CAS SciFinder

Task History

Initiating Search

February 23, 2025, 7:45 PM

Substances:

Filtered By:

Structure Match: **As Drawn**

Search Tasks

Task	Search Type	View
Returned Substance Results + Filters (2,302)	Substances	View Results
Exported: Retrieved Related Reaction Results + Filters (261)	Reactions	View Results

Filtered By:

Substance Role: **Reagent**

Catalyst: [1,3-Bis[2,6-bis(1-methylethyl)phenyl]-1,3-dihydro-2*H*-imidazol-2-ylidene]dichloro[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium, [μ-[(2*R*,2'*R*)-1,1'-Bis[(4*S*)-4-(1,1-dimethylethyl)-4,5-dihydro-2-oxazolyl-κN^3]-2,2'-bis(diphenylphosphino-κ*P*)ruthenocene]]tetrachlorobis(triphenylphosphine)diruthenium, [μ-[(2*R*,2'*S*)-1,1'-Bis[(4*S*)-4-(1,1-dimethylethyl)-4,5-dihydro-2-oxazolyl-κN^3]-2,2'-bis(diphenylphosphino-κ*P*)ruthenocene]]tetrachlorobis(triphenylphosphine)diruthenium, [4-Methyl-*N*-[(1*R*,2*R*)-2-(methylamino-κ*N*)-1,2-diphenylethyl]benzenesulfonamidato-κ*N*][(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene](1,1,1-trifluoromethanesulfonato-κ*O*)ruthenium, [4-Methyl-*N*-[(1*R*,2*R*)-2-(methylamino-κ*N*)-1,2-diphenylethyl]benzenesulfonamidato-κ*N*][(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene][tetrafluoroborato(1-)-κ*F*]ruthenium, (η^6-Benzene)dichlororuthenium, Bis(dihydrogen-κH^1,κH^2)dihydrobis(tricyclopentylphosphine)ruthenium, Chloro[2-(diphenylphosphino-κ*P*)benzenesulfonato-κ*O*][(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium, Dicarbonyldichlorobis(triphenylphosphine)ruthenium, Dichlorotris(triphenylphosphine)ruthenium, Di-μ-iododiiodobis[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]diruthenium, Iridium, compd. with ruthenium (1:2), Iridium, compd. with ruthenium (2:1), [*N*-[(1*R*,2*R*)-2-(Amino-κ*N*)-1,2-diphenylethyl]-4-

methylbenzenesulfonamidato-κ*N*][(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene](1,1,1-trifluoromethanesulfonato-κ*O*)ruthenium, [*N*-[(1*R*,2*R*)-2-(Amino-κ*N*)-1,2-diphenylethyl]-4-methylbenzenesulfonamidato-κ*N*]chloro[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium, [*N*-[(1*R*,2*R*)-2-(Amino-κ*N*)-1,2-diphenylethyl]methanesulfonamidato-κ*N*][μ-[3-[(fluoro-κ*F*)difluoromethyl]-5-(trifluoromethyl)phenyl-κ*C*]][(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene][tris[3,5-bis(trifluoromethyl)phenyl]boron]ruthenium, (*OC*-6-13)-Dichloro[(1*R*,2*R*)-1,2-cyclohexanediamine-κN^1,κN^2][1,1'-[(1*S*)-2,2',3,3'-tetrahydro-1,1'-spirobi[1*H*-indene]-7,7'-diyl]bis[1,1-bis(4-methoxy-3,5-dimethylphenyl)phosphine-κ*P*]]ruthenium, (*OC*-6-13)-Dichloro[(1*R*,2*R*)-1,2-diphenyl-1,2-ethanediamine-κN^1,κN^2][1,1'-[(1*S*)-2,2',3,3'-tetrahydro-1,1'-spirobi[1*H*-indene]-7,7'-diyl]bis[1,1-diphenylphosphine-κ*P*]]ruthenium, (*OC*-6-22-Δ)-Bis(acetato-κ*O*,κ*O'*)[1,1'-(1*R*)-[1,1'-binaphthalene]-2,2'-diylbis[1,1-diphenylphosphine-κ*P*]]ruthenium, (*OC*-6-22-Λ)-Bis(acetato-κ*O*,κ*O'*)[1,1'-(1*S*)-[1,1'-binaphthalene]-2,2'-diylbis[1,1-diphenylphosphine-κ*P*]]ruthenium, (*OC*-6-22)-Bis(acetato-κ*O*,κ*O'*)[(1*R*)-[1,1'-binaphthalene]-2,2'-diylbis[diphenylphosphine-κ*P*]]ruthenium, (*OC*-6-54)-[1,1'-(4*R*)-[4,4'-Bi-1,3-benzodioxole]-5,5'-diylbis[1,1-bis(3,5-dimethylphenyl)phosphine-κ*P*]]chloro[2-[(1*R*,2*S*)-1,2-di(amino-κ*N*)-1-(4-methoxyphenyl)-3-methylbutyl]-5-methoxyphenyl-κ*C*]ruthenium, Platinum ruthenium alloy, Ruthenium, Ruthenium(1+), [1,1'-(1*R*)-[1,1'-binaphthalene]-2,2'-diylbis[1,1-diphenylphosphine-κ*P*]]chloro[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]-, chloride (1:1), Ruthenium(1+), [(1,2,3,4-η)-1,3-cyclooctadiene][(1,2,3,4,5-η)-1,2,3,4,5-pentamethyl-2,4-cyclopentadien-1-yl]-, tetrafluoroborate(1-) (1:1), Ruthenium, [(1,2,5,6-η)-1,5-cyclooctadiene]bis[(1,2,3-η)-2-methyl-2-propenyl]-, Ruthenium(1+), chlorobis[1,1'-(1,2-ethanediyl)bis[1,1-diphenylphosphine-κ*P*]]-, (*TB*-5-22)-, 1,1,1-trifluoromethanesulfonate (1:1), Ruthenium(1+), chlorobis[1,3-propanediylbis[diphenylphosphine-κ*P*]]-, (*TB*-5-22)-, salt with trifluoromethanesulfonic acid (1:1), Ruthenium, [2,6-bis[(4*R*)-4,5-dihydro-4-phenyl-2-oxazolyl-κN^3]pyridine-κ*N*]dichloro(trimethyl phosphite-κ*P*)-, (*OC*-6-14)-, Ruthenium alloy, base, Ru 84,Fe 16, Ruthenium, bis(acetato-κ*O*,κ*O'*)[(4*S*)-[4,4'-bi-1,3-benzodioxole]-5,5'-diylbis[diphenylphosphine-κ*P*]]-, (*OC*-6-22)-, Ruthenium, chloro[2-[(diphenoxyphosphino)oxy]phenyl-*C*,*P*]tris(triphenyl phosphite-*P*)-, (*OC*-6-24)-, Ruthenium, dichloro[1,1'-[[(4*S*,5*S*)-2,2-dimethyl-1,3-dioxolane-4,5-diyl]bis(methylene)]bis[1,1-diphenylphosphine-κ*P*]][(α*S*)-α-(2-methylpropyl)-1*H*-benzimidazole-2-methanamine-κN^2,κN^3]-, (*OC*-6-14)-, Ruthenium, dichloro[(1*R*,2*R*)-1,2-diphenyl-1,2-ethanediamine-κ*N*,κ*N'*][(2*S*,2'*S*,5*S*,5'*S*)-1,1'-(1,2-phenylene)bis[2,5-diethylphospholane-κ*P*]]-, (*OC*-6-13)-, Ruthenium, octacarbonyltetra-μ-hydrotetrakis(tributylphosphine)tetra-, *tetrahedro*, Ruthenium, tetracarbonyl-μ-hydrotrihydro-μ-hydroxy-μ_3-hydroxy-μ_4-oxotetrakis(tricyclohexylphosphine)tetra-, (4*Ru*-*Ru*), Ruthenium trichloride, stereoisomer of Di-μ-iododiiodobis[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]diruthenium, (*TB*-5-12)-(2,3-Dimethyl-2,3-butanediaminato-κN^2,κN^3)hydrobis(triphenylphosphine)ruthenium, Tetra-μ_3-chlorotetrakis[(1,2,3,4,5-η)-1,2,3,4,5-pentamethyl-2,4-cyclopentadien-1-yl]tetraruthenium, Tetracarbonyl(triphenylphosphine)ruthenium, Triruthenium dodecacarbonyl, Tris(acetylacetonato)ruthenium

Document Type: Journal

Language: English

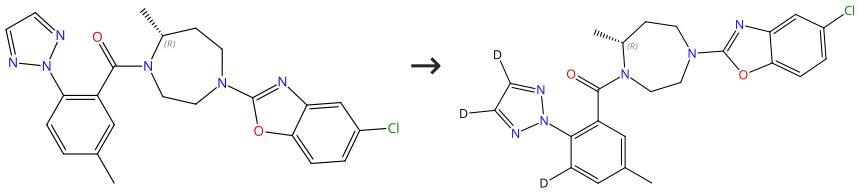
CAS SciFinder

Reactions (94)

View in CAS SciFinder

Scheme 1 (1 Reaction)

Steps: **1** Yield: **99%**



Absolute stereochemistry shown, Rotation (-)

Absolute stereochemistry shown

Suppliers (25)

31-116-CAS-22001860

Steps: **1** Yield: **99%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 24 h, 2 bar, 55 °C

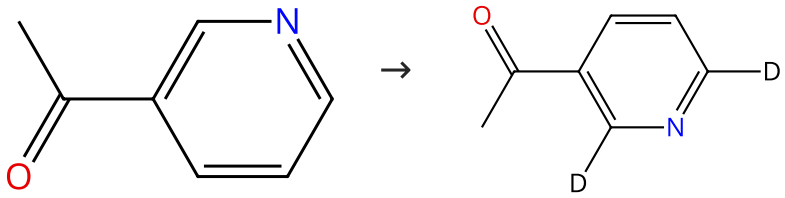
Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 2 (1 Reaction)

Steps: **1** Yield: **99%**



Suppliers (106)

31-116-CAS-4526046

Steps: **1** Yield: **99%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 5 h, rt

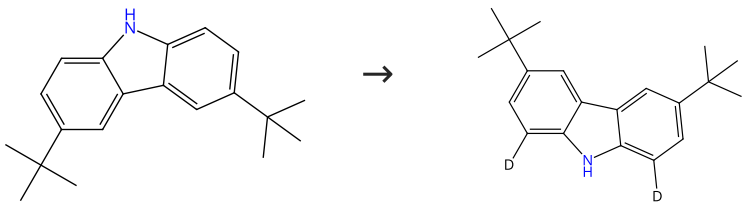
One-step exchange-labelling of pyridines and other N-heteroaromatics using deuterium gas: catalysis by heterog eneous rhodium and ruthenium catalysts

By: Alexakis, Efstathios; et al

Tetrahedron Letters (2006), 47(29), 5025-5028.

