_2$.

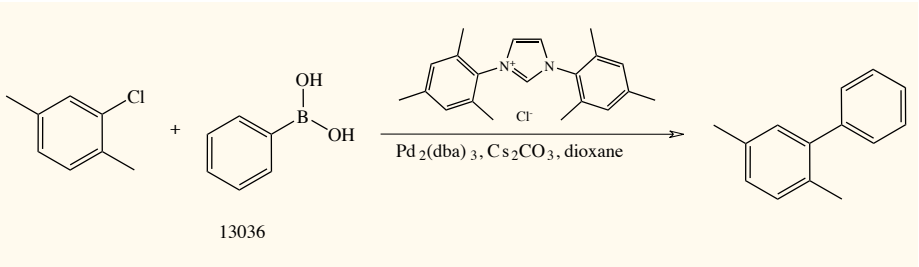
Careful choice of ligand can facilitate two steps of the catalytic cycle. The use of strong σ-donating ligands, such as trialkylphosphines, increases electron density around the metal, accelerating the oxidative addition of the catalyst to the substrate. This is most commonly believed to be the rate determining step. Choice of ligand also determines the mechanism by which oxidative addition occurs.[1] The elimination step is accelerated by the use of bulky ligands, in particular phosphine ligands exhibiting a large cone angle (also known as Tolman angle).[2]





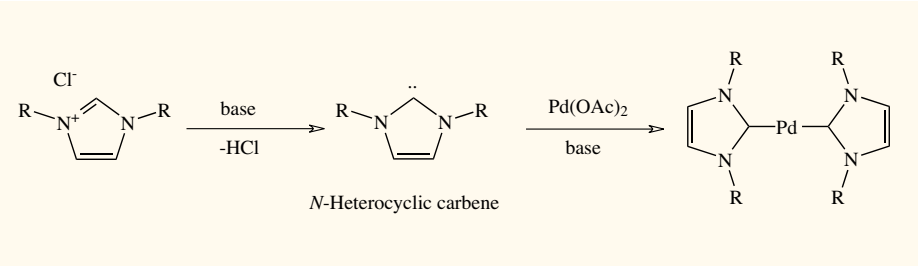
Ligand	Cone Angle (deg)	Cat. No.
dppm	121	29361
dppe	125	14791
dppp	127	31005
dcpe	142	36385
PPh_3	145	14042
$P(c\text{-}hex)_3$	170	42161
$P(^tBu)_3$	182	36089
$P(C_6F_5)_3$	184	31316
$P(2,4,6\text{-}Me_3C_6H_2)_3$	212	32113

Phosphine ligands have recently been replaced in a number of palladium catalysed reactions with *N*-heterocyclic carbenes (NHCs).[3]



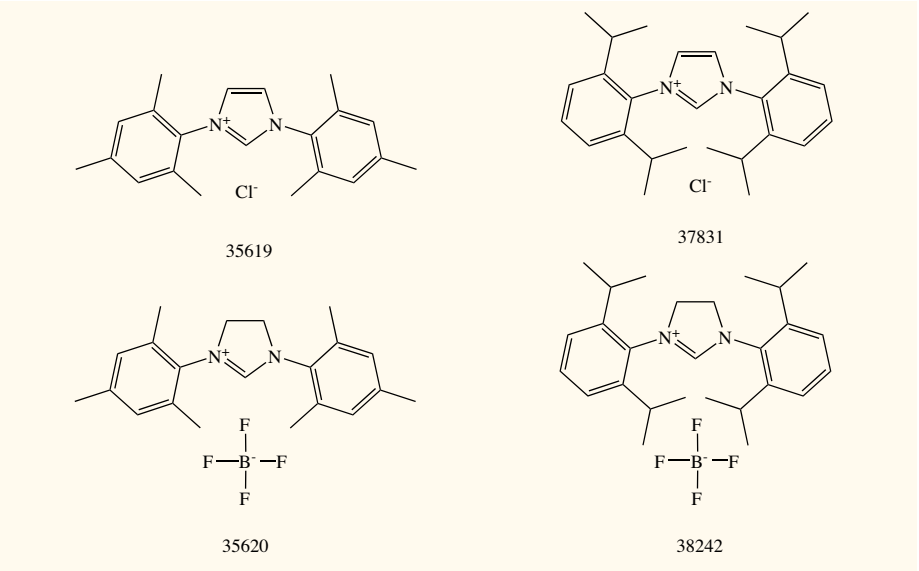
13036

These ligands offer similar electronic properties to phosphines, being strongly σ-donating and weakly π-acidic. NHCs can offer very high catalytic activity combined with stability and longevity in comparison with phosphine ligands. The carbene is air sensitive but can be generated in situ to aid operational simplicity.



N-Heterocyclic carbene

We offer a range of commonly used NHC precursors for use in cross coupling reactions.



35619

37831

35620

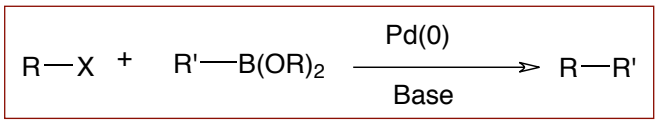
38242

References

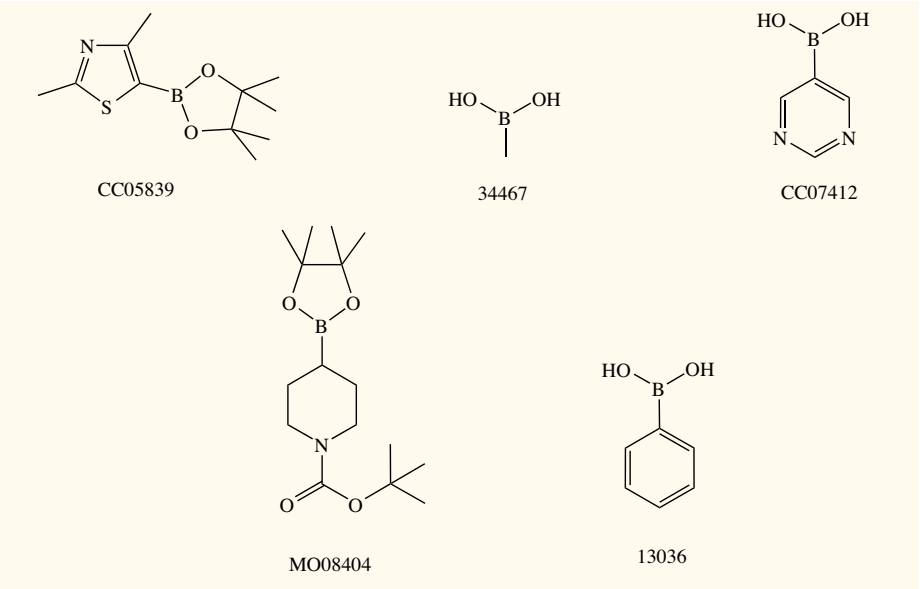
1. Galardon,E.; Ramdeehul, S.; Brown, J.M.; Cowley, A.; Hii, K.K.; Jutand, A.; *Angew.Chem, Int. Ed.* **2002** 41, 1760-1763
2. Tolman, C. A. *Chem. Rev.*, **1977**, 77, 313–348
3. For a review see: Hillier, A.C.; Grasa, G. A.; Viciu, M.S.; Lee, H. M.; Yang, C; Nolan, S. P. *J. Organomet.* Chem. **2002**, 69-82

