CAS SciFinder

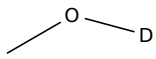
Task History

Initiating Search

February 23, 2025, 7:19 PM

Substances:

Filtered By:



Structure Match: **Substructure**

Search Tasks

Task	Search Type	View
Returned Substance Results + Filters (12,936)	Substances	View Results
Exported: Retrieved Related Reaction Results + Filters (587)	Reactions	View Results

Filtered By:

Substance Role: **Reactant, Reagent, Solvent**

Catalyst: [(1,2,3,4,5-η)-1,2,3,4,5-Pentamethyl-2,4-cyclopentadien-1-yl][[2,2'-(phenylphosphinidene-κ*P*)bis[benzenethiolato-κ*S*]](2-)]ruthenium, [(1,2,3,4,5,6-η)-1-Methyl-4-(1-methylethyl)benzene](2,4,6-trimethylbenzoato-κ*O*)(2,4,6-trimethylbenzoato-κ*O*,κ*O*')ruthenium, [(1,2,5,6-η)-1,5-Cyclooctadiene][(1,2,3,4,4a,8a-η)-naphthalene]ruthenium, [1,3-Bis(4-methylphenyl)-1-triazenato-κN^1,κN^3]chloro[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium, (2*R*,2'*R*)-1,1'-Bis[(4*S*)-4-(1,1-dimethylethyl)-4,5-dihydro-2-oxazolyl]-2,2'-bis(diphenylphosphino)ruthenocene, [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)carbonylhydro(tricyclohexylphosphine)ruthenium(1+), (Acetato-κ*O*)(acetato-κ*O*,κ*O*')[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium, Bis(acetato-κ*O*)[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium, Bis(dichloro($η^6$-*p*-

cymene)ruthenium), Bromotricarbonyl(η^3-2-propenyl)ruthenium, Carbonylchloro[2-(diphenylphosphino-κ*P*)-*N*-[2-(diphenylphosphino-κ*P*)ethyl]ethanamine-κ*N*]hydroruthenium, Carbonylchlorohydro(triphenylphosphine)ruthenium, Carbonylchlorohydrotris(triphenylphosphine)ruthenium, Carbonyldihydrotris(triphenylphosphine)ruthenium, Chloro[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene][2-[3-(4-methylphenyl)-1-triazen-1-yl-κ*N*^{1},κ*N*^{3}]benzenemethanolato]ruthenium, Chloro[(1,2,5,6-η)-1,5-cyclooctadiene][(1,2,3,4,5-η)-1,2,3,4,5-pentamethyl-2,4-cyclopentadien-1-yl]ruthenium, Chloro[2-(diphenylphosphino-κ*P*)benzenesulfonato-κ*O*][(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium, Chloro(η^5-cyclopentadienyl)bis(triphenylphosphine)ruthenium, Dichloro[1,1'-(oxydi-2,1-phenylene)bis[1,1-diphenylphosphine-κ*P*]](triphenylphosphine)ruthenium, Dichloro[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium, Dichloro[(1,2,5,6-η)-1,5-cyclooctadiene]ruthenium, Dichloro(1,3-dibutyl-1,3-dihydro-2*H*-imidazol-2-ylidene)[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium, Dichloro[1,3-dihydro-1,3-bis(1-methylethyl)-2*H*-imidazol-2-ylidene][(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium, Dichlorotris(triphenylphosphine)ruthenium, (*HB*-8-11-222'2'33)-Bis(dihydrogen-κ*H*^{1},κ*H*^{2})dihydrobis(tricyclohexylphosphine)ruthenium, [*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*S*,2*S*)-2-(Amino-κ*N*)-1,2-diphenylethyl]-4-methylbenzenesulfonamidato-κ*N*]chloro[(1,2,3,4,5,6-η)-1,2,3,4,5,6-hexamethylbenzene]ruthenium, (*OC*-6-12)-Dichloro(1,3-dihydro-1,3-dimethyl-2*H*-imidazol-2-ylidene)[2-(diphenylphosphino-κ*P*)-*N*-[2-(diphenylphosphino-κ*P*)ethyl]ethanamine-κ*N*]ruthenium, (*OC*-6-12)-Dichloro[4-[[(*S*)-ethylthio-κ*S*]methyl]acridine-κ*N*](triphenylphosphine)ruthenium, (*OC*-6-13)-Carbonyl[2-(diphenylphosphino-κ*P*)-*N*-[2-(diphenylphosphino-κ*P*)ethyl]ethanamine-κ*N*][tetrahydroborato(1-)-κ*H*]ruthenium, (*OC*-6-13)-Dichloro[*rel*-2-[(*R*)-ethylthio-κ*S*]-*N*-[2-[(*S*)-ethylthio-κ*S*]ethyl]ethanamine-κ*N*](triphenylphosphine)ruthenium, (*OC*-6-14)-[1,1'-(1*S*)-[1,1'-Binaphthalene]-2,2'-diylbis[1,1-bis(4-methylphenyl)phosphine-κ*P*]]dichloro[(1*R*)-*N*^{2},*N*^{2}-dibutyl-1-phenyl-1,2-ethanediamine-κ*N*^{1},κ*N*^{2}]ruthenium, (*OC*-6-14)-[1,3-Bis(2,4,6-trimethylphenyl)-2-imidazolidinylidene]dichloro(phenylmethylene)bis(pyridine)ruthenium, (*OC*-6-14)-Carbonyl[1,3-dihydro-1,3-bis(1-methylethyl)-2*H*-imidazol-2-ylidene]dihydrobis(triphenylphosphine)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*-6-23)-[2-[6-[(Amino-κ*N*)methyl]-2-pyridinyl-κ*N*]-5-methylphenyl-κ*C*][1,1'-(1,4-butanediyl)bis[1,1-diphenylphosphine-κ*P*]]chlororuthenium, (*OC*-6-34)-Carbonylchlorohydro-*d*-tris(triphenylphosphine)ruthenium, (*OC*-6-34)-Carbonylchlorohydrotris(triphenylphosphine)ruthenium, (*OC*-6-52)-[2-[6-[(Amino-κ*N*)methyl]-2-pyridinyl-κ*N*]-5-methylphenyl-κ*C*][1,1'-(1,4-butanediyl)bis[1,1-diphenylphosphine-κ*P*]]hydroruthenium, (*OC*-6-52)-Carbonylchloro[2-(2-pyridinyl-κ*N*)phenyl-κ*C*]bis(triphenylphosphine)ruthenium, (*OC*-6-52)-Carbonylchloro[2-(diphenylphosphino-κ*P*)-*N*-[2-(diphenylphosphino-κ*P*)ethyl]ethanamine-κ*N*]hydroruthenium, Platinum ruthenium alloy, Ruthenate(4-), di-μ-chlorodichlorotetrakis[3-(diphenylphosphino-κ*P*)benzenesulfonato]di-, sodium (1:4), Ruthenate(5-), (η^6-