Scheme 3 (1 Reaction)

Steps: **1** Yield: **99%**



Suppliers (75)

31-116-CAS-22001852 Steps: **1** Yield: **99%**

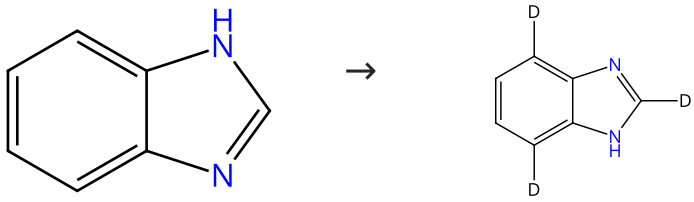
1.1 **Reagents:** Cesium carbonate, Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 24 h, 2 bar, 55 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 4 (1 Reaction) Steps: **1** Yield: **99%**



Suppliers (100)

31-116-CAS-22001845 Steps: **1** Yield: **99%**

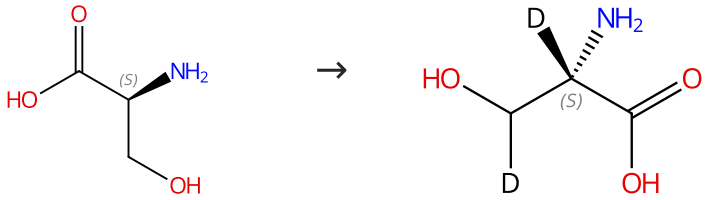
1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 12 h, 2 bar, 50 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 5 (1 Reaction) Steps: **1** Yield: **99%**



Absolute stereochemistry shown, Rotation (-)

Absolute stereochemistry shown

Suppliers (176)

31-116-CAS-5173454 Steps: **1** Yield: **99%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

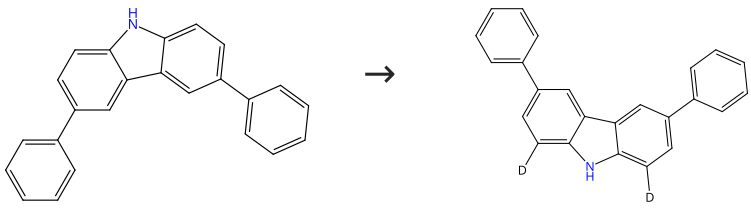
Experimental Protocols

Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 6 (1 Reaction) Steps: **1** Yield: **99%**



Suppliers (70)

31-116-CAS-22001853 Steps: **1** Yield: **99%**

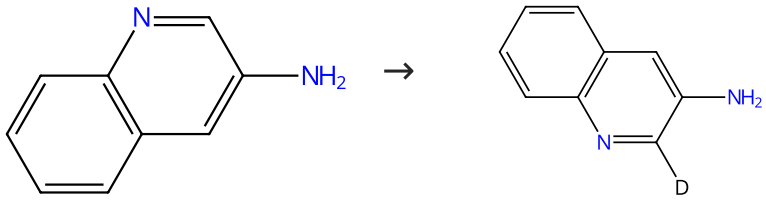
1.1 **Reagents:** Cesium carbonate, Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 24 h, 2 bar, 55 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 7 (1 Reaction) Steps: **1** Yield: **99%**



Suppliers (85)

31-116-CAS-6935502 Steps: **1** Yield: **99%**

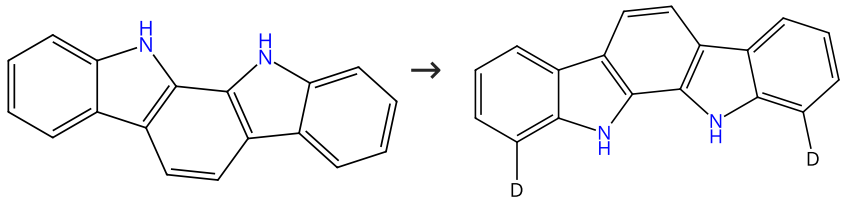
1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 5 h, rt

One-step exchange-labelling of pyridines and other N-heteroaromatics using deuterium gas: catalysis by heterog eneous rhodium and ruthenium catalysts

By: Alexakis, Efstathios; et al

Tetrahedron Letters (2006), 47(29), 5025-5028.

Scheme 8 (1 Reaction) Steps: **1** Yield: **99%**



Suppliers (65)

31-116-CAS-22001854 Steps: **1** Yield: **99%**

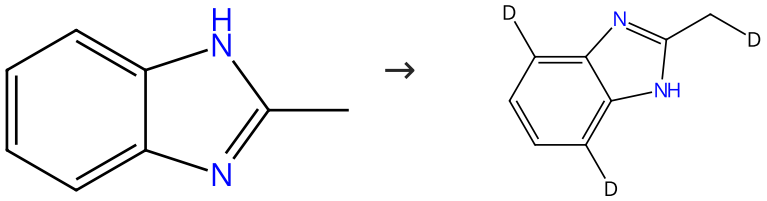
1.1 **Reagents:** Cesium carbonate, Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 24 h, 2 bar, 55 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 9 (1 Reaction) Steps: **1** Yield: **99%**



Suppliers (97)

31-116-CAS-22001846 Steps: **1** Yield: **99%**

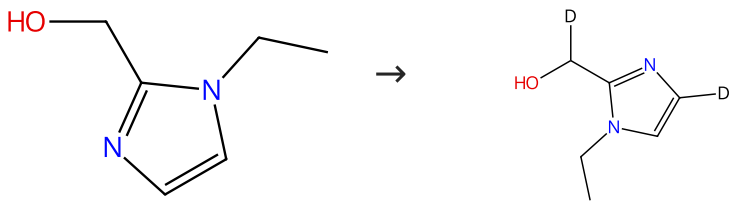
1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 12 h, 2 bar, 50 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 10 (1 Reaction) Steps: **1** Yield: **99%**



Suppliers (50)

31-116-CAS-22001844 Steps: **1** Yield: **99%**

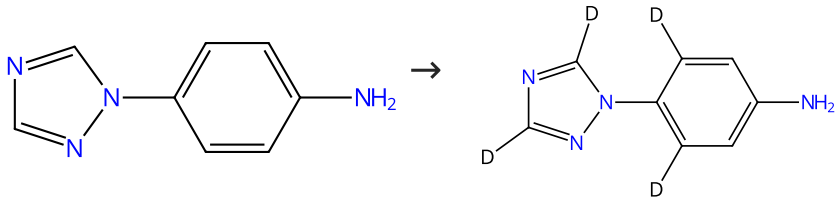
1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Dimethylacetamide; 12 h, 2 bar, 50 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 11 (1 Reaction) Steps: **1** Yield: **99%**



Suppliers (84)

31-116-CAS-22001849 Steps: **1** Yield: **99%**

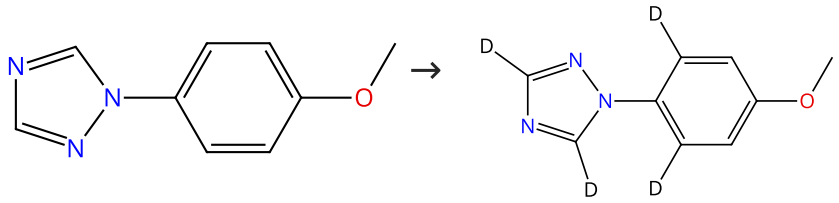
1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Dimethylacetamide; 24 h, 2 bar, 55 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 12 (1 Reaction) Steps: **1** Yield: **99%**



Suppliers (38)

31-116-CAS-22001848 Steps: **1** Yield: **99%**

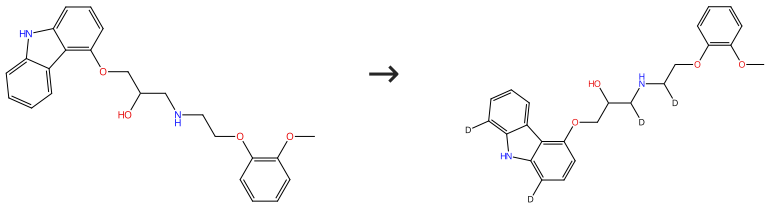
1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 24 h, 2 bar, 55 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 13 (1 Reaction) Steps: **1** Yield: **99%**



Suppliers (91)

31-614-CAS-30112304 Steps: **1** Yield: **99%**

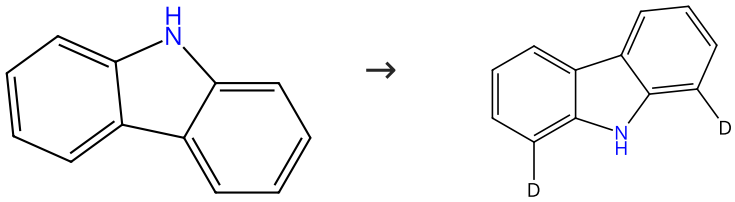
1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 24 h, 2 bar, 55 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 14 (1 Reaction) Steps: **1** Yield: **99%**



Suppliers (123) Supplier (1)

31-116-CAS-22001851 Steps: **1** Yield: **99%**

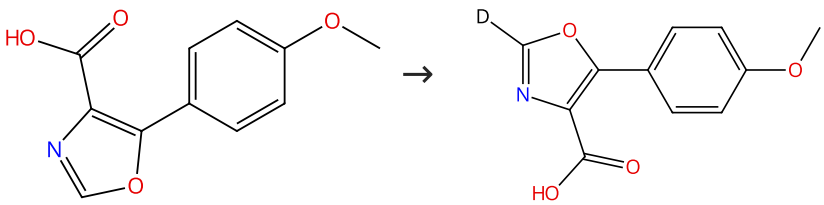
1.1 **Reagents:** Cesium carbonate, Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 24 h, 2 bar, 55 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 15 (1 Reaction) Steps: **1** Yield: **99%**



Suppliers (57)

31-116-CAS-22001842 Steps: **1** Yield: **99%**

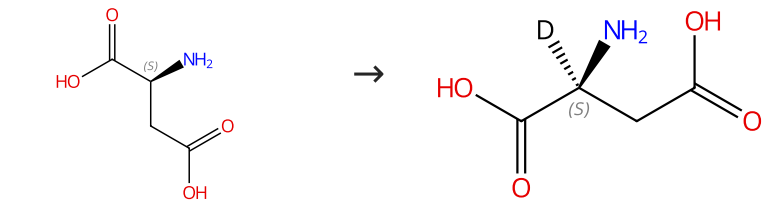
1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Dimethylacetamide; 24 h, 2 bar, 50 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 16 (1 Reaction) Steps: **1** Yield: **95%**



Absolute stereochemistry shown, Rotation (+)

Absolute stereochemistry shown

Suppliers (166)

31-116-CAS-11593057 Steps: **1** Yield: **95%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

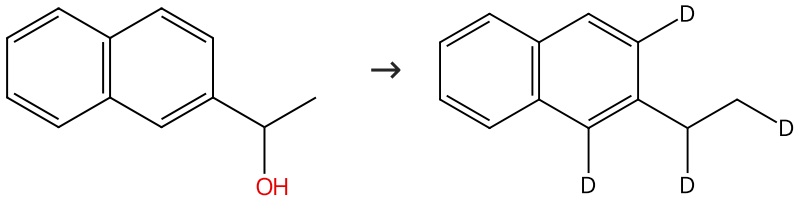
Experimental Protocols

Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 17 (1 Reaction) Steps: **1** Yield: **94%**



Suppliers (97)

31-614-CAS-31526752 Steps: **1** Yield: **94%**

1.1 **Reagents:** Deuterium
Catalysts: *p*-Toluenesulfonic acid, Chloro[2-(diphenylphosphino-κ*P*)benzenesulfonato-κ*O*][(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium
Solvents: Toluene; 20 h, 3 MPa, 150 °C

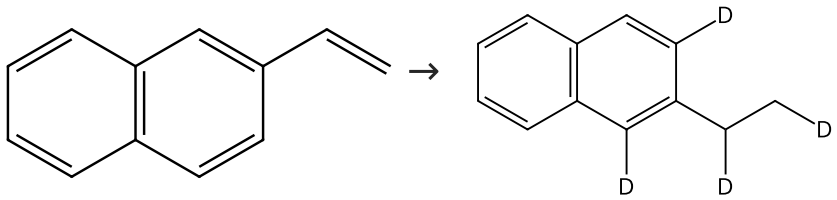
Experimental Protocols

Ru(dppbsa)-catalyzed hydrodeoxygenation and reductive etherification of ketones and aldehydes

By: Sun, Rui; et al

Organic Chemistry Frontiers (2022), 9(7), 1943-1954.

Scheme 18 (1 Reaction) Steps: **1** Yield: **93%**



Suppliers (74)

31-614-CAS-31526761 Steps: **1** Yield: **93%**

1.1 **Reagents:** Deuterium
Catalysts: *p*-Toluenesulfonic acid, Chloro[2-(diphenylphosphino-κ*P*)benzenesulfonato-κ*O*][(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium
Solvents: Toluene; 20 h, 3 MPa, 150 °C

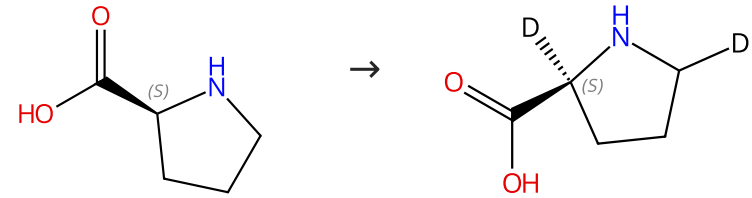
Experimental Protocols

Ru(dppbsa)-catalyzed hydrodeoxygenation and reductive etherification of ketones and aldehydes

By: Sun, Rui; et al

Organic Chemistry Frontiers (2022), 9(7), 1943-1954.