Palladium Catalysed Reactions

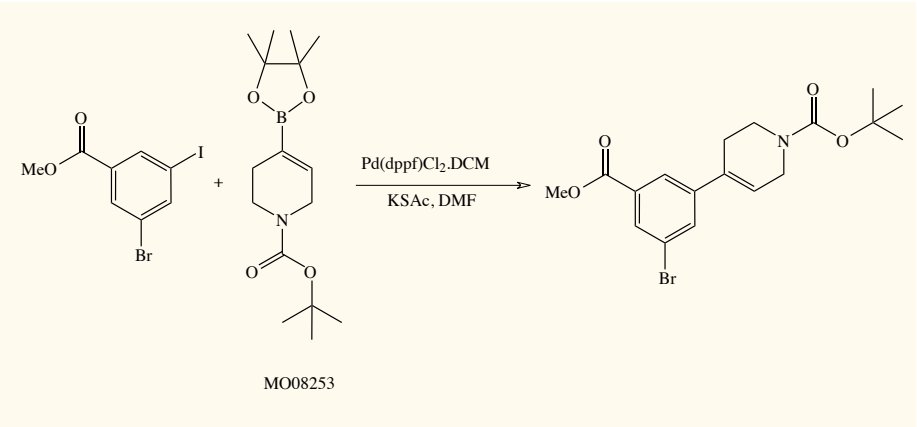
1) The Suzuki-Miyaura coupling



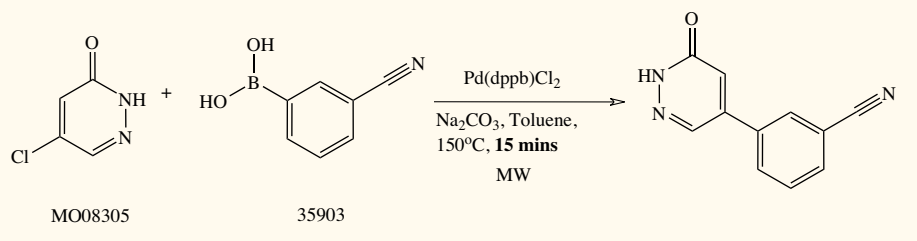
The Suzuki coupling reaction involves the cross coupling of organohalides (and their equivalents) with organoboron reagents. The organoboron reagent typically comes in the form of a boronic acid or ester, of which >300 structurally diverse examples are stocked under the Acros Organics and Maybridge brands, and requires activation by base or fluoride to enable it to undergo transmetallation.



The reaction is highly tolerant of many different functional groups, and boron containing by-products are easily removed by a simple alkali work-up. Although most commonly used to form aryl-aryl bonds the Suzuki reaction is just as effective for the synthesis of highly substituted styrene products.[4]

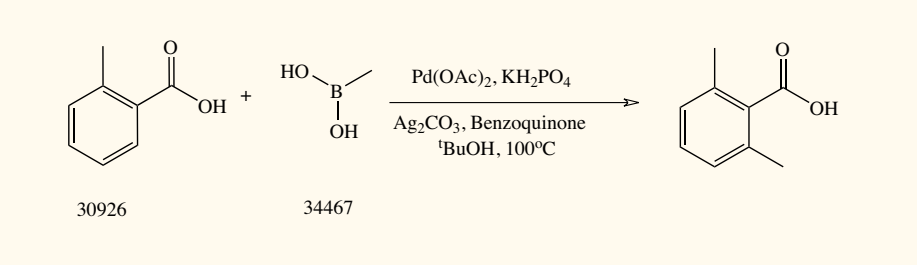


Suzuki chemistry is well known to be accelerated by the use of microwaves to heat the reaction.[5]

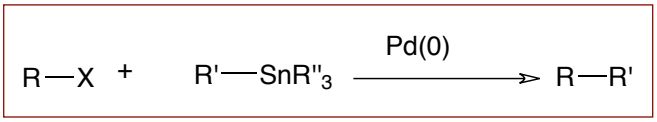


It can also be used to perform aromatic alkylations.[6] C-H insertion negates the necessity to begin with an aryl halide, improving the atom efficiency of the process.

Other organoboron species such as trifluoroborate salts can also be used in this reaction.[7]



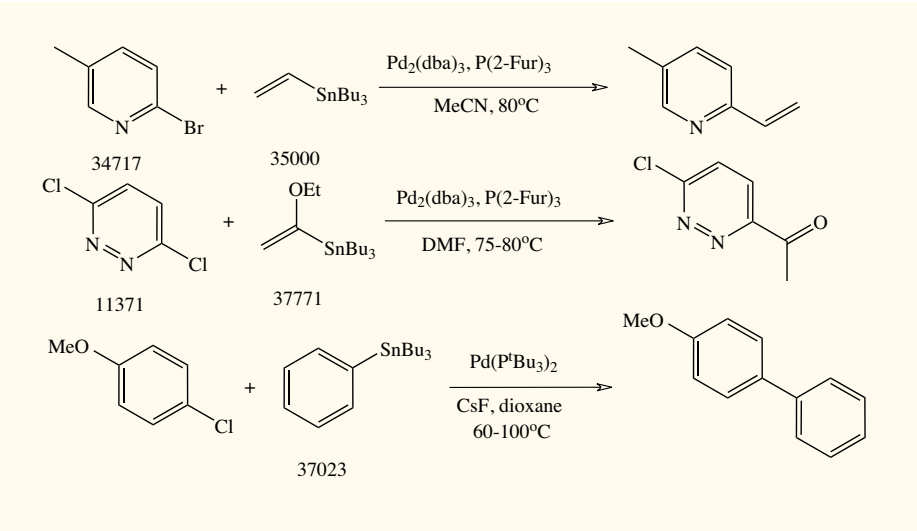
2) The Stille coupling



The Stille reaction is an extremely versatile alternative to the Suzuki reaction. It replaces the organoboron reagents with organostannanes. As the tin bears four organic functional groups, understanding the rates of transmetallation of each group is important.

Relative rate of transmetallation:
Alkynyl > vinyl > aryl > allyl ~ benzyl >> alkyl

The Stille coupling is particularly popular as organostannanes are readily prepared, purified and stored. The reaction also has the advantage that it is run under neutral conditions making it even more tolerant of different functional groups than the Suzuki reaction.