benzene)chlorobis[[3,3',3''-(phosphinidyne-κ*P*)tris[benzenesulfonato]](3-)]-, sodium chloride (1:6:1), Ruthenium, Ruthenium(1+), [1,1'-(1*S*)-[1,1'-binaphthalene]-2,2'-diylbis[1,1-bis(4-methylphenyl)phosphine-κ*P*]]chloro[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]-, chloride (1:1), Ruthenium(1+), [1,1'-(4*S*)-[4,4'-bi-1,3-benzodioxole]-5,5'-diylbis[1,1-bis[3,5-bis(1,1-dimethylethyl)-4-methoxyphenyl]phosphine-κ*P*]]chloro[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]-, chloride (1:1), Ruthenium(1+), [1,3-bis(2,4,6-trimethylphenyl)-2-imidazolidinylidene][3-[[(4-bromo-2,6-dimethylphenyl)imino-κ*N*]methyl]-4-(hydroxy-κ*O*)-*N*,*N*,*N*-trimethylbenzenaminiumato]chloro(phenylmethylene)-, chloride (1:1), (*TB*-5-12)-, Ruthenium(1+), [1,3-bis(2,4,6-trimethylphenyl)-2-imidazolidinylidene]dichloro[[4-(diethylmethylammonio)-2-(1-methylethoxy-κ*O*)phenyl]methylene-κ*C*]-, iodide (1:1), (*SP*-5-41)-, Ruthenium(1+), [(1*R*)-1,1'-[1,1'-binaphthalene]-2,2'-diylbis[1,1-bis(4-methylphenyl)phosphine-κ*P*]]chloro[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]-, chloride, Ruthenium(1+), (2,2'-bi-1*H*-benzimidazole-κN^3,κ$N^{3'}$)chloro[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]-, hexafluorophosphate(1-) (1:1), Ruthenium, [(1,2,5,6-η)-1,5-cyclooctadiene]bis[(1,2,3-η)-2-methyl-2-propenyl]-, Ruthenium(1+), (η^5-2,4-cyclopentadien-1-yl)(η^3-2-propen-1-yl)(2-quinolinecarboxylato-κN^1,κO^2)-, hexafluorophosphate(1-) (1:1), Ruthenium(1+), (η^5-2,4-cyclopentadien-1-yl)(η^3-2-propen-1-yl)[4-[[[5-(trihydroxysilyl)pentyl]amino]carbonyl]-2-pyridinecarboxylato-κN^1,κO^2]-, hexafluorophosphate(1-) (1:1), Ruthenium(1+), (η^5-2,4-cyclopentadien-1-yl)(4-methoxy-2-quinolinecarboxylato-κN^1,κO^2)(η^3-2-propen-1-yl)-, hexafluorophosphate(1-) (1:1), Ruthenium(1+), bis(acetonitrile)(η^5-2,4-cyclopentadien-1-yl)(triphenylphosphine)-, hexafluorophosphate(1-) (1:1), Ruthenium(1+), bis(acetonitrile)chloro[6-(1,10-phenanthrolin-2-yl-κN^1,κN^{10})-2-pyridinol-κN^1]-, chloride (1:1), (*OC*-6-45)-, Ruthenium(1+), carbonylhydro(η^6-benzene)(tricyclohexylphosphine)-, tetrafluoroborate(1-) (1:1), Ruthenium(1+), chloro[2-(2-pyridinyl-κ*N*)phenyl-κ*C*](2,2':6',2''-terpyridine-κN^1,κ$N^{1'}$,κ$N^{1''}$)-, (*OC*-6-54)-, hexafluorophosphate(1-) (1:1), Ruthenium(1+), chloro[2,4-dimethoxy-6-(2-pyridinyl-κ*N*)phenyl-κ*C*](2,2':6',2''-terpyridine-κN^1,κ$N^{1'}$,κ$N^{1''}$)-, (*OC*-6-54)-, hexafluorophosphate(1-) (1:1), Ruthenium(1+), chloro[2-(6-methyl-2-pyridinyl-κ*N*)-1,10-phenanthroline-κN^1,κN^{10}]bis(triphenylphosphine)-, (*OC*-6-42)-, Ruthenium(1+), [[[*N*(*Z*)]-ethaniminato]hydrobis(1*H*-pyrazolato-κN^1)borato(1-)-κ*N*,κN^2,κ$N^{2'}$][(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]-, 1,1,1-trifluoromethanesulfonato (1:1), Ruthenium(1+), *rel*-aquachloro[μ-[[*S*(*R*)]-methanethiolato]][μ-[[*S*(*S*)]-methanethiolato]]bis[(1,2,3,4,5-η)-1,2,3,4,5-pentamethyl-2,4-cyclopentadien-1-yl]di-, (*Ru*-*Ru*), stereoisomer, 1,1,1-trifluoromethanesulfonate (1:1), Ruthenium(1+), tris(acetonitrile)[(1,2,3,4,5-η)-1,2,3,4,5-pentamethyl-2,4-cyclopentadien-1-yl]-, hexafluorophosphate(1-) (1:1), Ruthenium(1+), tris(acetonitrile)(η^5-2,4-cyclopentadien-1-yl)-, hexafluorophosphate(1-) (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(2+), trichlorobis[(1,2,3,4,5,6-η)-1,2,3,4,5,6-hexamethylbenzene][μ$_3$-[*N*-[6-[[[[6-[[(1,10-phenanthrolin-4-yl-κN^1,κN^{10})carbonyl]amino]-2-pyridinyl-κ*N*]methyl][(2-pyridinyl-κ*N*)methyl]amino-κ*N*]methyl]-2-pyridinyl-κ*N*]-1,10-phenanthroline-4-carboxamidato-κN^1,κN^{10}:κO^4]]tri-, stereoisomer, hexafluorophosphate(1-) (1:2), Ruthenium(2+), trichlorobis[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene][μ$_3$-[*N*-[6-[[[[6-[[(1,10-phenanthrolin-4-yl-κN^1,κN^{10})carbonyl]amino]-2-pyridinyl-κ*N*]methyl][(2-pyridinyl-κ*N*)methyl]amino-κ*N*]methyl]-2-pyridinyl-κ*N*]-1,10-phenanthroline-4-carboxamidato-κN^1,κN^{10}:κO^4]]tri-, stereoisomer, hexafluorophosphate(1-) (1:2), Ruthenium(2+), tris(2,2'-bipyrazine-κN^1,κ$N^{1'}$)-, (*OC*-6-11)-, hexafluorophosphate(1-) (1:2), Ruthenium, (η^6-benzene)dichloro[(pentafluorophenyl)diphenylphosphine-κ*P*]-,