Scheme 19 (1 Reaction) Steps: **1** Yield: **92%**



Absolute stereochemistry shown, Rotation (-)

Absolute stereochemistry shown

Suppliers (170)

31-116-CAS-2790211 Steps: **1** Yield: **92%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

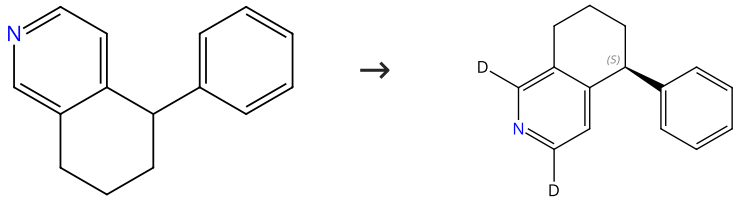
Experimental Protocols

Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 20 (1 Reaction) Steps: **1** Yield: **92%**



Rotation (+)

Absolute stereochemistry shown

31-116-CAS-18697970 Steps: **1** Yield: **92%**

1.1 **Catalysts:** Ruthenium, [(1,2,5,6-η)-1,5-cyclooctadiene]bis[(1,2,3-η)-2-methyl-2-propenyl]-, (1*S*,1''*S*)-2,2''-Bis[(1*S*)-1-(diphenylphosphino)ethyl]-1,1''-biferrocene
Solvents: Tetrahydrofuran; 8 h, rt

1.2 **Reagents:** Potassium carbonate, Deuterium
Solvents: Isopropanol; 48 h, 80 °C

Experimental Protocols

Ruthenium-Catalyzed Chemo- and Enantioselective Hydrogenation of Isoquinoline Carbocycles

By: Jin, Yushu; et al

Journal of Organic Chemistry (2018), 83(7), 3829-3839.

Scheme 21 (1 Reaction) Steps: **1** Yield: **92%**

Absolute stereochemistry shown, Rotation (+)

Absolute stereochemistry shown, Rotation (+)

Suppliers (195)

Suppliers (28)

31-116-CAS-9793291 Steps: **1** Yield: **92%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

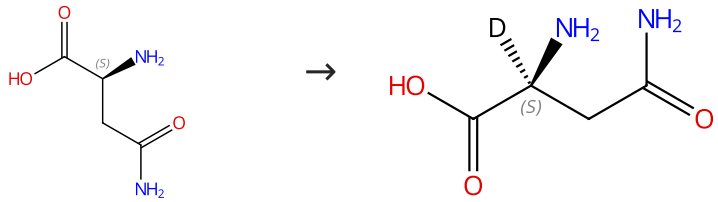
Experimental Protocols

Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 22 (1 Reaction) Steps: **1** Yield: **90%**



Absolute stereochemistry shown

Absolute stereochemistry shown

Suppliers (128)

31-116-CAS-4926242 Steps: **1** Yield: **90%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

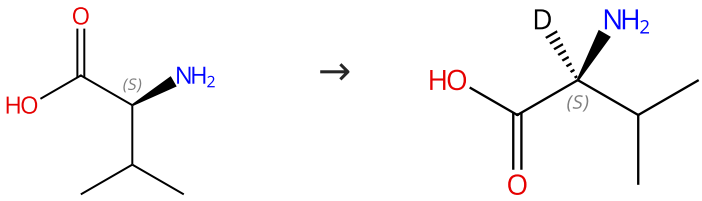
Experimental Protocols

Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 23 (1 Reaction) Steps: **1** Yield: **89%**



Absolute stereochemistry shown, Rotation (+)

Absolute stereochemistry shown

Suppliers (195)

Suppliers (28)

31-116-CAS-11924235 Steps: **1** Yield: **89%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

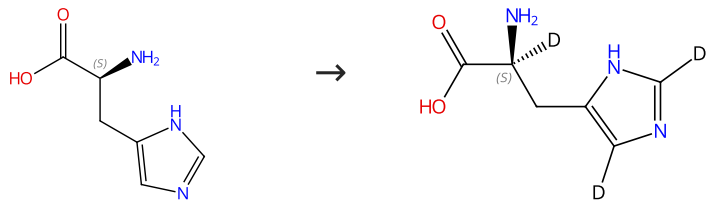
Experimental Protocols

Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 24 (1 Reaction) Steps: **1** Yield: **87%**



Absolute stereochemistry shown, Rotation (-)

Absolute stereochemistry shown

Suppliers (158)

31-116-CAS-9463343 Steps: **1** Yield: **87%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

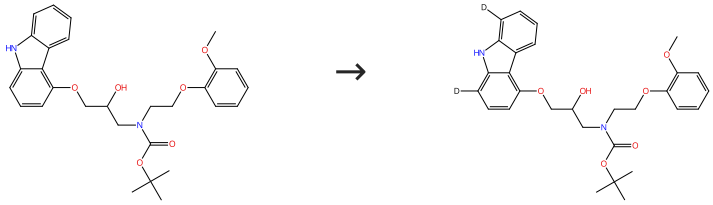
Experimental Protocols

Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 25 (1 Reaction) Steps: **1** Yield: **86%**



31-116-CAS-22001861 Steps: **1** Yield: **86%**

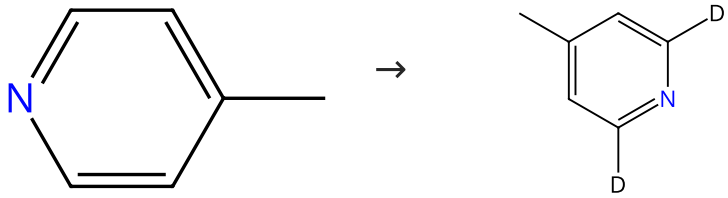
1.1 **Reagents:** Cesium carbonate, Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 24 h, 2 bar, 55 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 26 (1 Reaction) Steps: **1** Yield: **85%**



Suppliers (65)

31-116-CAS-13006307 Steps: **1** Yield: **85%**

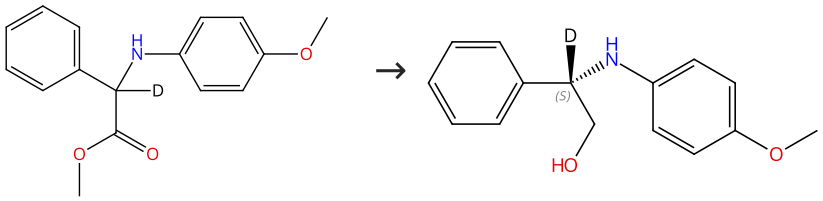
1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 5 h, rt

One-step exchange-labelling of pyridines and other N-heteroaromatics using deuterium gas: catalysis by heterog eneous rhodium and ruthenium catalysts

By: Alexakis, Efstathios; et al

Tetrahedron Letters (2006), 47(29), 5025-5028.

Scheme 27 (1 Reaction) Steps: **1** Yield: **82%**



Absolute stereochemistry shown, Rotation (+)

31-614-CAS-36072891 Steps: **1** Yield: **82%**

1.1 **Reagents:** Deuterium
Catalysts: 1-Butanol, 2-methyl-, sodium salt (1:1), (*OC*-6-54)-[1,1'-(4*R*)-[4,4'-Bi-1,3-benzodioxole]-5,5'-diylbis[1,1-bis(3,5-dimethylphenyl)phosphine-κ*P*]]chloro[2-[(1*R*,2*S*)-1,2-di(amino-κ*N*)-1-(4-methoxyphenyl)-3-methylbutyl]-5-methoxyphenyl-κ*C*]ruthenium
Solvents: Tetrahydrofuran, Cyclopentyl methyl ether; 8 h, 15 atm, 25 °C

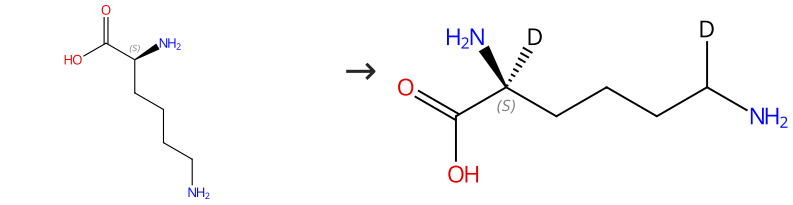
Experimental Protocols

Asymmetric Hydrogenation of α-Amino Esters into Optically Active β-Amino Alcohols through Dynamic Kinetic Resolution Catalyzed by Ruthenabicyclic Complexes

By: Ishikawa, Hiroki; et al

Organic Letters (2023), 25(13), 2355-2360.

Scheme 28 (1 Reaction) Steps: **1** Yield: **82%**



Absolute stereochemistry shown

Absolute stereochemistry shown

Suppliers (122)

31-116-CAS-3039265 Steps: **1** Yield: **82%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

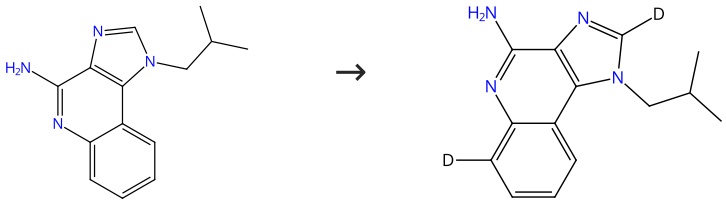
Experimental Protocols

Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 29 (1 Reaction) Steps: **1** Yield: **80%**



Suppliers (104)

31-116-CAS-22001857 Steps: **1** Yield: **80%**

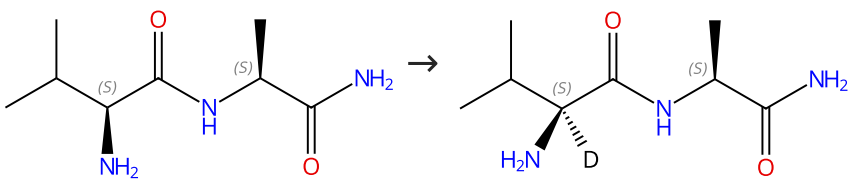
1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Dimethylacetamide; 24 h, 2 bar, 55 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 30 (1 Reaction) Steps: **1** Yield: **79%**



Absolute stereochemistry shown

Absolute stereochemistry shown

Suppliers (10)

31-116-CAS-2737030 Steps: **1** Yield: **79%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

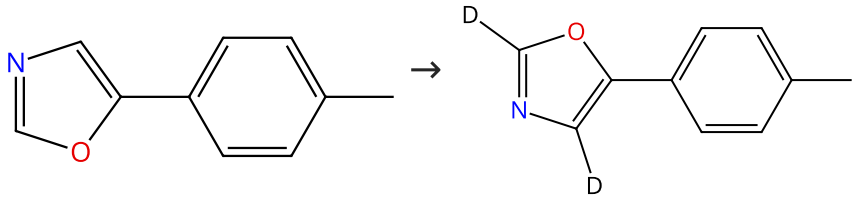
Experimental Protocols

Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 31 (1 Reaction) Steps: **1** Yield: **79%**



Suppliers (58)

31-116-CAS-22001840 Steps: **1** Yield: **79%**

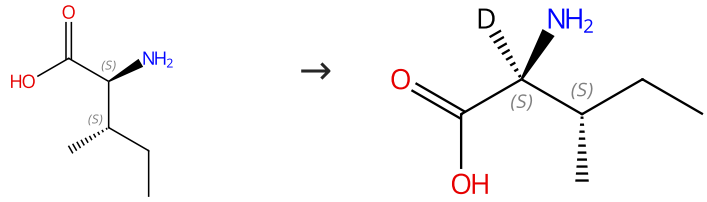
1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 24 h, 2 bar, 50 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 32 (1 Reaction) Steps: **1** Yield: **75%**



Absolute stereochemistry shown

Suppliers (189)

Absolute stereochemistry shown

Suppliers (23)

31-116-CAS-662963 Steps: **1** Yield: **75%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

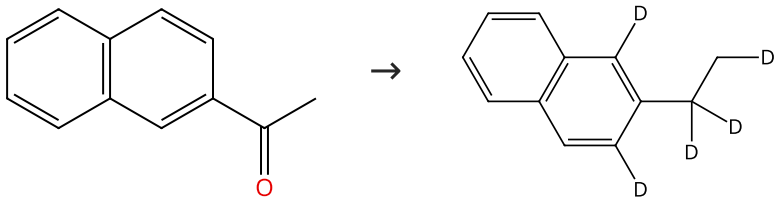
Experimental Protocols

Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 33 (1 Reaction) Steps: **1** Yield: **75%**



Suppliers (95)

31-614-CAS-31526754 Steps: **1** Yield: **75%**

1.1 **Reagents:** Deuterium
Catalysts: *p*-Toluenesulfonic acid, Chloro[2-(diphenylphosphino-κ*P*)benzenesulfonato-κ*O*][(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium
Solvents: Toluene; 20 h, 3 MPa, 150 °C

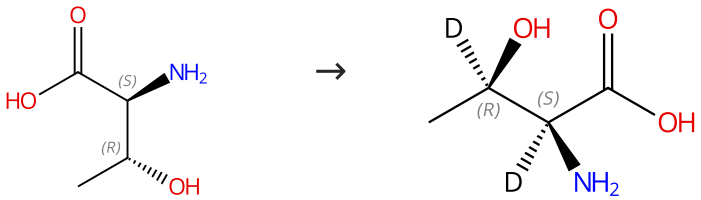
Experimental Protocols

Ru(dppbsa)-catalyzed hydrodeoxygenation and reductive etherification of ketones and aldehydes

By: Sun, Rui; et al

Organic Chemistry Frontiers (2022), 9(7), 1943-1954.