References

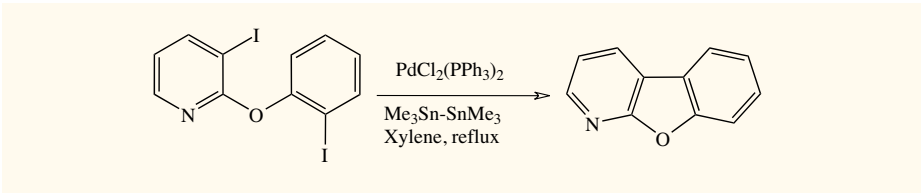
4. Jung, D; Shimogawa, H.; Kwon, Y.; Mao, Q.; Sato, S.-I. Kamisuki, S.; Kigoshi, H.; Uesugi, M. J. *Am. Chem.* Soc. **2009**, *131*, 4774-4782.
5. van Niel, M. B.; Wilson, K.; Adkins, C. H.; Atack, J. R.; Castro, J. L.; Clarke, D. E.; Fletcher, S.; Gerhard, U.; Mackey, M. M.; Malpas, S.; Maubach, K.; Newman, R.; O'Connor, D.; Pillai, G. V.; Simpson, P. B.; Thomas, S. R.; MacLoed, A. M. *J. Med. Chem.* **2005**, *48*, 6004-6011.
6. Giri, R.; Maugel, N; Li, J.J; Wang, D.-H.; Breazzano, S. P.; Saunders, L. B.; Yu J.-O. *J. Am. Chem.* Soc. **2007**, *129*, 3510-3511.
7. Molander, G.A.; Canturk, B. *Angew. Chem. Int. Ed.* **2009**; *48*; 9240-9261

It can be used to synthesise a wide range of compounds including styrenes,[8] aromatic ketones[9] and biaryl derivatives.[10]

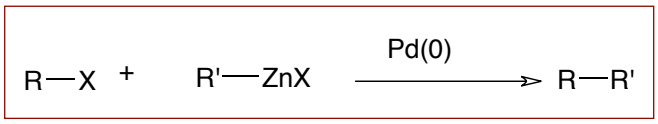
The Stille-Kelly coupling

The Stille-Kelly coupling is a palladium catalysed intramolecular cross coupling using di-stannanes such as hexabutyl-distannane or hexamethyldistannane.

The intermediate mono-halide mono-stannane cyclises under the reaction conditions to yield the desired product.[11]

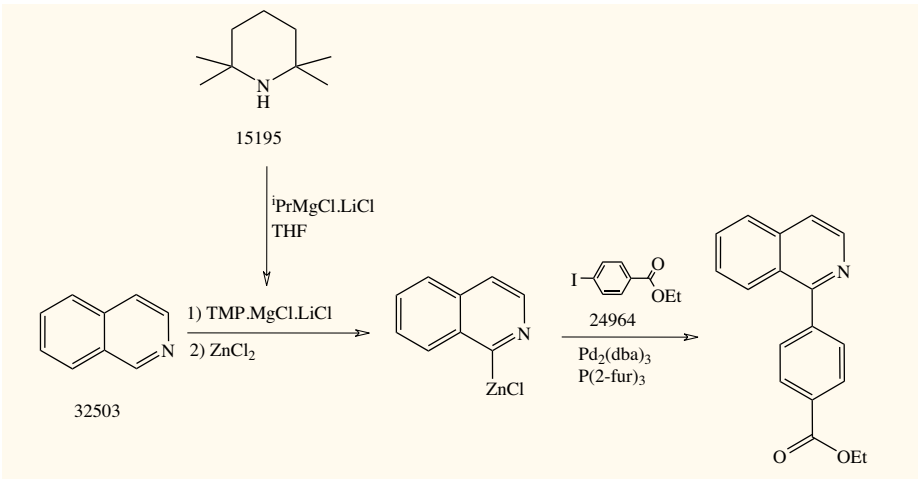


3) The Negishi coupling



The Negishi coupling utilises organo-zinc reagents as starting materials to cross couple with organohalides and equivalents.

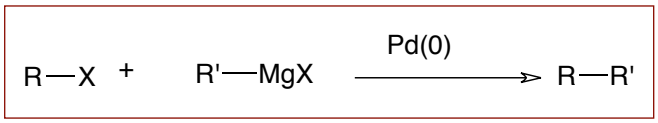
The method is compatible with a good range of functional groups on the organohalide including ketones, esters, amines and nitriles. The organo-zinc reagent can be prepared *in situ* by a variety of methodologies, such as transmetallation of the corresponding organo-lithium or Grignard reagent,[12] or *via* oxidative addition of activated Zn(0) to an organohalide.[13]



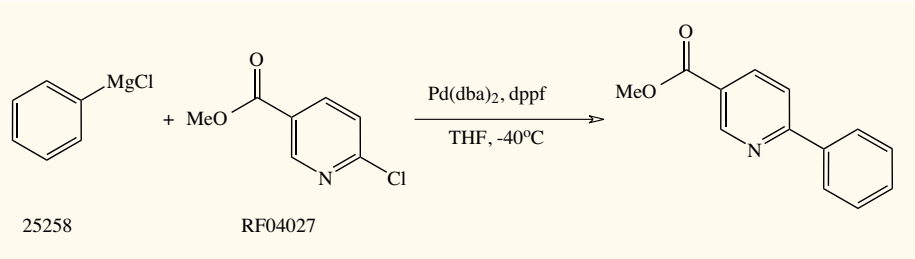
References

8. Nunez, A.; Abarca, B,; Cuadro, A. M.; Alvarez-Builla, J.; Vaquero, J. J. *J. Org. Chem.* **2009**, *74*, 4166-4176.
9. Zheng, G. Z.; Mao, Y.; Lee, C.-H.; Pratt, J. K.; Koenig, J. R.; Perner, R. J.; Cowart, M. D.; Gfesser, G. A.; McGaraughty, S.; Chu, K. L.; Zhu, C; Yu, H.; Kohlhaas, K.; Alexander, K.M.; Wismer, C.T.; Mikusa, J.; Jarvis, M. F.; Kowaluk E.A.; Stewart, A. O. *Bioorg. & Med. Chem. Lett.* **2003**, *18*, 3041-3044.
10. Littke, A. F.; Schwartz, L.; Fu, G. C. *J. Am. Chem.* Soc. **2002**, *124*, 6343-6348.
11. Yue, W. S.; Li, J. J. *Org.Lett.* **2002**, *13*, 2201-2204.
12. Krasovskiy, A.; Krasovskaya, V.; Knochel, P. *Angew. Chem. Int. Ed.* **2006**, *45*, 2958-2961.
13. Prasad, A. S. B.; Stevenson, T. M.; Citineni, J. R.; Nyzam, V.; Knochel, P. *Tetrahedron* **1997**, *53*, 7237-7254