Ruthenium, aqua[[2,2'-bipyridine]-6,6'(1*H*,1'*H*)-dionato(2-)-κN^1,κ$N^{1'}$][(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]-, Ruthenium, (benzo[*h*]quinolin-10-yl-*C*^{10},*N*^{1})carbonylchlorobis(triphenylphosphine)-, (*OC*-6-52)-, 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, carbonylbis(trifluoroacetato-*O*)tris(triphenylphosphine)-, Ruthenium, carbonylchloro[1-(2-pyridinyl-κ*N*)-2-naphthalenyl-κ*C*]bis(triphenylphosphine)-, (*OC*-6-52)-, Ruthenium, dicarbonylchloro[2-(5-methoxy-2-pyridinyl-κ*N*)-*N*-[2-(5-methoxy-2-pyridinyl-κ*N*)phenyl]benzenaminato-κ*N*]-, (*OC*-6-34)-, Ruthenium, di-μ-carbonyldicarbonylbis(η^5-2,4-cyclopentadien-1-yl)di-, (*Ru*-*Ru*), Ruthenium, dichloro[2-[2-(4-chlorophenyl)diazenyl-κN^2]-1,10-phenanthroline-κN^1,κN^{10}](triphenylphosphine)-, (*OC*-6-42)-, Ruthenium, dichlorobis[μ-(methanethiolato)]bis[(1,2,3,4,5-η)-1,2,3,4,5-pentamethyl-2,4-cyclopentadien-1-yl]di-, (*Ru*-*Ru*), stereoisomer, Ruthenium dioxide, Ruthenium oxide, Ruthenium trichloride, Ruthenium trichloride hydrate, (*SP*-5-41)-[1,3-Bis(2,4,6-trimethylphenyl)-2-imidazolidinylidene]dichloro[[2-(1-methylethoxy-κ*O*)phenyl]methylene-κ*C*]ruthenium, (*SP*-5-43)-[1,3-Bis(2,4,6-trimethylphenyl)-2-imidazolidinylidene]dichloro[[2-(2-naphthalenylthio-κ*S*)phenyl]methylene-κ*C*]ruthenium, (*TB*-5-12)-[1,3-Bis(2,4,6-trimethylphenyl)-2-imidazolidinylidene][2-[[(4-bromo-2,6-dimethylphenyl)imino-κ*N*]methyl]-4-nitrophenolato-κ*O*]chloro(phenylmethylene)ruthenium, Tetracarbonyl-μ-hydro[(1,2,3,4,5-η)-1-hydroxylato-2,3,4,5-tetraphenyl-2,4-cyclopentadien-1-yl][(1,2,3,4,5-η)-1-hydroxy-2,3,4,5-tetraphenyl-2,4-cyclopentadien-1-yl]diruthenium, Tricarbonyl[(4a,5,7,7a-η)-1,2,3,4-tetrahydro-1,4-dimethyl-5,7-diphenyl-6*H*-cyclopentapyrazin-6-one]ruthenium, Triruthenium dodecacarbonyl, Tris(2,2'-bipyridine)ruthenium(2+) bis(hexafluorophosphate), Tris(2,2'-bipyridyl)dichlororuthenium(II) hexahydrate, Tris(2,2'-bipyridyl)ruthenium(II) chloride, Tris(4,7-diphenyl-1,10-phenanthroline)ruthenium dichloride, Tris(acetylacetonato)ruthenium