Scheme 34 (1 Reaction) Steps: **1** Yield: **72%**



Absolute stereochemistry shown

Absolute stereochemistry shown

Suppliers (212)

Suppliers (31)

31-116-CAS-7258419 Steps: **1** Yield: **72%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

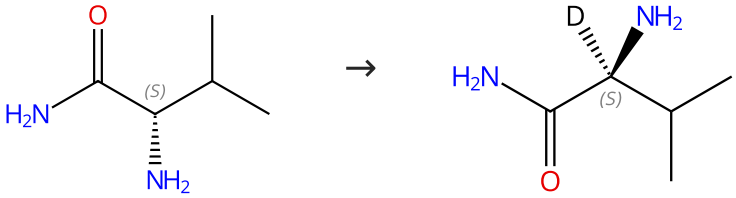
Experimental Protocols

Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 35 (1 Reaction) Steps: **1** Yield: **71%**



Absolute stereochemistry shown, Rotation (+)

Absolute stereochemistry shown

Suppliers (22)

31-116-CAS-13995239 Steps: **1** Yield: **71%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

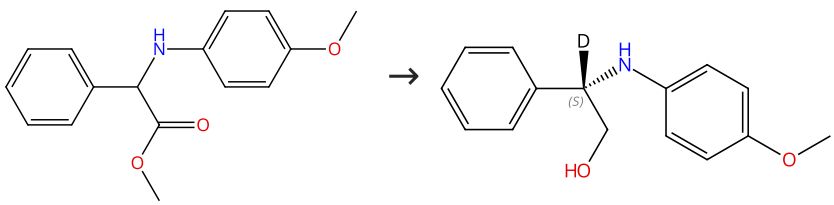
Experimental Protocols

Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 36 (1 Reaction) Steps: **1** Yield: **70%**



Absolute stereochemistry shown, Rotation (+)

Suppliers (5)

31-614-CAS-36072888 Steps: **1** Yield: **70%**

1.1 **Reagents:** Deuterium
Catalysts: 1-Butanol, 2-methyl-, sodium salt (1:1), (*OC*-6-54)-[1,1'-(4*R*)-[4,4'-Bi-1,3-benzodioxole]-5,5'-diylbis[1,1-bis(3,5-dimethylphenyl)phosphine-κ*P*]]chloro[2-[(1*R*,2*S*)-1,2-di(amino-κ*N*)-1-(4-methoxyphenyl)-3-methylbutyl]-5-methoxyphenyl-κ*C*]ruthenium
Solvents: Tetrahydrofuran, Cyclopentyl methyl ether; 14 h, 15 atm, 25 °C

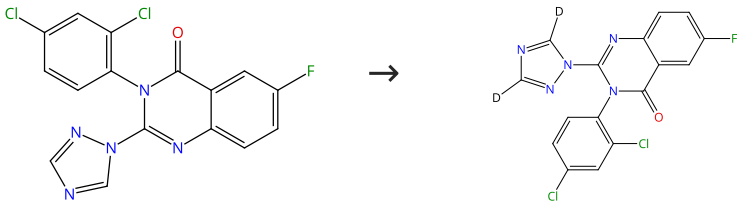
Experimental Protocols

Asymmetric Hydrogenation of α-Amino Esters into Optically Active β-Amino Alcohols through Dynamic Kinetic Resolution Catalyzed by Ruthenabicyclic Complexes

By: Ishikawa, Hiroki; et al

Organic Letters (2023), 25(13), 2355-2360.

Scheme 37 (1 Reaction) Steps: **1** Yield: **70%**



Suppliers (33)

31-116-CAS-22001859 Steps: **1** Yield: **70%**

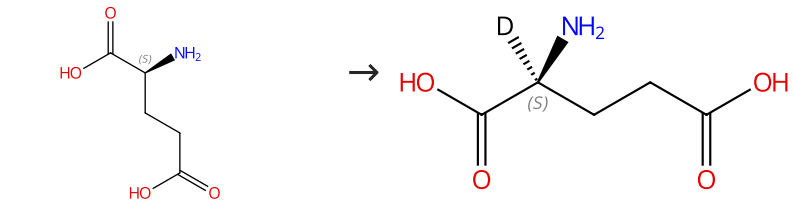
1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 24 h, 2 bar, 55 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 38 (1 Reaction) Steps: **1** Yield: **68%**



Absolute stereochemistry shown

Suppliers (188)

Absolute stereochemistry shown, Rotation (+)

Suppliers (2)

31-116-CAS-13726956 Steps: **1** Yield: **68%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

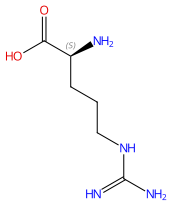
Experimental Protocols

Enantiospecific C-H activation using ruthenium nanocatalysts

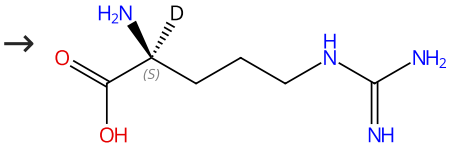
By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 39 (1 Reaction) Steps: **1** Yield: **68%**



Absolute stereochemistry shown



Absolute stereochemistry shown

Suppliers (168)

31-116-CAS-945805 Steps: **1** Yield: **68%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

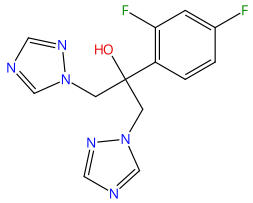
Experimental Protocols

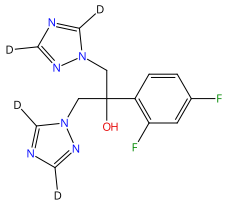
Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 40 (1 Reaction) Steps: **1** Yield: **67%**





Suppliers (143)

31-116-CAS-22001858 Steps: **1** Yield: **67%**

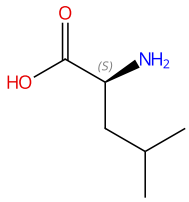
1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 24 h, 2 bar, 55 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

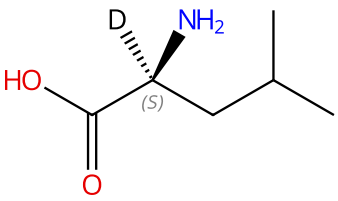
By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 41 (1 Reaction) Steps: **1** Yield: **65%**



Absolute stereochemistry shown, Rotation (+)



Absolute stereochemistry shown

Suppliers (194)

Suppliers (19)

31-116-CAS-14054302 Steps: **1** Yield: **65%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

Experimental Protocols

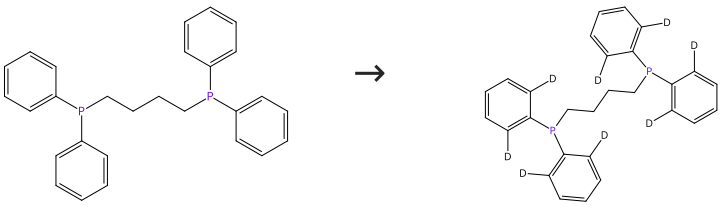
Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 42 (2 Reactions)

Steps: **1** Yield: **65%**



Suppliers (111)

31-614-CAS-41125213

Steps: **1** Yield: **65%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium (N-heterocyclic carbene or polyvinylp yrrolidone stabilized); 2 h, 3 bar, rt

1.2 **Reagents:** Deuterium
Solvents: Tetrahydrofuran; 48 h, 2 bar, 55 °C

Experimental Protocols

Bringing Selectivity in H/D Exchange Reactions Catalyzed by Metal Nanoparticles through Modulation of the Metal and the Ligand Shell

By: Martinez-Espinar, Francisco; et al

Inorganic Chemistry (2023), 62(11), 4570-4580.

31-116-CAS-7138338

Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium, Poly(vinylpyrrolidone); 2 h, 3 bar, rt

1.2 **Reagents:** Deuterium
Solvents: Tetrahydrofuran; 48 h, 2 bar, 80 °C

Experimental Protocols

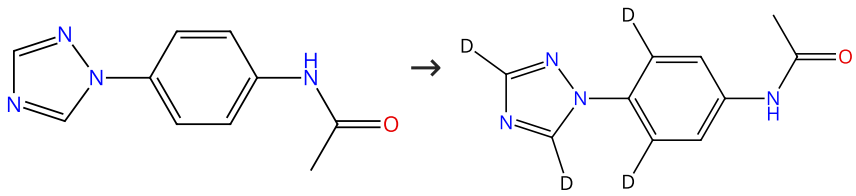
Selective catalytic deuteration of phosphorus ligands using ruthenium nanoparticles: a new approach to gain inform ation on ligand coordination

By: Breso-Femenia, Emma; et al

Chemical Communications (Cambridge, United Kingdom) (2015), 51(91), 16342-16345.

Scheme 43 (1 Reaction)

Steps: **1** Yield: **64%**



Suppliers (5)

31-116-CAS-22001850

Steps: **1** Yield: **64%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Dimethylacetamide; 24 h, 2 bar, 55 °C

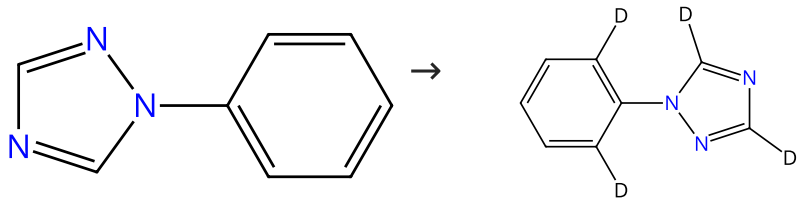
Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 44 (1 Reaction)

Steps: **1** Yield: **62%**



Suppliers (60)

31-116-CAS-22001847 Steps: **1** Yield: **62%**

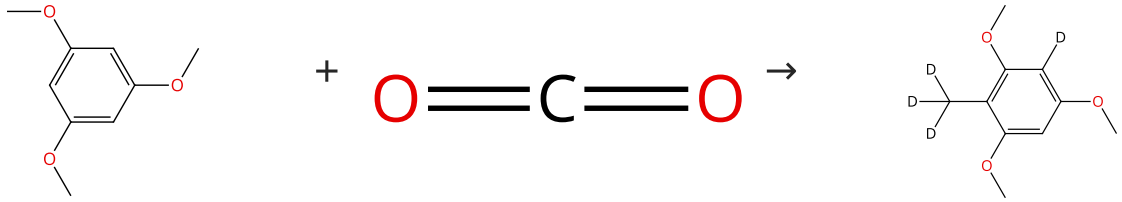
1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 24 h, 2 bar, 55 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 45 (1 Reaction) Steps: **1** Yield: **61%**



Suppliers (109) Suppliers (17)

31-116-CAS-9782236 Steps: **1** Yield: **61%**

1.1 **Reagents:** Deuterium
Catalysts: Tris(acetylacetonato)ruthenium, 1,1'-[2-[(Diphenylphosphino)methyl]-2-methyl-1,3-propanediyl]bis[1,1-diphenylphosphine], Aluminum triflate
Solvents: Tetrahydrofuran; 24 h, 160 °C

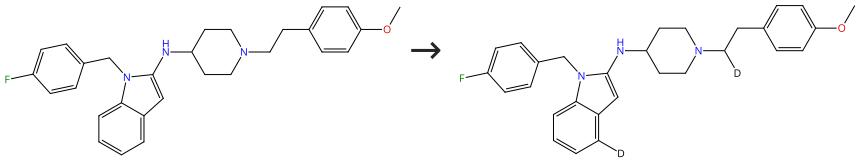
Experimental Protocols

Catalytic methylation of C-H bonds using CO_2 and H_2

By: Li, Yuehui; et al

Angewandte Chemie, International Edition (2014), 53(39), 10476-10480.