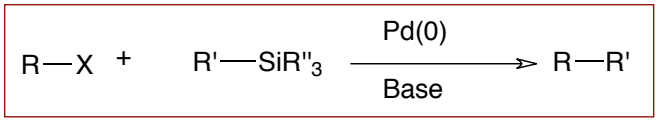
4) The Kumada coupling



The cross coupling of organohalides with Grignard reagents is known as the Kumada coupling. Although it suffers from a limited tolerance of different functional groups, the higher reactivity and basicity of the Grignard reagent allows viable reactions to take place under mild conditions.[14]

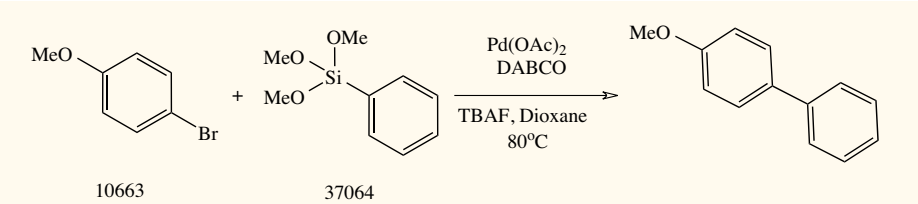


5) The Hiyama coupling



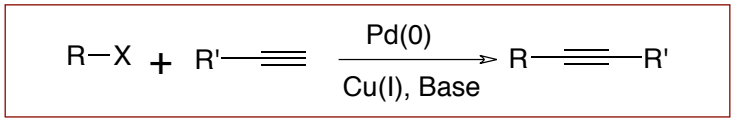
Organosilanes can also be coupled with organohalides (or their equivalents) using palladium catalysts. As with the Suzuki reaction the transmetallation will not occur without activation by base or fluoride.[15]

The use of a silanol as the organosilane is one recent method that has managed to negate the requirement for the reaction to contain fluoride as an activator.[16] This has helped to enlarge the substrate scope available to organic chemists.



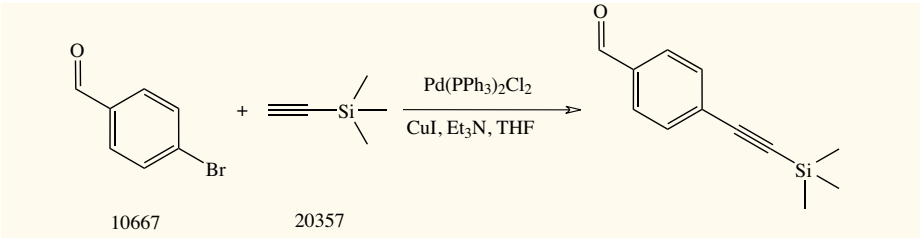
References
14. Bonnet, V.; Mongin, F.; Trecourt, F.; Queguiner, G.; Knochel. P *Tetrahedron* **2002**, 4429-4438.
15. Li, J.-H.; Deng, W.-J.; Liu, Y.-X. *Synthesis* **2005**, 3039-3044.
16. For a recent review on silanols in the Hiyama coupling see: Denmark, S. E.; Regens, C. S. *Acc. Chem. Res.* **2008**, *41*, 1486-1499.

6) The Sonogashira coupling



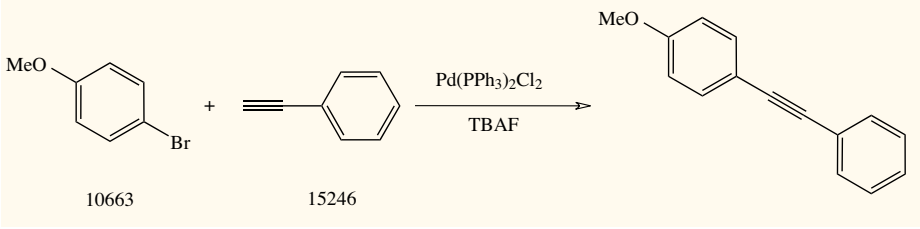
The Sonogashira reaction offers an extremely useful route into aryl- and alkenyl-alkynes. The alkyne moiety is usually introduced *via* its copper salt. This is generated *in situ* from a Cu(I) salt, such as CuI or CuCN, and a terminal alkyne in the presence of an amine base.[17]

In this case, the TMS protecting group can be removed following the reaction to give the terminal alkyne product. This can be further functionalised, possibly *via* a second Sonogashira coupling.



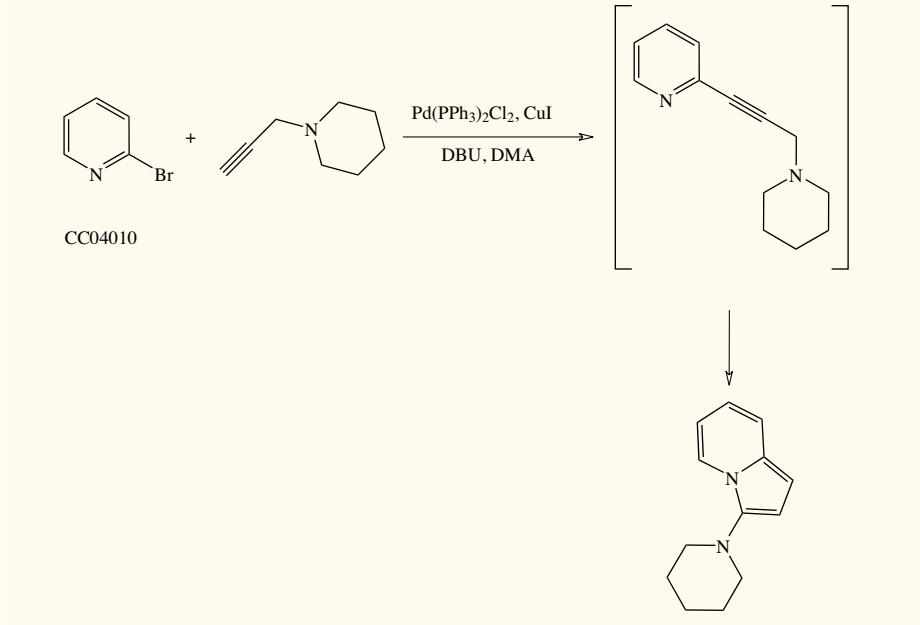
10667 20357

Recent improvements in this reaction have led to the development of copper and amine free couplings.[18]



10663 15246

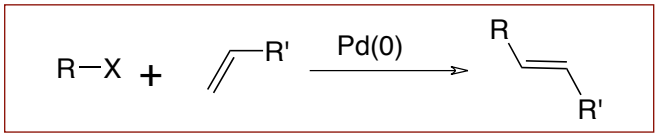
Other uses for this reaction involve the synthesis of intermediates that continue to react under the conditions to give more interesting products.[19]