Document Type: Journal

Language: English

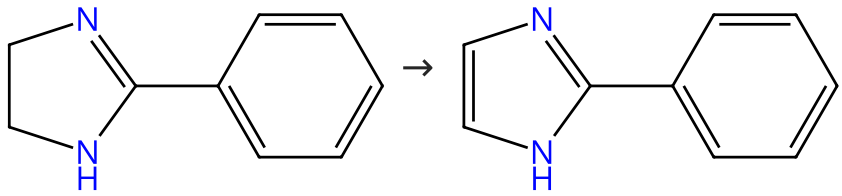
CAS SciFinder

Reactions (207)

View in CAS SciFinder

Scheme 1 (2 Reactions)

Steps: **1** Yield: **95-100%**



Suppliers (76)

Suppliers (94)

31-478-CAS-7907406

Steps: **1** Yield: **100%**

1.1 **Reagents:** Potassium carbonate, Oxygen
Catalysts: Ruthenium(1+), chloro[2-(2-pyridinyl-κ*N*)phenyl-κ*C*](2,2':6',2''-terpyridine-κN^1,κ$N^{1'}$,κ$N^{1''}$)-, (*OC*-6-54)-, hexafluorophosphate(1-) (1:1)
Solvents: Methanol-d_4; 8 h, 55 °C

Aerobic Oxidative Dehydrogenation of 2-Substituted Imidazolines Promoted by a Cyclometalated Ruthenium Catalyst

By: Taketoshi, Ayako; et al

ChemCatChem (2010), 2(1), 58-60.