Scheme 46 (1 Reaction) Steps: **1** Yield: **60%**



31-116-CAS-22001856 Steps: **1** Yield: **60%**

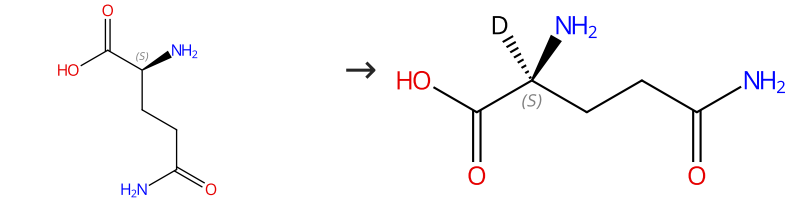
1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 24 h, 2 bar, 55 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 47 (1 Reaction) Steps: **1** Yield: **59%**



Absolute stereochemistry shown Absolute stereochemistry shown

Suppliers (192)

31-116-CAS-7005009 Steps: **1** Yield: **59%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

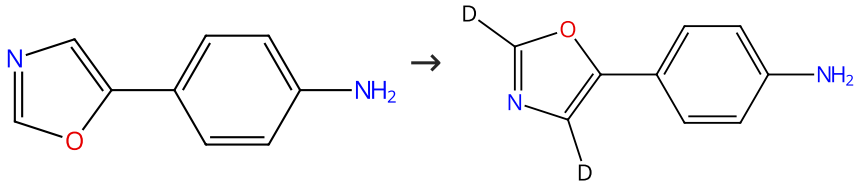
Experimental Protocols

Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 48 (1 Reaction) Steps: **1** Yield: **50%**



Suppliers (75)

31-116-CAS-22001841 Steps: **1** Yield: **50%**

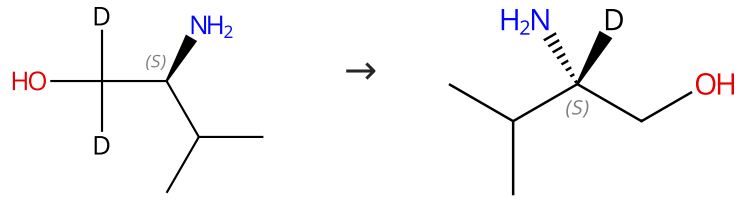
1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Dimethylacetamide; 24 h, 2 bar, 50 °C

Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 49 (1 Reaction) Steps: **1** Yield: **47%**



Absolute stereochemistry shown, Rotation (+)

Absolute stereochemistry shown

31-116-CAS-7658446 Steps: **1** Yield: **47%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

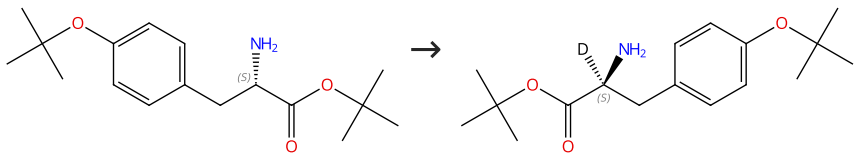
Experimental Protocols

Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 50 (1 Reaction) Steps: **1** Yield: **43%**



Absolute stereochemistry shown

Absolute stereochemistry shown

Suppliers (10)

31-116-CAS-2456751 Steps: **1** Yield: **43%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 36 h, 2 bar, 55 °C

Experimental Protocols

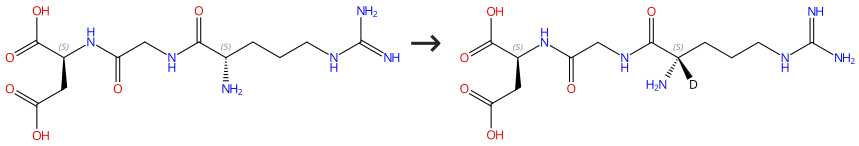
Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 51 (1 Reaction)

Steps: **1** Yield: **42%**



Absolute stereochemistry shown, Rotation (+)

Absolute stereochemistry shown

Suppliers (65)

31-116-CAS-4933151

Steps: **1** Yield: **42%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

Experimental Protocols

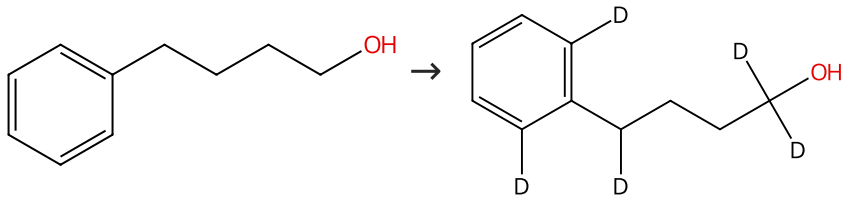
Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 52 (1 Reaction)

Steps: **1** Yield: **35%**



Suppliers (95)

31-116-CAS-22781811

Steps: **1** Yield: **35%**

1.1 **Reagents:** Potassium *tert*-butoxide, Deuterium
Catalysts: Ruthenium (on carbon)
Solvents: *tert*-Butyl methyl ether; 24 h, 2 bar, 55 °C

Experimental Protocols

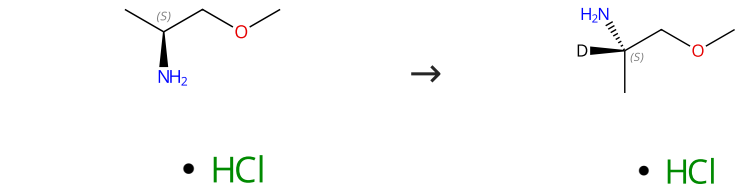
Tuning the Reactivity of a Heterog eneous Catalyst using N-Heterocyclic Carbene Ligands for C-H Activation Reactions

By: Palazzolo, Alberto; et al

Angewandte Chemie, International Edition (2020), 59(47), 20879-20884.

Scheme 53 (1 Reaction)

Steps: **1** Yield: **32%**



Absolute stereochemistry shown, Rotation (-)

Absolute stereochemistry shown, Rotation (+)

Suppliers (46)

31-116-CAS-5523622

Steps: **1** Yield: **32%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 36 h, 2 bar, 55 °C

1.2 **Reagents:** Hydrochloric acid
Solvents: Water; 1 h, rt

Experimental Protocols

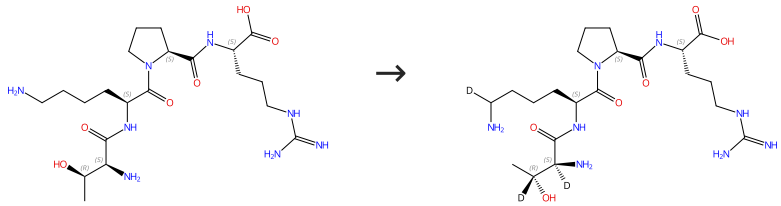
Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 54 (1 Reaction)

Steps: **1** Yield: **32%**



Absolute stereochemistry shown

Absolute stereochemistry shown

Suppliers (37)

31-116-CAS-6992929

Steps: **1** Yield: **32%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

Experimental Protocols

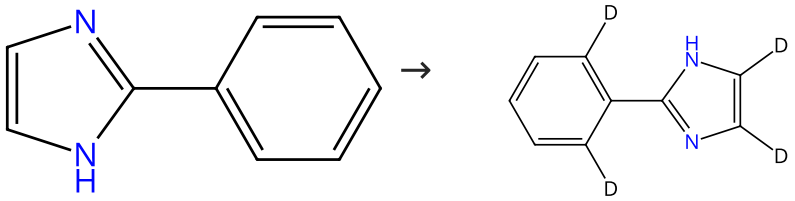
Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 55 (1 Reaction)

Steps: **1** Yield: **30%**



Suppliers (94)

31-116-CAS-22001843

Steps: **1** Yield: **30%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Tetrahydrofuran; 12 h, 2 bar, 55 °C

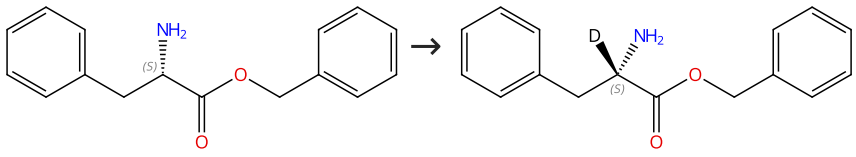
Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 56 (1 Reaction)

Steps: **1** Yield: **26%**



Absolute stereochemistry shown, Rotation (-)

Absolute stereochemistry shown

Suppliers (38)

31-116-CAS-276018

Steps: **1** Yield: **26%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Dimethylformamide; 36 h, 2 bar, 55 °C

Experimental Protocols

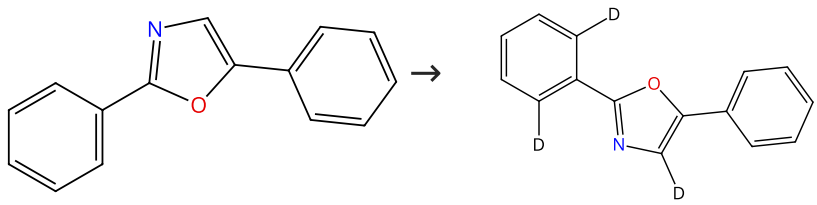
Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 57 (1 Reaction)

Steps: **1** Yield: **25%**



Suppliers (91)

31-116-CAS-22001838

Steps: **1** Yield: **25%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Dimethylacetamide; 24 h, 2 bar, 50 °C

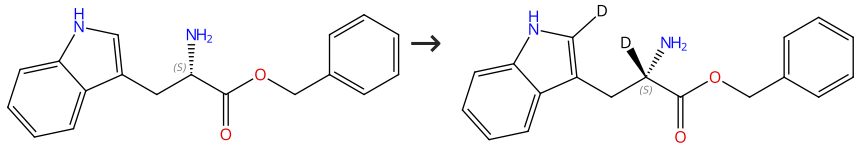
Hydrogen Isotope Exchange Catalyzed by Ru Nanocat alysts: Labelling of Complex Molecules Containing N-Heterocycles and Reaction Mechanism Insights

By: Pfeifer, Viktor; et al

Chemistry - A European Journal (2020), 26(22), 4988-4996.

Scheme 58 (1 Reaction)

Steps: **1** Yield: **20%**



Absolute stereochemistry shown

Absolute stereochemistry shown

Suppliers (48)

31-116-CAS-4594170

Steps: **1** Yield: **20%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Dimethylformamide; 36 h, 2 bar, 55 °C

Experimental Protocols

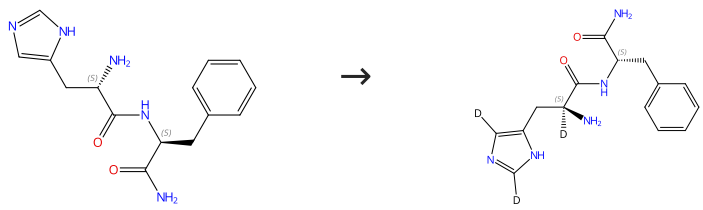
Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 59 (1 Reaction)

Steps: **1** Yield: **18%**



Absolute stereochemistry shown

Absolute stereochemistry shown

31-116-CAS-597807

Steps: **1** Yield: **18%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 36 h, 2 bar, 55 °C

Experimental Protocols

Enantiospecific C-H activation using ruthenium nanocatalysts

By: Taglang, Celine; et al

Angewandte Chemie, International Edition (2015), 54(36), 10474-10477.

Scheme 60 (1 Reaction)

Steps: **1**

Suppliers (84)

31-116-CAS-1409233

Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium, Poly(vinylpyrrolidone); 2 h, 3 bar, rt

1.2 **Reagents:** Deuterium
Solvents: Tetrahydrofuran; 88 h, 2 bar, 80 °C

Experimental Protocols

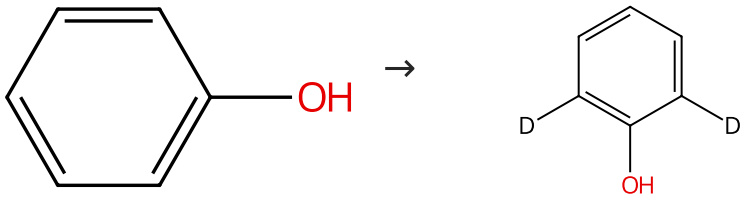
Selective catalytic deuteration of phosphorus ligands using ruthenium nanoparticles: a new approach to gain inform ation on ligand coordination

By: Breso-Femenia, Emma; et al

Chemical Communications (Cambridge, United Kingdom) (2015), 51(91), 16342-16345.