CC04010

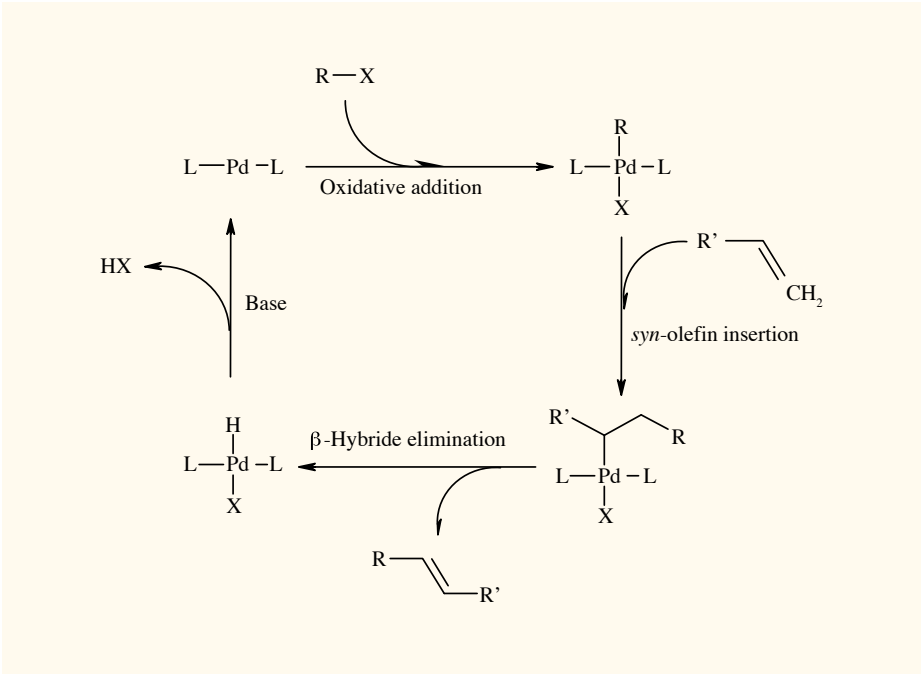
References
17. Thorand, S.; Krause, N. *J. Org. Chem.* **1998**, *63*, 8551-8553.
18. Liang, Y.; Xie, Y.-X.; Li, J.-H. *J. Org. Chem.* **2006**, *71*, 379-380.
19. Liu, Y.; Song, Z.; Yan, B. *Org. Lett.* **2007**, *9*, 409-412.

7) The Heck reaction



The Heck reaction follows a slightly different pathway to other palladium catalysed couplings.

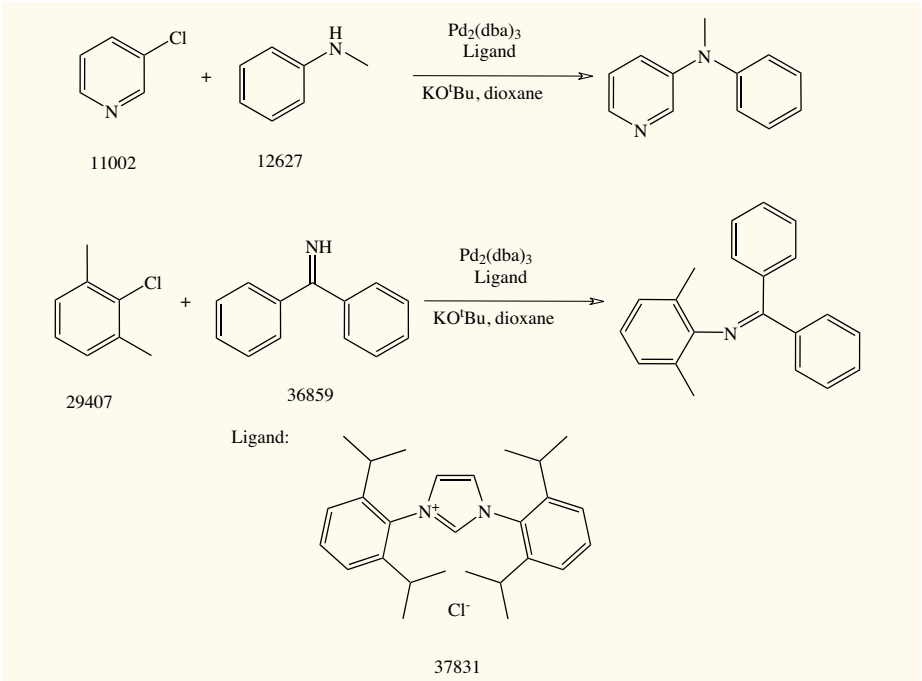
For intermolecular reactions with mono-substituted olefins, the olefin insertion step is usually directed by steric hindrance. This intermediate then undergoes β-hydride elimination under thermodynamically controlled conditions, leading to preferential formation of the *E* product.



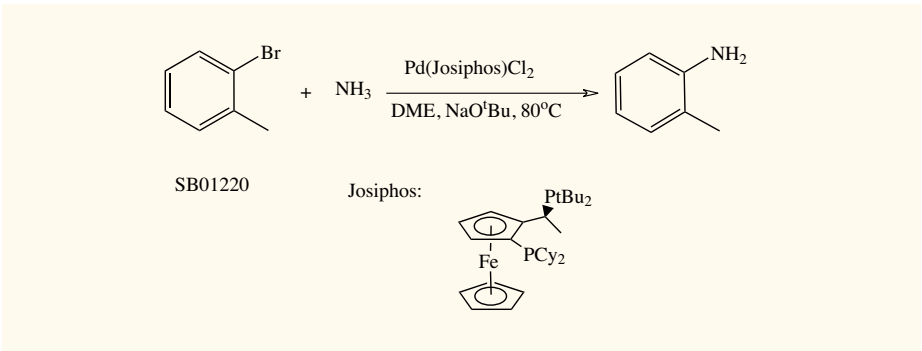
8) The Buchwald-Hartwig coupling

Palladium catalysis has also been expanded to the formation of C-N bonds. In 1995 Buchwald and Hartwig independently reported the palladium catalysed coupling of aryl halides with amine nucleophiles in the presence of stoichiometric amounts of base.[20]

The coupling of aryl chlorides with amine nucleophiles, including anilines and ammonia surrogates, has been reported in high yields using an NHC ligand.[21]



Hartwig has reported that the use of a Josiphos based catalyst can facilitate the direct coupling of ammonia with aryl bromides, giving predominantly the monoarylamine.[22]

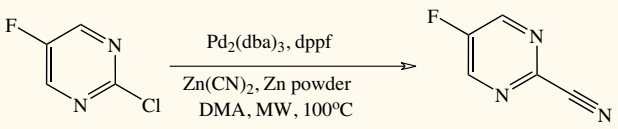


References

20. a) Guram, A. S.; Rennels, R. A.; Buchwald, S. L. *Angew. Chem. Int. Ed.* 1995, 34, 1348-1350. b) Louie, J.; Hartwig, J. F. *Tetrahedron Lett.* **1995**, *36*, 3609-3612.
21. Hillier, A.C.; Grasa, G. A.; Viciu, M.S.; Lee, H. M.; Yang, C; Nolan, S. P. *J. Organomet. Chem.* **2002**, 69-82
22. Shen, Q.; Hartwig, J. *J. Am. Chem. Soc.* **2006**, *128*, 10028-10029.