31-478-CAS-10831217

Steps: **1** Yield: **95%**

1.1 **Reagents:** Potassium carbonate, Oxygen
Catalysts: Ruthenium(1+), chloro[2,4-dimethoxy-6-(2-pyridinyl-κ*N*)phenyl-κ*C*](2,2':6',2''-terpyridine-κN^1,κ$N^{1'}$,κ$N^{1''}$)-, (*OC*-6-54)-, hexafluorophosphate(1-) (1:1)
Solvents: Methanol-d_4; 18 h, 1 atm, 25 °C

Experimental Protocols

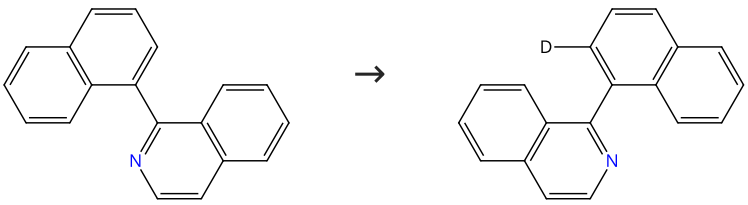
Ligand Modification of Cyclometalated Ruthenium Complexes in the Aerobic Oxidative Dehydrogenation of Imidazolines

By: Aiki, Shota; et al

ACS Catalysis (2013), 3(5), 812-816.

Scheme 2 (1 Reaction)

Steps: **1** Yield: **98%**



Suppliers (8)

31-614-CAS-35668657

Steps: **1** Yield: **98%**

1.1 **Reagents:** Methanol-d_4, Tempo
Catalysts: Silver tetrafluoroborate, Cobalt iodide (CoI_2), Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 30 min, 110 °C

Experimental Protocols

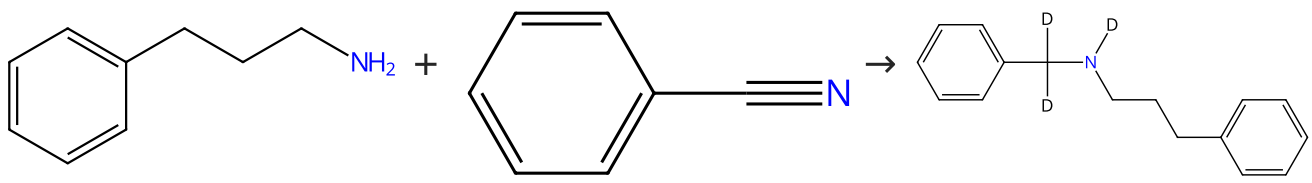
Ruthenium(II)-Catalyzed Sterically Hindered C-H Acyloxylation to Synthesize Biaryl Isoquinoline Derivatives via Peresters

By: Liu, Hao; et al

Journal of Organic Chemistry (2023), 88(5), 3148-3158.

Scheme 3 (1 Reaction)

Steps: **1** Yield: **97%**



Suppliers (84)

Suppliers (84)

31-614-CAS-41472469

Steps: **1** Yield: **97%**

1.1 **Reagents:** Deuterium
Catalysts: Platinum ruthenium alloy
Solvents: Hexane, Methanol-d_4; 4 h, 40 °C

Experimental Protocols

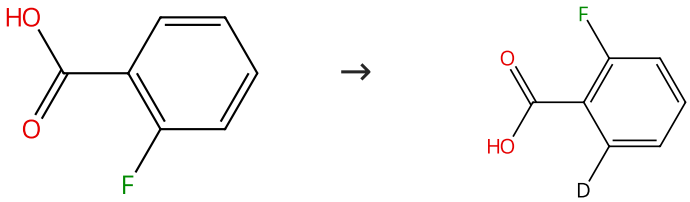
Tandem Protocol for Diversified Deuteration of Secondary Aliphatic Amines under Mild Conditions

By: Zhu, Feng-Yuan; et al

Journal of Organic Chemistry (2024), 89(16), 11414-11420.

Scheme 4 (2 Reactions)

Steps: **1** Yield: **84-97%**



Suppliers (97)

31-116-CAS-20873272

Steps: **1** Yield: **97%**

1.1 **Reagents:** Potassium carbonate, Methanol-d_4, Water-d_2
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium); 28 h, 50 °C

A ruthenium(II)-catalyzed C-H allenylation-based approach to allenoic acids

By: Wu, Xiaoyan; et al

Chemical Science (2019), 10(25), 6316-6321.

31-614-CAS-41178152

Steps: **1** Yield: **84%**

1.1 **Reagents:** Potassium carbonate, Methanol-d, Water-d_2
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium); 28 h, 50 °C

Experimental Protocols

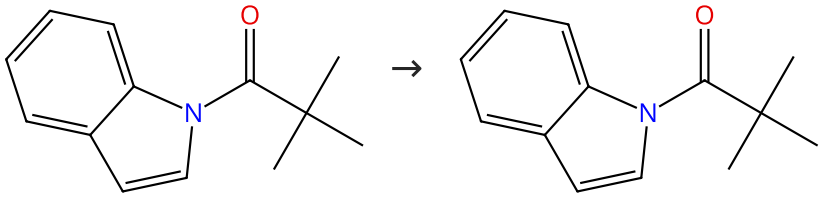
Stereo-selective synthesis of complex dienes and eneynes by sequential hydroarylation and olefinic C-H functionalization

By: Zhu, Yuhang; et al

Organic Chemistry Frontiers (2024), 11(16), 4456-4463.