Scheme 61 (1 Reaction)

Steps: **1**



Suppliers (220)

31-116-CAS-5403179

Steps: **1**

1.1 **Reagents:** Potassium phenoxide, Deuterium
Catalysts: Ruthenium, chloro[2-[(diphenoxyphosphino)oxy] phenyl-*C*,*P*]tris(triphenyl phosphite-*P*)-, (*OC*-6-24)-
Solvents: Tetrahydrofuran

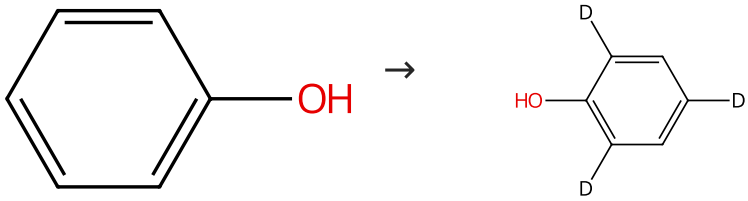
Reexamination of the deuteration of phenol catalyzed by an orthometalated ruthenium complex

By: Lewis, Larry N.

Inorganic Chemistry (1985), 24(25), 4433-5.

Scheme 62 (1 Reaction)

Steps: **1**



Suppliers (220)

Suppliers (25)

31-614-CAS-38030186

Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium alloy, base, Ru 84,Fe 16 (ionic-liquid-modified silica supported and functio nalized with diethyl...), 2924183-46-8 (silica supported, iron ruthenium nanoparticles immobilized)
Solvents: Heptane; 18 h, 20 bar, rt → 200 °C

Experimental Protocols

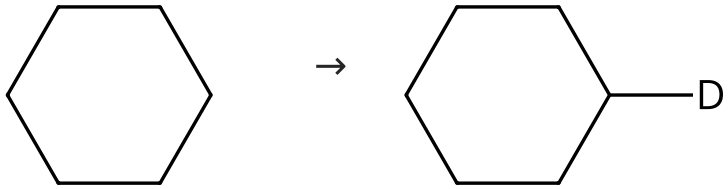
Decarboxylation and Tandem Reduction/Decarboxylation Pathways to Substituted Phenols from Aromatic Carboxylic Acids Using Bimetallic Nanoparticles on Supported Ionic Liquid Phases as Multifunctional Catalysts

By: Levin, Natalia; et al

Journal of the American Chemical Society (2023), 145(41), 22845-22854.

Scheme 63 (1 Reaction)

Steps: **1**



Suppliers (228)

31-116-CAS-19188581

Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium, 1,4-Bis(diphenylphosphino)butane
Solvents: Tetrahydrofuran; 24 h, 60 °C

Experimental Protocols

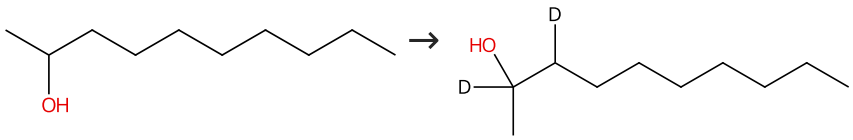
Surprising Differences of Alkane C-H Activation Catalyzed by Ruthenium Nanoparticles: Complex Surface-Substrate Recognition?

By: Rothermel, Niels; et al

ChemCatChem (2018), 10(19), 4243-4247.

Scheme 64 (1 Reaction)

Steps: **1**



Suppliers (57)

31-116-CAS-22781840

Steps: **1**

1.1 **Reagents:** Potassium *tert*-butoxide, Deuterium
Catalysts: Ruthenium (on carbon)
Solvents: *tert*-Butyl methyl ether; 24 h, 2 bar, 55 °C

Experimental Protocols

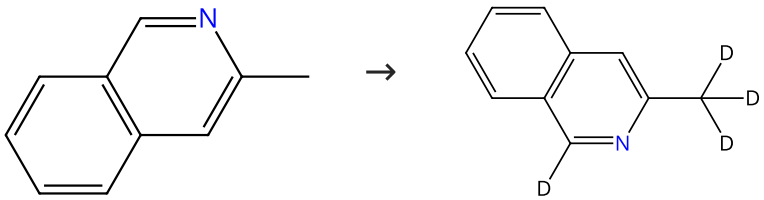
Tuning the Reactivity of a Heterogeneous Catalyst using N-Heterocyclic Carbene Ligands for C-H Activation Reactions

By: Palazzolo, Alberto; et al

Angewandte Chemie, International Edition (2020), 59(47), 20879-20884.

Scheme 65 (1 Reaction)

Steps: **1**



Suppliers (45)

31-116-CAS-5690741

Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium
Solvents: Benzene-d_6; 4 d, 10 psi, rt

Experimental Protocols

Reactions of Group III Biheterocyclic Complexes

By: Carver, Colin T.; et al

Journal of the American Chemical Society (2009), 131(29), 10269-10278.

Scheme 66 (1 Reaction)

Steps: **1**

Suppliers (84)

31-116-CAS-5624078

Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium, Poly(vinylpyrrolidone); 2 h, 3 bar, rt

1.2 **Reagents:** Deuterium
Solvents: Tetrahydrofuran; 88 h, 2 bar, 80 °C

Experimental Protocols

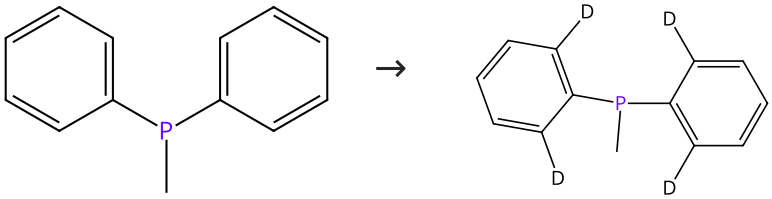
Selective catalytic deuteration of phosphorus ligands using ruthenium nanoparticles: a new approach to gain inform ation on ligand coordination

By: Breso-Femenia, Emma; et al

Chemical Communications (Cambridge, United Kingdom) (2015), 51(91), 16342-16345.

Scheme 67 (2 Reactions)

Steps: **1**



Suppliers (85)

31-614-CAS-41125210

Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium (N-heterocyclic carbene or polyvinylp yrrolidone stabilized); 2 h, 3 bar, rt

1.2 **Reagents:** Deuterium
Solvents: Tetrahydrofuran; 8 d, 2 bar, 55 °C

Experimental Protocols

Bringing Selectivity in H/D Exchange Reactions Catalyzed by Metal Nanoparticles through Modulation of the Metal and the Ligand Shell

By: Martinez-Espinar, Francisco; et al

Inorganic Chemistry (2023), 62(11), 4570-4580.

31-116-CAS-14147369

Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium, Poly(vinylpyrrolidone); 2 h, 3 bar, rt

1.2 **Reagents:** Deuterium
Solvents: Tetrahydrofuran; 88 h, 2 bar, 80 °C

Experimental Protocols

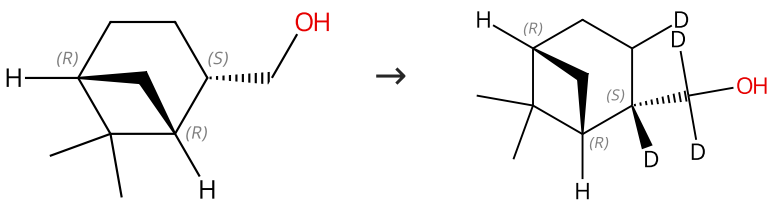
Selective catalytic deuteration of phosphorus ligands using ruthenium nanoparticles: a new approach to gain inform ation on ligand coordination

By: Breso-Femenia, Emma; et al

Chemical Communications (Cambridge, United Kingdom) (2015), 51(91), 16342-16345.

Scheme 68 (1 Reaction)

Steps: **1**



Relative stereochemistry shown

Relative stereochemistry shown

Suppliers (10)

31-116-CAS-22781793 Steps: **1**

1.1 **Reagents:** Potassium *tert*-butoxide, Deuterium
Catalysts: Ruthenium (on carbon)
Solvents: *tert*-Butyl methyl ether; 24 h, 2 bar, 55 °C

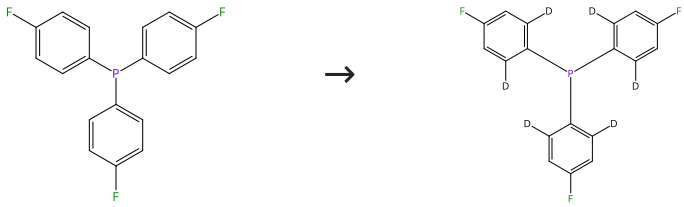
Experimental Protocols

Tuning the Reactivity of a Heterogeneous Catalyst using N-Heterocyclic Carbene Ligands for C-H Activation Reactions

By: Palazzolo, Alberto; et al

Angewandte Chemie, International Edition (2020), 59(47), 20879-20884.

Scheme 69 (1 Reaction) Steps: **1**



Suppliers (87)

31-116-CAS-3201518 Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium, Poly(vinylpyrrolidone); 2 h, 3 bar, rt

1.2 **Reagents:** Deuterium
Solvents: Tetrahydrofuran; 88 h, 2 bar, 80 °C

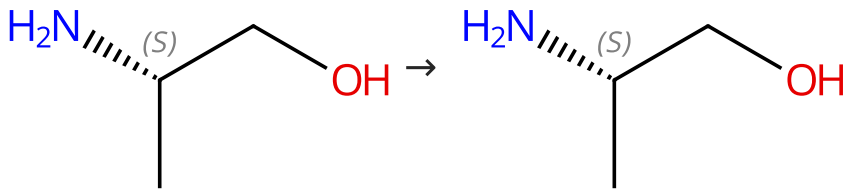
Experimental Protocols

Selective catalytic deuteration of phosphorus ligands using ruthenium nanoparticles: a new approach to gain information on ligand coordination

By: Breso-Femenia, Emma; et al

Chemical Communications (Cambridge, United Kingdom) (2015), 51(91), 16342-16345.

Scheme 70 (1 Reaction) Steps: **1**



Absolute stereochemistry shown, Rotation (+)

Absolute stereochemistry shown, Rotation (+)

deuterated

Suppliers (99)

31-614-CAS-27478674 Steps: **1**

1.1 **Reagents:** Phosphoric acid, Deuterium
Catalysts: Ruthenium
Solvents: Water-d_2; 1 h, 1000 Pa, 150 °C

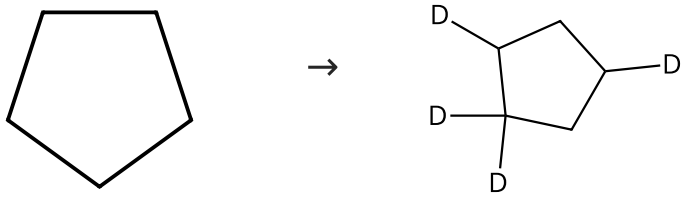
Experimental Protocols

Stereoretentive C-H Bond Activation in the Aqueous Phase Catalytic Hydrogenation of Amino Acids to Amino Alcohols

By: Jere, Frank T.; et al

Organic Letters (2003), 5(4), 527-530.

Scheme 71 (1 Reaction) Steps: **1**



Suppliers (65)

31-116-CAS-19188580 Steps: 1

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium, 1,4-Bis(diphenylphosphino)butane
Solvents: Tetrahydrofuran; 24 h, 60 °C

Experimental Protocols

Surprising Differences of Alkane C-H Activation Catalyzed by Ruthenium Nanoparticles: Complex Surface-Substrate Recognition?

By: Rothermel, Niels; et al

ChemCatChem (2018), 10(19), 4243-4247.

Scheme 72 (1 Reaction) Steps: **1**

Suppliers (102)

31-116-CAS-10218866 Steps: 1

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium, Poly(vinylpyrrolidone); 2 h, 3 bar, rt

1.2 **Reagents:** Deuterium
Solvents: Tetrahydrofuran; 88 h, 2 bar, 80 °C

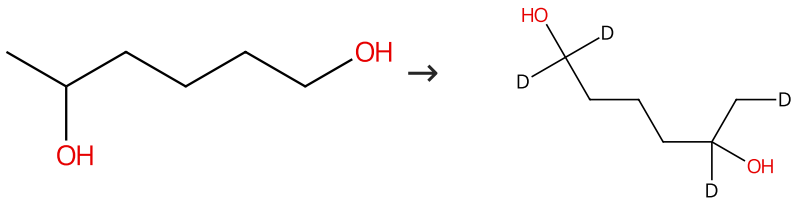
Experimental Protocols

Selective catalytic deuteration of phosphorus ligands using ruthenium nanoparticles: a new approach to gain information on ligand coordination

By: Breso-Femenia, Emma; et al

Chemical Communications (Cambridge, United Kingdom) (2015), 51(91), 16342-16345.