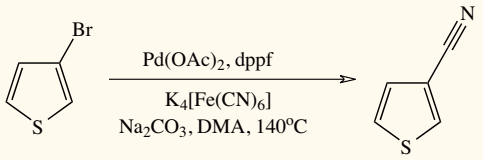
9) Palladium catalysed cyanation

The palladium catalysed cyanation of aromatic halides offers a convenient alternative to the Rosemund-Von Braun reaction, which often employs harsh reaction conditions and can have a labour intensive work-up. As the cyanide nucleophile is a strong σ-donor and can poison the catalyst, it is necessary to keep its concentration low during the reaction. To achieve this $Zn(CN)_2$ is often employed as the cyanide source as its solubility in DMF (a common solvent for this reaction) is limited.[23]



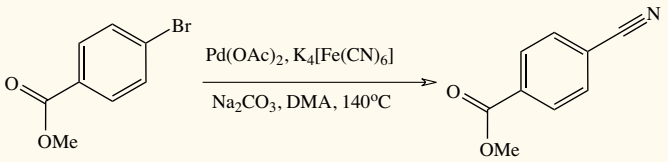
42981

An alternative, non-toxic, source of cyanide has also been reported. $K_4[Fe(CN)_6]$ can be used in combination with palladium catalysts to synthesise aryl nitriles from their corresponding halides.[24]



14780

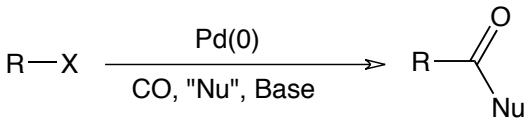
This work was later extended to enable the reaction to take place without the need for the phosphine ligand.[25]



41407

References
23. $Zn(CN)_2$ has a solubility of 1.8 x 10^{-4} g/mL in DMF at 80°C.
24. Schareina, T.; Zapf, A.; Beller, M. *Chem. Comm.* **2004**, 1388-1389
25. Weissman, S. A.; Zewge, D.; Chen, C. *J. Org. Chem.* **2005**, *70*, 1508-1510

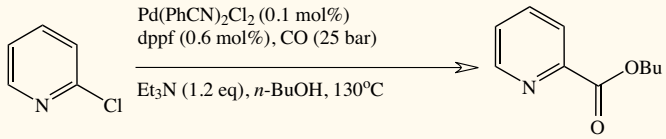
10) Palladium catalysed carbonylation



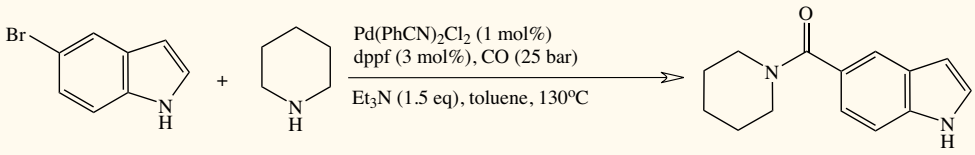
Nu = R'O, R'R''N, H

As with most palladium mediated C-C bond forming reactions palladium catalysed carbonylation is compatible with a range of functional groups. This gives it significant advantages over standard organolithium and Grignard chemistry for the synthesis of aryl aldehydes, acids, esters and amides.

Esters and amides are synthesised by carbonylation in the presence of the required alcohol[26] or amine nucleophile.[27]

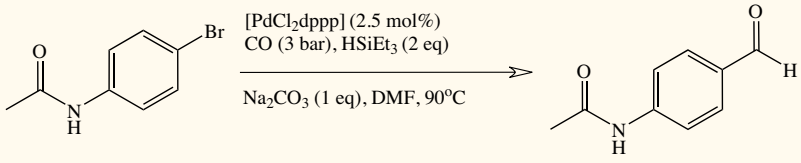


11001



10706 14718

The use of triethylsilane as the nucleophile gives the corresponding aldehyde as the product.[28]



17157

References
26. Beller, M.; Mägerlein, W.; Indolese, A. F.; Fischer C. *Synthesis*, **2001**, 1098-1110
27. Kumar K.; Zapf, A.; Michalik, D; Tillack, A.; Heinrich, T.; Bottcher, H.; Arlt, M.; Beller, M. *Org. Lett.*, **2004**, *6*, 7-10.
28. Ashfield, L.; Barnard, C. F. J.; Org. Process Res. Dev., **2007**, 11, 39-43

Monodentate Ligands

General ligands

Cat. No.	Ligand Name	CAS No
14042	Triphenylphosphine	603-35-0
29480	Tri-(2-furyl)phosphine	5518-52-5
42232	Tri-o-tolylphosphine	6163-58-2
32113	Trimesitylphosphine	23897-15-6
42161, 38683, 42842, 42783	Tricyclohexylphosphine	2622-14-2
31733	Triisopropylphosphine	6476-36-4
13934	Tri-n-butylphosphine	998-40-3
38338	Di-tert-butylmethylphosphine	6002-40-0
36089, 36694	Tri-tert-butylphosphine	13716-12-6

Buchwald type ligands

Cat. No.	Ligand Name	CAS No
38972	2-(Dicyclohexylphosphino)-2'-isopropylbiphenyl	251320-85-1
38714	2-(Dicyclohexylphosphino)-2',4',6'-triisopropylbiphenyl	564483-18-7
35621	2-(Di-tert-butylphosphino)biphenyl	224311-51-7
35622	2-(Dicyclohexylphosphino)biphenyl	247940-06-3
35623	2-Dicyclohexylphosphino-2'-(N,N-dimethylamino)biphenyl	213697-53-1
38009	2-Diphenylphosphino-2'-(N,N-dimethylamino)biphenyl	240417-00-9
38008	2-(Dicyclohexylphosphino)-2'-methylbiphenyl	251320-86-2
38007	2-(Di-tert-butylphosphino)-2'-methylbiphenyl	255837-19-5
38006	2-Di-tert-butylphosphino-2'-(N,N-dimethylamino)biphenyl	224311-49-3
42983	2-Dicyclohexylphosphino-2',6'-diisopropoxy-1,1'-biphenyl	787618-22-8
42984	2-Di-tert-butylphosphino-2',4',6'-triisopropylbiphenyl	564483-19-8

NHC ligands

Cat. No.	Ligand Name	CAS No
35619	1,3-Bis(2,4,6-trimethylphenyl)imidazolium chloride	141556-45-8
37831	1,3-Bis(2,6-diisopropylphenyl)imidazolium chloride	250285-32-6
37832	1,3-Bis(adamant-1-yl)imidazolium chloride	131042-78-9
35620	1,3-Bis(2,4,6-trimethylphenyl)-4,5-dihydroimidazolium tetrafluoroborate	245679-18-9
38242	1,3-Bis(2,6-diisopropylphenyl) imidazolidinium tetrafluoroborate	282109-83-5
37833	1,3-Bis(2,4,6-trimethylphenyl) imidazolidinium chloride	173035-10-4
37834	1,3-Bis(2,6-diisopropylphenyl) imidazolidinium chloride	258278-25-0