Scheme 5 (1 Reaction)

Steps: **1** Yield: **97%**



Suppliers (8)

31-614-CAS-26420361

Steps: **1** Yield: **97%**

1.1 **Catalysts:** Silver hexafluoroantimonate, Bis(acetato-κ*O*)[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium
Solvents: 2,2,2-Trifluoroethanol-d; 16 h, 40 °C

Experimental Protocols

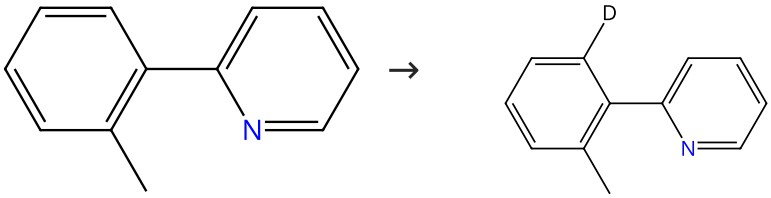
C7-Indole Amidations and Alkenylations by Ruthenium(II) Catalysis

By: Choi, Isaac; et al

Angewandte Chemie, International Edition (2020), 59(30), 12534-12540.

Scheme 6 (1 Reaction)

Steps: **1** Yield: **96%**



Suppliers (67)

31-116-CAS-16794403

Steps: **1** Yield: **96%**

1.1 **Reagents:** Formaldehyde, Methanol-*d*, Zinc bromide
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Dichloroethane; 2 h, 60 °C

Experimental Protocols

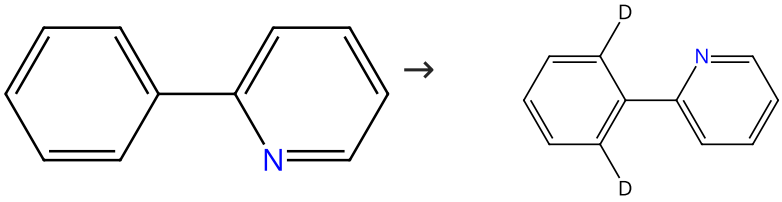
Ru-Catalyzed Regioselective Direct Hydroxymethylation of (Hetero)Arenes via C-H Activation

By: Zhang, Guo-Fu; et al

Organic Letters (2017), 19(5), 1216-1219.

Scheme 7 (3 Reactions)

Steps: **1** Yield: **65-95%**



Suppliers (93)

Supplier (1)

31-116-CAS-19356817

Steps: **1** Yield: **95%**

1.1 **Reagents:** Methanol-d_4
Catalysts: Carbonylchlorohydrotris(triphenylphosphine) ruthenium
Solvents: 1,2-Dichloroethane; 12 h, 100 °C

Experimental Protocols

RuHCl(CO)(PPh_3)$_3$-Catalyzed Direct Amidation of Arene C-H Bond with Azides

By: Xiao, Xinsheng; et al

Journal of Organic Chemistry (2018), 83(22), 13811-13820.

31-116-CAS-3726892

Steps: **1** Yield: **89%**

1.1 **Reagents:** Methanol-d_4
Catalysts: Dichloro(1,3-dibutyl-1,3-dihydro-2*H*-imidazol-2-ylidene)[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene] ruthenium; 7 h, 120 °C

Experimental Protocols

(η^6-Arene)ruthenium(N-heterocyclic carbene) Complexes for the Chelation-Assisted Arylation and Deuteration of Arylpyridines: Catalytic Studies and Mechanistic Insights

By: Prades, Amparo; et al

Advanced Synthesis & Catalysis (2010), 352(7), 1155-1162.

31-116-CAS-20676690

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

1.1 **Reagents:** Sodium bicarbonate, Oxygen, 2-Propan-*2*-*d*-ol-*d*, 1,1,1,3,3,3-hexafluoro-
Catalysts: Silver acetate, Bis(dichloro(η^6-*p*-cymene)ruthenium) ; 4 h, 90 °C

Experimental Protocols

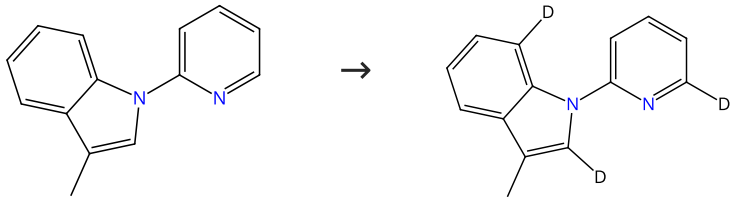
Ruthenium(II)-Catalyzed C-H Acylmethylation between (Hetero)arenes and α-Cl Ketones/Sulfoxonium Ylides

By: Li, Huihui; et al

Journal of Organic Chemistry (2019), 84(21), 13262-13275.