Scheme 73 (1 Reaction) Steps: **1**



Suppliers (46)

31-116-CAS-22781801 Steps: 1

1.1 **Reagents:** Potassium *tert*-butoxide, Deuterium
Catalysts: Ruthenium (on carbon)
Solvents: *tert*-Butyl methyl ether; 24 h, 2 bar, 55 °C

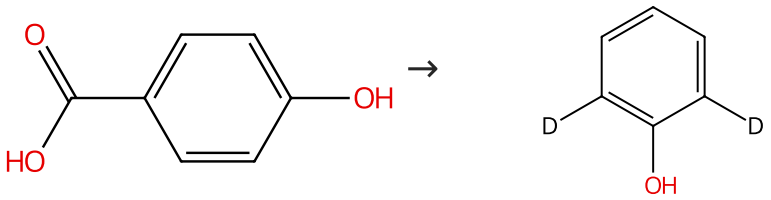
Experimental Protocols

Tuning the Reactivity of a Heterogeneous Catalyst using N-Heterocyclic Carbene Ligands for C-H Activation Reactions

By: Palazzolo, Alberto; et al

Angewandte Chemie, International Edition (2020), 59(47), 20879-20884.

Scheme 74 (1 Reaction) Steps: **1**



Suppliers (137)

31-614-CAS-38030188 Steps: 1

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium alloy, base, Ru 84,Fe 16 (ionic-liquid-modified silica supported and functionalized with diethyl...), 2924183-46-8 (silica supported, iron ruthenium nanoparticles immobilized)
Solvents: Heptane; 18 h, 20 bar, rt → 200 °C

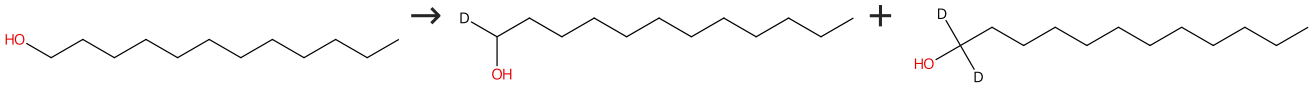
Experimental Protocols

Decarboxylation and Tandem Reduction/Decarboxylation Pathways to Substituted Phenols from Aromatic Carboxylic Acids Using Bimetallic Nanoparticles on Supported Ionic Liquid Phases as Multifunctional Catalysts

By: Levin, Natalia; et al

Journal of the American Chemical Society (2023), 145(41), 22845-22854.

Scheme 75 (4 Reactions) Steps: **1** Yield: **92%**



Suppliers (101) Suppliers (3)

31-116-CAS-22781782 Steps: **1** Yield: **92%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium (on carbon)
Solvents: Heptane; 24 h, 2 bar, 55 °C

Experimental Protocols

Tuning the Reactivity of a Heterogeneous Catalyst using N-Heterocyclic Carbene Ligands for C-H Activation Reactions

By: Palazzolo, Alberto; et al

Angewandte Chemie, International Edition (2020), 59(47), 20879-20884.

31-116-CAS-22781783 Steps: **1** Yield: **92%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium (on carbon)
Solvents: Water-d_2; 24 h, 2 bar, 55 °C

Experimental Protocols

Tuning the Reactivity of a Heterogeneous Catalyst using N-Heterocyclic Carbene Ligands for C-H Activation Reactions

By: Palazzolo, Alberto; et al

Angewandte Chemie, International Edition (2020), 59(47), 20879-20884.

31-116-CAS-22781781 Steps: **1** Yield: **92%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium (on carbon)
Solvents: Water-d_2; 24 h, 2 bar, 55 °C

Experimental Protocols

Tuning the Reactivity of a Heterogeneous Catalyst using N-Heterocyclic Carbene Ligands for C-H Activation Reactions

By: Palazzolo, Alberto; et al

Angewandte Chemie, International Edition (2020), 59(47), 20879-20884.

31-116-CAS-22781780 Steps: **1** Yield: **92%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium (on carbon)
Solvents: Heptane; 24 h, 2 bar, 55 °C

Experimental Protocols

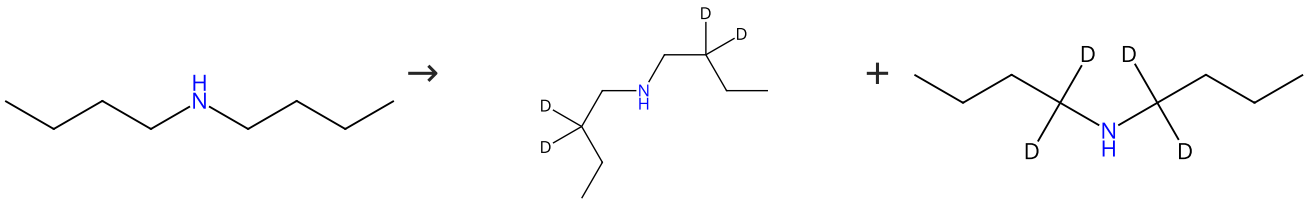
Tuning the Reactivity of a Heterogeneous Catalyst using N-Heterocyclic Carbene Ligands for C-H Activation Reactions

By: Palazzolo, Alberto; et al

Angewandte Chemie, International Edition (2020), 59(47), 20879-20884.

Scheme 76 (1 Reaction)

Steps: **1** Yield: **67%**



Suppliers (75)

Suppliers (8)

31-614-CAS-42765282

Steps: **1** Yield: **67%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium; 3 h, 4 bar, 120 °C

Experimental Protocols

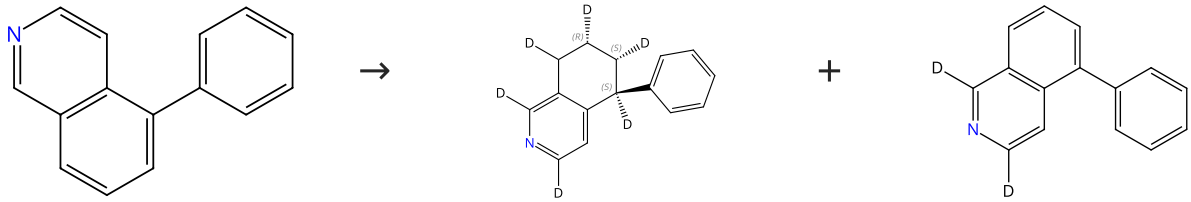
Magnetically Induced Amination of Alcohols Using M Ni@Cu (M=Fe, Co) Nanoparticles as Catalysts

By: Varela-Izquierdo, Victor; et al

Angewandte Chemie, International Edition (2024), 63(50), e202412421.

Scheme 77 (1 Reaction)

Steps: **1** Yield: **54%**



Absolute stereochemistry shown

Suppliers (14)

31-116-CAS-18697972

Steps: **1** Yield: **54%**

1.1 **Catalysts:** Ruthenium, [(1,2,5,6-η)-1,5-cyclooctadiene]bis[(1,2,3-η)-2-methyl-2-propenyl]-, (1*S*,1''*S*)-2,2''-Bis[(1*S*)-1-(diphenylphosphino)ethyl]-1,1''-biferrocene
Solvents: Tetrahydrofuran; 8 h, rt

1.2 **Reagents:** Potassium carbonate, Deuterium
Solvents: Isopropanol; 72 h, 80 °C

Experimental Protocols

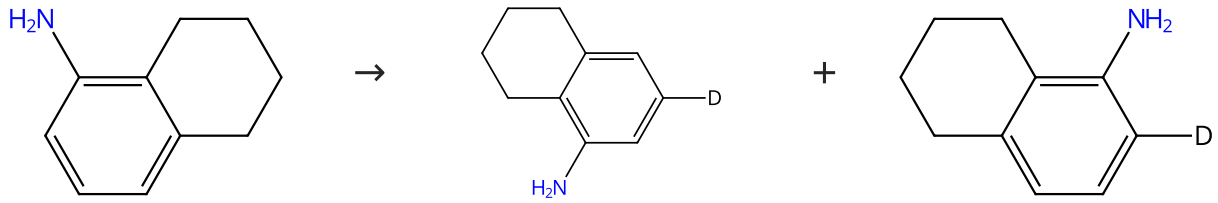
Ruthenium-Catalyzed Chemo- and Enantioselective Hydrogenation of Isoquinoline Carbocycles

By: Jin, Yushu; et al

Journal of Organic Chemistry (2018), 83(7), 3829-3839.

Scheme 78 (1 Reaction)

Steps: **1**



Suppliers (61)

31-614-CAS-34988546

Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: 1,3-Dihydro-1,3-bis(2,4,6-trimethylphenyl)-2*H*-imidazol-2-ylidene (Iridium and ruthenium supported), Iridium, compd. with ruthenium (2:1)
Solvents: Tetrahydrofuran; 24 h, 2 bar, 55 °C

Experimental Protocols

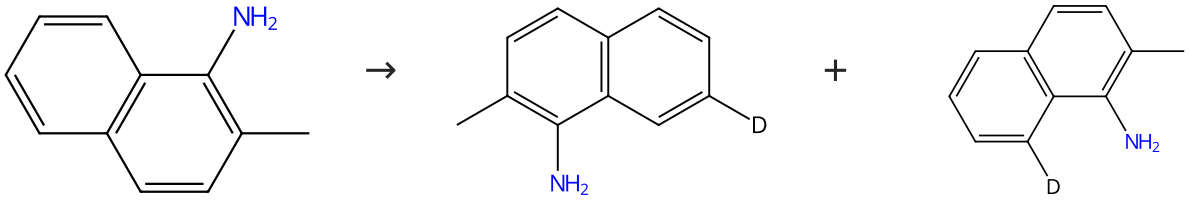
N-Heterocyclic Carbene-Based Iridium and Ruthenium /Iridium Nanoparticles for the Hydrogen Isotope Exchange Reaction through C-H Bond Activations

By: Zuluaga-Villamil, Alejandra; et al

Organometallics (2022), 41(22), 3313-3319.

Scheme 79 (3 Reactions)

Steps: **1**



Suppliers (79)

31-614-CAS-34988550

Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: 1,3-Dihydro-1,3-bis(2,4,6-trimethylphenyl)-2*H*-imidazol-2-ylidene (Iridium and ruthenium supported), Iridium, compd. with ruthenium (1:2)
Solvents: Tetrahydrofuran; 24 h, 2 bar, 55 °C

Experimental Protocols

N-Heterocyclic Carbene-Based Iridium and Ruthenium /Iridium Nanoparticles for the Hydrogen Isotope Exchange Reaction through C-H Bond Activations

By: Zuluaga-Villamil, Alejandra; et al

Organometallics (2022), 41(22), 3313-3319.

31-614-CAS-34988544

Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: 1,3-Dihydro-1,3-bis(2,4,6-trimethylphenyl)-2*H*-imidazol-2-ylidene (Iridium and ruthenium supported), Iridium, compd. with ruthenium (2:1)
Solvents: Tetrahydrofuran; 24 h, 2 bar, 55 °C

Experimental Protocols

N-Heterocyclic Carbene-Based Iridium and Ruthenium /Iridium Nanoparticles for the Hydrogen Isotope Exchange Reaction through C-H Bond Activations

By: Zuluaga-Villamil, Alejandra; et al

Organometallics (2022), 41(22), 3313-3319.

31-614-CAS-34988536

Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium (bound to polyvinylpyrrolidone or IMes N-heterocyclic carbene), 1,3-Dihydro-1,3-bis(2,4,6-trimethylphenyl)-2*H*-imidazol-2-ylidene (Iridium and ruthenium supported)
Solvents: Tetrahydrofuran; 24 h, 2 bar, 55 °C

Experimental Protocols

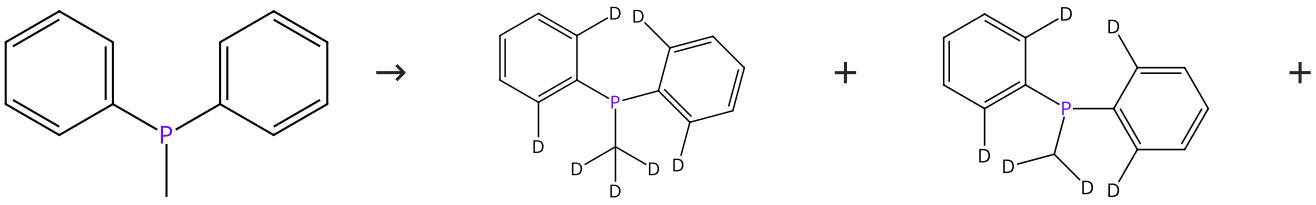
N-Heterocyclic Carbene-Based Iridium and Ruthenium /Iridium Nanoparticles for the Hydrogen Isotope Exchange Reaction through C-H Bond Activations

By: Zuluaga-Villamil, Alejandra; et al

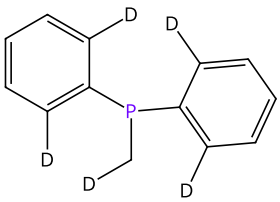
Organometallics (2022), 41(22), 3313-3319.