Bidentate Ligands

General ligands

Cat. No.	Ligand Name	CAS No
29361	Bis(diphenylphosphino)methane	2071-20-7
14791	1,2-Bis(diphenylphosphino)ethane	1663-45-2
36385	1,2-Bis(dicyclohexylphosphino)ethane	23743-26-2
31005	1,3-Bis(diphenylphosphino)propane	6737-42-4
38112	1,3-Bis(dicyclohexylphosphino)propane	103099-52-1
29646	1,4-Bis(diphenylphosphino)butane	7688-25-7
32085	1,5-Bis(diphenylphosphino)pentane	27721-02-4
38337	Bis(2-diphenylphosphinophenyl)ether	166330-10-5
34801	1,1'-Bis(diphenylphosphino)ferrocene	12150-46-8
36387	1,1'-Bis(diisopropylphosphino)ferrocene	97239-80-0
42971	1,1'-Bis(di-tert-butylphosphino)ferrocene	84680-95-5
36375	1,2-Bis(diphenylphosphino)benzene	13991-08-7
37806	9,9-Dimethyl-4,5-bis(diphenylphosphino) xanthene	161265-03-8

BINAP ligands

Cat. No.	Ligand Name	CAS No
38235	(S)-(-)-2,2'-Bis(di-p-tolylphosphino)-1,1'-binaphthyl	100165-88-6
38234	(R)-(+)-2,2'-Bis(di-p-tolylphosphino)-1,1'-binaphthyl	99646-28-3
26554	(S)-(-)-2,2'-Bis(diphenylphosphino)-1,1'-binaphthyl	76189-56-5
26553	(R)-(+)-2,2'-Bis(diphenylphosphino)-1,1'-binaphthyl	76189-55-4
39223	rac-2,2'-Bis(di-p-tolylphosphino)-1,1'-binaphthyl	153305-67-0
39222	rac-2,2'-Bis(di(3,5-dimethylphenyl) phosphino)-1,1'-binaphthyl	145416-77-9
36864	(±)-2,2'-Bis(diphenylphosphino)-1,1'-binaphthyl	98327-87-8

Josiphos ligands

Cat. No.	Ligand Name	CAS No
37075	(R)-(-)-1-[(S)-2-Di-t-butylphosphino) ferrocenyl]ethyldi-(4-trifluoromethylphenyl) phosphine	246231-79-8
37070	(R)-(-)-1-[(S)-2-Diphenylphosphino) ferrocenyl]ethylbis(3,5-dimethylphenyl) phosphine	184095-69-0
37069	(R)-(-)-1-[(S)-2-Dicyclohexylphosphino) ferrocenyl]ethyldicyclohexylphosphine	167416-28-6
37068	(R)-(-)-1-[(S)-2-Diphenylphosphine) ferrocenyl]ethyldi-tert-butylphosphine	155830-69-6
37067	(R)-(-)-1-[(S)-2-Diphenylphosphino) ferrocenyl]ethyldicyclohexylphosphine	155806-35-2

Palladium catalysts and precursors

Catalyst precursors

Cat. No.	Catalyst Precursor Name	CAS No
20683	Allylpalladium chloride dimer	12012-95-2
20945	Bis(acetonitrile)palladium(II) chloride	14592-56-4
20790	Bis(benzonitrile)palladium(II) chloride	14220-64-5
29197	Bis(dibenzylideneacetone)palladium	32005-36-0
19518	Palladium(II) acetate	3375-31-3
19519	Palladium(II) bromide	13444-94-5
19520, 36967	Palladium(II) chloride	7647-10-1
31702	Palladium(II) trifluoroacetate	42196-31-6
36352	Tetrakis(acetonitrile)palladium(II) tetrafluoroborate	21797-13-7
31877	Tris(dibenzylideneacetone)dipalladium(0)	51364-51-3
36934	Tris(dibenzylideneacetone)dipalladium-chloroform adduct	52522-40-4

Catalysts

Cat. No.	Catalyst Name	CAS No
38403	[1,2-Bis(diphenylphosphino)ethane] dichloropalladium(II)	19978-61-1
34868	1,1'-Bis(diphenylphosphino)ferrocene-palladium(II)dichloride dichloromethane adduct	95464-05-4
36351	Bis(tricyclohexylphosphine)palladium(0)	33309-88-5
37797	Bis(triethylphosphine)palladium(II) chloride	28425-04-9
20927	Bis(triphenylphosphine)palladium(II) acetate	14588-08-0
19732, 29925	Bis(triphenylphosphine)palladium(II) chloride	13965-03-2
36350	Bis(tri-t-butylphosphine)palladium(0)	53199-31-8
21299	Bis[1,2-bis(diphenylphosphino)ethane] palladium(0)	31277-98-2
37796	Bis[tri(o-tolyl)phosphine]palladium(II) chloride	40691-33-6
39589	Dichlorobis(tricyclohexylphosphine) palladium(II)	29934-17-6
20238	Tetrakis(triphenylphosphine)palladium(0)	14221-01-3
36971	trans-Benzyl(chloro)bis(triphenylphosphine) palladium(II)	22784-59-4

Fisher Scientific

GLOBAL LOCATIONS

AMERICAS

Canada
Fisher Scientific Canada
112 Colonnade Road
Ottawa, Ontario
Post Code: K2E 7L6
Toll-Free Number: 800-234-7437
Fax: 800-463-2996
www.fishersci.ca

Latin America
Fisher Scientific Global Export, Latin America
3970 Johns Creek Court
Suite 500
Suwanee, GA
Post Code: 30024
Toll-Free Number: 770-871-4725
Fax: 770-871-4726
www.fishersci.com

United States
Fisher HealthCare
9999 Veterans Memorial Drive
Houston, TX
Post Code: 77038
Toll-Free Number: 800-640-0640
Fax: 800-290-0290
www.fisherhealthcare.com

Fisher Scientific
2000 Park Lane Drive
Pittsburgh, PA
Post Code: 15275
Toll-Free Number: 800-766-7000
Fax: 800-926-1166
www.fishersci.com

ASIA

China
Fisher Scientific China
Toll-Free Number: 400 881 5117
sales.china@thermofisher.com
www.fishersci.com.cn

Shanghai Corporate Office
6/F Long Life Mansion
No. 1566 Yan An West Rd.
Shanghai, China
Post Code: 200052
Tel: (8621) 5258 1100
Fax: (8621) 5258 0119

Beijing Office
Units 702-715, 7th Floor
Tower West, Yonghe Plaza
No. 28 Andingmen East Street
Beijing, China
Post Code: 100007
Tel: (8610) 8419 3588
Fax: (8610) 8419 3580