Scheme 8 (1 Reaction)

Steps: **1** Yield: **95%**



Suppliers (9)

31-116-CAS-7397006

Steps: **1** Yield: **95%**

1.1 **Reagents:** Methanol-d_4
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: *m*-Xylene; 96 h, 110 °C

Experimental Protocols

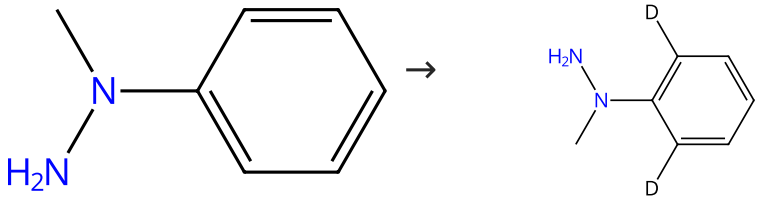
Ruthenium(II)-Catalyzed Direct Addition of Indole/Pyrrole C2-H Bonds to Alkynes

By: Liang, Libo; et al

Journal of Organic Chemistry (2014), 79(20), 9472-9480.

Scheme 9 (1 Reaction)

Steps: **1** Yield: **95%**



Suppliers (73)

31-116-CAS-16305631

Steps: **1** Yield: **95%**

1.1 **Reagents:** Potassium acetate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Methanol-d_4; 6 h, 70 °C

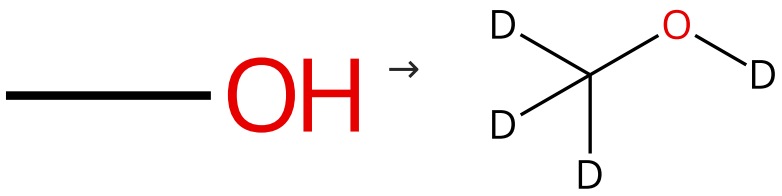
Ruthenium(II)-Catalyzed Traceless C-H Functionalization Using N-N Bond as an Internal Oxidant

By: Zhou, Shuguang; et al

Chemistry - A European Journal (2016), 22(41), 14508-14512.

Scheme 10 (1 Reaction)

Steps: **1** Yield: **94%**



Suppliers (471)

Suppliers (246)

31-116-CAS-14932055

Steps: **1** Yield: **94%**

1.1 **Catalysts:** Potassium carbonate, (*OC*-6-52)-Carbonylchloro[2-(diphenylphosphino-κ*P*)-*N*-[2-(diphenylphosphino-κ*P*)ethyl] ethanamine-κ*N*]hydroruthenium
Solvents: 2-Propan-*1,1,1,2,3,3,3*-d_7-ol-*d*; 3 h, rt → 140 °C; 1.5 h, 140 °C → 0 °C

Experimental Protocols

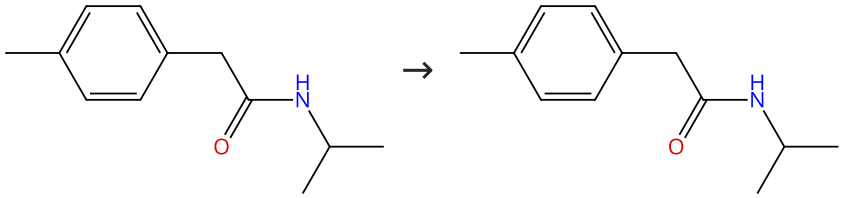
Transfer Hydrogenation of Organic Formates and Cyclic Carbonates: An Alternative Route to Methanol from Carbon Dioxide

By: Kim, Seung Hyo; et al

ACS Catalysis (2014), 4(10), 3630-3636.