Scheme 80 (1 Reaction)

Steps: **1** Yield: **67%**



Suppliers (85)



31-614-CAS-41125212 Steps: **1** Yield: **67%**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium (N-heterocyclic carbene or polyvinylpyrrolidone stabilized); 2 h, 3 bar, rt

1.2 **Reagents:** Deuterium
Solvents: Tetrahydrofuran; 8 d, 2 bar, 55 °C

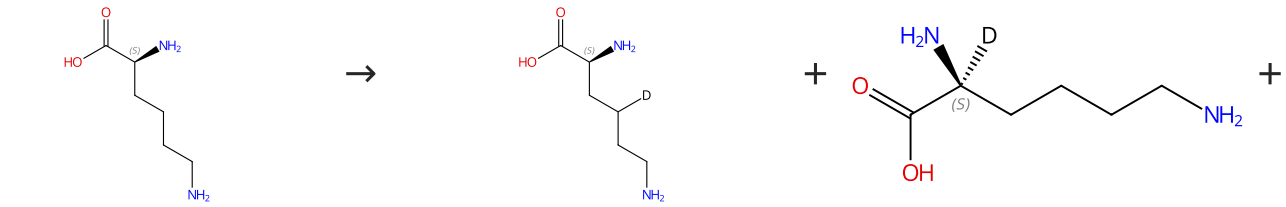
Experimental Protocols

Bringing Selectivity in H/D Exchange Reactions Catalyzed by Metal Nanoparticles through Modulation of the Metal and the Ligand Shell

By: Martinez-Espinar, Francisco; et al

Inorganic Chemistry (2023), 62(11), 4570-4580.

Scheme 81 (3 Reactions) Steps: **1**

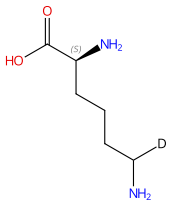


Absolute stereochemistry shown

Absolute stereochemistry shown

Absolute stereochemistry shown

Suppliers (122)



Absolute stereochemistry shown

31-614-CAS-34988549 Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: 1*H*-Imidazolium, 1-(3-sulfopropyl)-3-(2,4,6-trimethylphenyl)-, inner salt (Iridium and ruthenium supported), Iridium, compd. with ruthenium (2:1)
Solvents: Water-d_2; 48 h, 2 bar, 55 °C

Experimental Protocols

N-Heterocyclic Carbene-Based Iridium and Ruthenium /Iridium Nanoparticles for the Hydrogen Isotope Exchange Reaction through C-H Bond Activations

By: Zuluaga-Villamil, Alejandra; et al

Organometallics (2022), 41(22), 3313-3319.

31-614-CAS-34988551 Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: 1*H*-Imidazolium, 1-(3-sulfopropyl)-3-(2,4,6-trimethylphenyl)-, inner salt (Iridium and ruthenium supported), Iridium, compd. with ruthenium (1:2)
Solvents: Water-d_2; 48 h, 2 bar, 55 °C

Experimental Protocols

N-Heterocyclic Carbene-Based Iridium and Ruthenium /Iridium Nanoparticles for the Hydrogen Isotope Exchange Reaction through C-H Bond Activations

By: Zuluaga-Villamil, Alejandra; et al

Organometallics (2022), 41(22), 3313-3319.

31-614-CAS-34988547 Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium (bound to polyvinylpyrrolidone or IMes N-heterocyclic carbene), 1*H*-Imidazolium, 1-(3-sulfopropyl)-3-(2,4,6-trimethylphenyl)-, inner salt (Iridium and ruthenium supported)
Solvents: Water-d_2; 48 h, 2 bar, 55 °C

Experimental Protocols

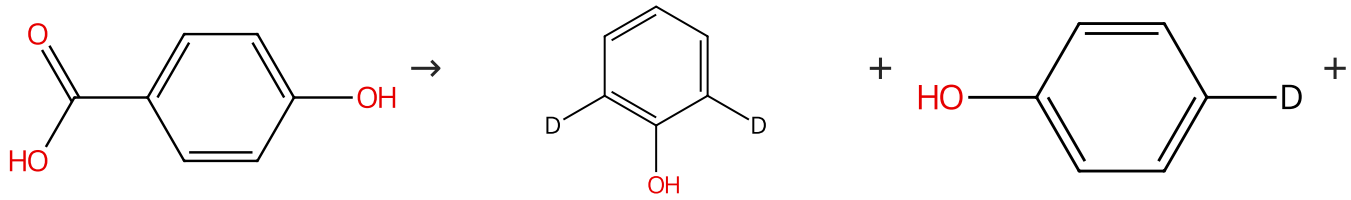
N-Heterocyclic Carbene-Based Iridium and Ruthenium /Iridium Nanoparticles for the Hydrogen Isotope Exchange Reaction through C-H Bond Activations

By: Zuluaga-Villamil, Alejandra; et al

Organometallics (2022), 41(22), 3313-3319.

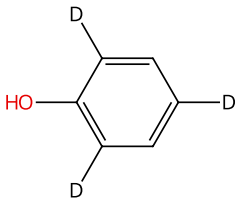
Scheme 82 (1 Reaction)

Steps: **1**



Suppliers (137)

Suppliers (7)



Suppliers (25)

31-614-CAS-38030190

Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium alloy, base, Ru 84,Fe 16 (ionic-liquid-modified silica supported and functionalized with diethyl...), 2924183-46-8 (silica supported, iron ruthenium nanoparticles immobilized)
Solvents: Heptane; 1 h, 20 bar, rt → 200 °C

Experimental Protocols

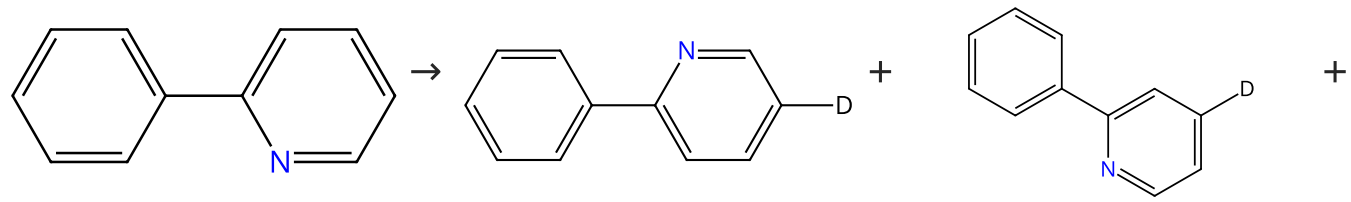
Decarboxylation and Tandem Reduction /Decarboxylation Pathways to Substituted Phenols from Aromatic Carboxylic Acids Using Bimetallic Nanoparticles on Supported Ionic Liquid Phases as Multifunctional Catalysts

By: Levin, Natalia; et al

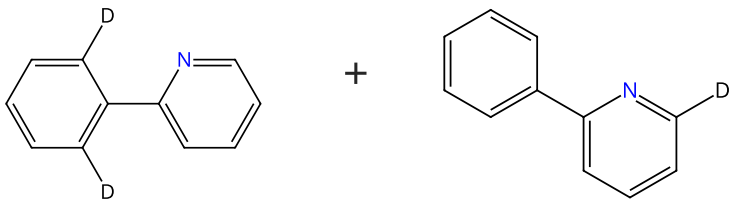
Journal of the American Chemical Society (2023), 145(41), 22845-22854.

Scheme 83 (2 Reactions)

Steps: **1**



Suppliers (93)



Supplier (1)

Supplier (1)

31-614-CAS-34988534

Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: Poly(vinylpyrrolidone) (Iridium and ruthenium supported), Iridium, compd. with ruthenium (2:1)
Solvents: Tetrahydrofuran; 24 h, 2 bar, 55 °C

Experimental Protocols

N-Heterocyclic Carbene-Based Iridium and Ruthenium /Iridium Nanoparticles for the Hydrogen Isotope Exchange Reaction through C-H Bond Activations

By: Zuluaga-Villamil, Alejandra; et al

Organometallics (2022), 41(22), 3313-3319.

31-614-CAS-34681536 Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: Poly(vinylpyrrolidone) (Iridium and ruthenium supported), Iridium, compd. with ruthenium (1:2)
Solvents: Tetrahydrofuran; 24 h, 2 bar, 55 °C

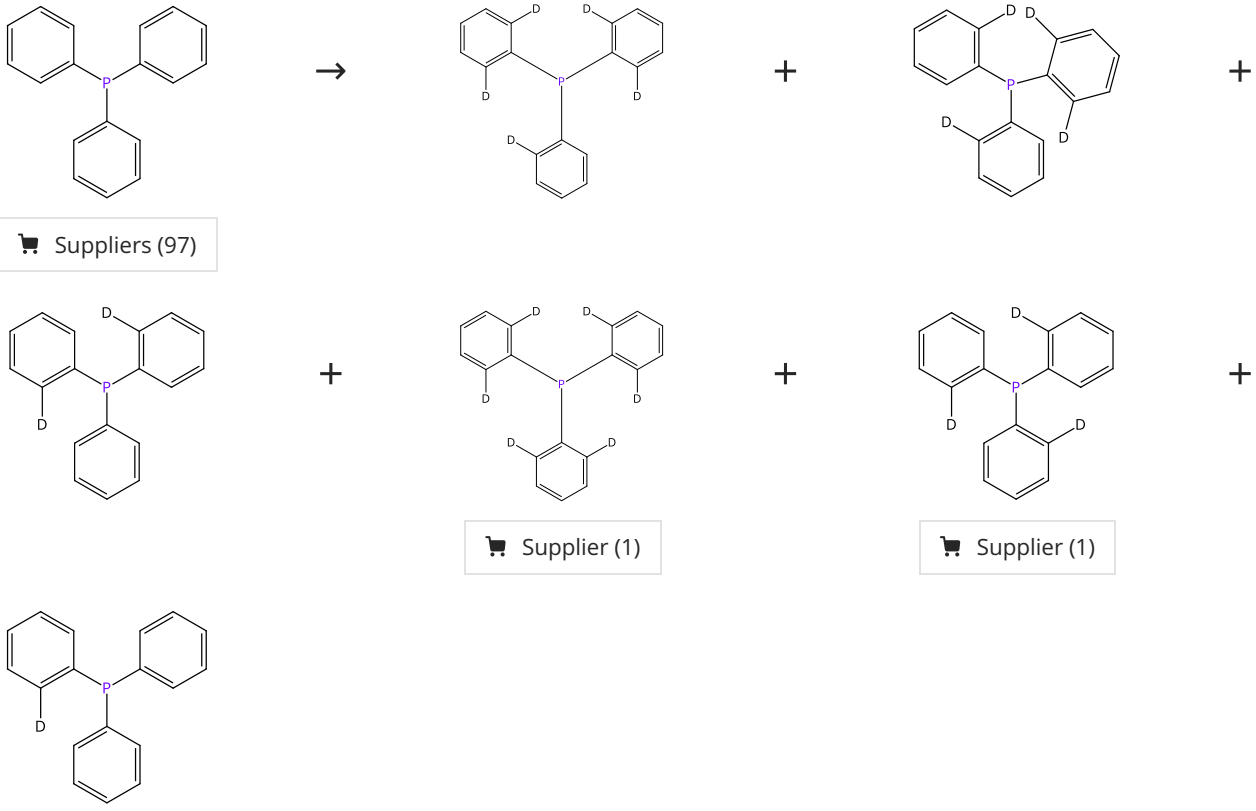
Experimental Protocols

N-Heterocyclic Carbene-Based Iridium and Ruthenium /Iridium Nanoparticles for the Hydrogen Isotope Exchange Reaction through C-H Bond Activations

By: Zuluaga-Villamil, Alejandra; et al

Organometallics (2022), 41(22), 3313-3319.

Scheme 84 (1 Reaction) Steps: **1**



Suppliers (97)

Supplier (1)

Supplier (1)

Supplier (1)

31-614-CAS-30709671 Steps: **1**

1.1 **Reagents:** Deuterium
Catalysts: Ruthenium, Poly(vinylpyrrolidone); 2 h, 3 bar, rt

1.2 **Reagents:** Deuterium
Solvents: Tetrahydrofuran; 48 h, 2 bar, 80 °C

Experimental Protocols

Selective catalytic deuteration of phosphorus ligands using ruthenium nanoparticles: a new approach to gain inform ation on ligand coordination

By: Breso-Femenia, Emma; et al

Chemical Communications (Cambridge, United Kingdom) (2015), 51(91), 16342-16345.