Guangzhou Office
Room 2405-2406, JianLiBao Mansion
No. 410-412 Middle DongFeng Rd.
Guangzhou, China
Post Code: 510030
Tel: (8620) 8314 5288
Fax: (8620) 3877 1941

India
Fisher Scientific India
101A-101B, Godrej Coliseum,
Somaiya Hospital Road,
Off Eastern Express Highway,
Sion East, Mumbai 400 022
Customer Service Toll Free: 1 800 209 7001
Fax: 022 6680 3001 or 3002
qfc.customercare@thermofisher.com
www.fishersci.in

Japan
Fisher Scientific Japan
Thermo Fisher Scientific K.K.
C-2F, 3-9 Moriya-cho
Kanawaga-ku, Yokohama
221-0022 Japan
Tel: 81 45 450 6310
Fax: 81 45 450 6316
support@fishersci.co.jp
www.fishersci.co.jp

Korea
Fisher Scientific Korea
Sambu Bldg. 13F
676 Yeoksam-dong,
Kangnam-Gu
Seoul 135-979, Korea
Dir (02) 527-0300
Customer Service Center: (02) 527-0300
Fax: (02) 527-0311
sales@fishersci.co.kr
www.acros.co.kr

Malaysia
Fisher Scientific Malaysia Sdn Bhd
No. 3 Jalan Sepadu 25/123
Taman Perindustrian Axis Seksyen 25
40400 Shah Alam
Selangor Darul Ehsan Malaysia
Technical Service Hotline: 1-300-88-7868
Tel: (603) 51218888
Fax: (603) 51218899
Marketing.FSM@thermofisher.com
www.fishersci.com.my

Singapore
Fisher Scientific Singapore
Fisher Scientific Pte Ltd.
8 Pandan Crescent
LL4, #05-05 UE Tech Park
Singapore 128464
Tel: (65) 6873 6006
Fax: (65) 6873 5005
enquiry.sg@thermofisher.com
www.fishersci.com.sg

EUROPE

Austria
Fisher Scientific (Austria) GmbH
Rudolf von Alt-Platz 1
A-1030 Wien
Phone: 0800 20 88 40
Fax: 0800 20 66 90
info.austria@thermofisher.com
www.at.fishersci.com

Belgium
Fisher Scientific
BP 567
B-7500 Tournai 1
Tel: 056 260 260
Fax: 056 260 270
be.fisher@thermofisher.com
www.be.fishersci.com

Czech Republic
Fisher Scientific, spol. s r.o.
Kosmonautů 324
Pardubice
CZ-530 09
Tel: 466 798 230
Fax: 466 435 008
info.cz@thermofisher.com
www.thermofisher.cz

Denmark
Fisher Scientific Biotech Line A/S
Industrivej 3
Postboks 60
DK-3550 Slangerup
Tel: +45 70 27 99 20
Fax: +45 70 27 99 29
kundeservice@thermofisher.com
www.fishersci.dk

Finland
Fisher Scientific Oy
Ratastie 2
FI-01620 Vantaa
Tel: +358 802 76 237
Fax: +358 802 76 235
fisher.fi@thermofisher.com
www.fishersci.fi

France
Fisher Scientific
Parc d'Innovation BP 50111
67403 Illkirch Cedex
Tel: 03 88 67 53 20
Fax: 03 88 67 11 68
fr.commande@thermofisher.com
www.fr.fishersci.com

Germany
Fisher Scientific GmbH
Im Heiligen Feld 17
D-58239 Schwerte
Phone: 0800 3 47 43 70
Fax: 0800 3 47 43 71
info.germany@thermofisher.com
www.de.fishersci.com

Ireland
Fisher Scientific Ireland
Suite 3 Plaza 212
Blanchardstown Corporate
Park 2
Ballycoolin
Dublin 15
Tel: +353 01 885 5854
Fax: +353 01 899 1855
fsie.sales@thermofisher.com
www.ie.fishersci.com

Italy
Fisher Scientific
Tel: 02 953 28 258
Fax: 02 953 27 374
it.fisher@thermofisher.com
www.it.fishersci.com

The Netherlands
Fisher Scientific
Postbus 4
1120 AA Landsmeer
Tel: 020 487 70 00
Fax: 020 487 70 70
nl.info@thermofisher.com
www.nl.fishersci.com

Norway
Fisher Scientific
Frysjaveien 33E
0884 Oslo
Tel: +47 22 95 59 59
Fax: +47 22 95 59 40
fisher.no@thermofisher.com
www.fishersci.no

Portugal
Fisher Scientific
Rua Pedro Álvares Cabral, nº24, 3ºD
Edifício Euro - Infantado
2670-391 Loures
Telefone: +351 21 425 33 50/4
Fax: +351 21 425 33 51
pt.fisher@thermofisher.com
www.pt.fishersci.com

Spain
Fisher Scientific
C/ Luis I, 9
28031 MADRID
Tfno: 91 380 67 10
Fax: 91 380 85 02
es.fisher@thermofisher.com
www.es.fishersci.com

Sweden
Fisher Scientific
Box 9193
400 94 Göteborg
Tel: +46 31 - 68 94 30
Fax: +46 31 - 68 07 17
gtf.info@thermofisher.com
www.fishersci.se

Switzerland
Fisher Scientific
Wilstrasse 57 - Postfach 1006
5610 Wohlen
Tel: 056 618 41 11
Fax: 056 618 41 41
info.ch@thermofisher.com
www.ch.fishersci.com

United Kingdom
Fisher Scientific UK
Bishop Meadow Road
Loughborough
Leicestershire LE11 5RG
Tel: +44 (0)1509 231166
Fax: +44 (0)1509 231893
info@fisher.co.uk
www.fisher.co.uk

Rest of Europe
Thermo Fisher Scientific
Geel West Zone 2
Janssen Pharmaceuticalaan 3a
2440 Geel – Belgium
Tel: +32 14 57 52 11
Fax: +32 14 59 26 10
www.acros.com

MIDDLE EAST AND AFRICA

Fisher Scientific Global Export, Latin America
3970 Johns Creek Court
Suite 500
Suwanee, GA
Post Code: 30024
Toll-Free Number: 770-871-4725
Fax: 770-871-4726
www.fishersci.com

OCEANIA

Australia
Thermo Fisher Scientific Australia Pty Ltd
5 Caribbean Drive
Scoresby, VIC 3179
Tel: +1300 735 292
Fax: +61 3 9763 1169
AUinfo@thermofisher.com
www.thermofisher.com.au

New Zealand
Thermo Fisher Scientific New Zealand Ltd
244 Bush Road,
Albany, Auckland 0632
Tel: 0800 933 966
Fax: +64 9 980 6788
infonz@thermofisher.com
www.thermofisher.co.nz

ACROS ORGANICS

Fisher BioReagents®

Fisher Chemical

MAYBRIDGE