Scheme 11 (1 Reaction)

Steps: **1** Yield: **94%**



Suppliers (6)

31-614-CAS-26693103

Steps: **1** Yield: **94%**

1.1 **Reagents:** Methanol-d_4, 1-Adamantanecarboxylic acid, Trifluoromethanesulfonic acid, Propanoic acid, 2,2-dimethyl-, silver (1+) salt (1:1)
Catalysts: Silver triflate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 2,2,2-Trifluoroethanol; 16 h, 100 °C

1.2 **Solvents:** Water; rt

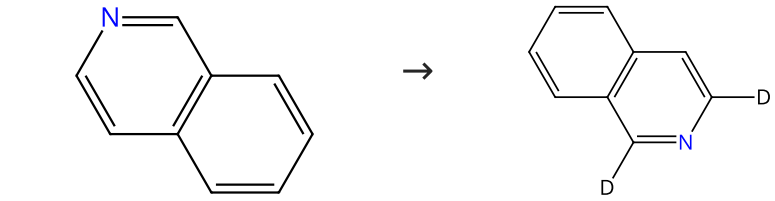
Ruthenium Catalyzed C-H Selenylations of Aryl Acetic Amides and Esters via Weak Coordination

By: Weng, Zhengyun; et al

Organic Letters (2019), 21(16), 6310-6314.

Scheme 12 (1 Reaction)

Steps: **1** Yield: **93%**



Suppliers (98)

Supplier (1)

31-116-CAS-12584786

Steps: **1** Yield: **93%**

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 3 h, rt → 115 °C

Experimental Protocols

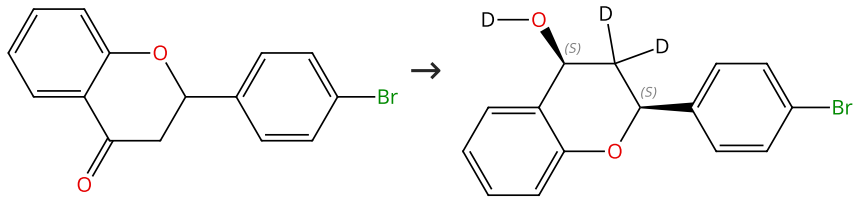
Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

Scheme 13 (1 Reaction)

Steps: **1** Yield: **93%**



Absolute stereochemistry shown

Suppliers (4)

31-614-CAS-37448826

Steps: **1** Yield: **93%**

1.1 **Reagents:** Sodium formate, Methanol-d_4
Catalysts: Ruthenium (complexes with trimethylbenzene, Cl and copolymer of EGDMA-NIPMAM-viny...), 2973383-97-8 (ruthenium complexes with trimethylbenzene and Cl)
Solvents: Water-d_2; 18 h, 40 °C

Experimental Protocols

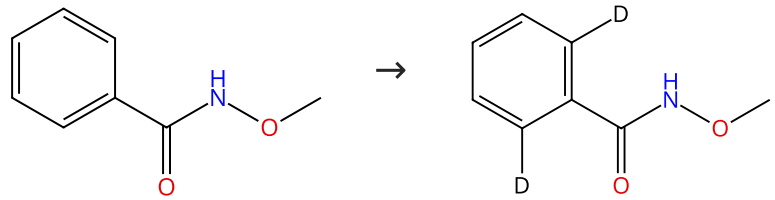
Harmonization of an incompatible aqueous aldol condensation/oxa-Michael addition/reduction cascade process over a core-shell-structured thermoresponsive catalyst

By: Su, Yu; et al

Green Chemistry (2023), 25(17), 6859-6868.

Scheme 14 (2 Reactions)

Steps: **1** Yield: **83-93%**



Suppliers (49)

31-614-CAS-37547226

Steps: **1** Yield: **93%**

1.1 **Reagents:** Methanol-d_4
Catalysts: Cesium acetate, Bis(dichloro(η^6-*p*-cymene) ruthenium); 16 h, 90 °C

Experimental Protocols

Ruthenium-Catalyzed Synthesis of Macrocyclic Isoquinolines and Isoquinolones via a C-H/N-H Annulations Reaction

By: Gurumurthy, Palanivelu; et al

ChemistrySelect (2023), 8(32), e202301735.

31-116-CAS-16390822

Steps: **1** Yield: **83%**

1.1 **Reagents:** Sodium acetate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Methanol-d_4; 24 h, 80 °C

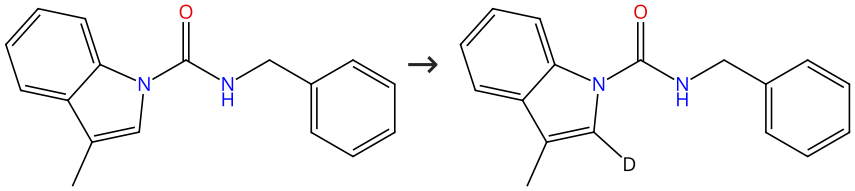
Carbonyl-assisted reverse regioselective cascade annulation of 2-acetylenic ketones triggered by Ru-catalyzed C-H activation

By: Gollapelli, Krishna Kumar; et al

Chemical Science (2016), 7(7), 4748-4753.

Scheme 15 (1 Reaction)

Steps: **1** Yield: **92%**



31-116-CAS-10124349

Steps: **1** Yield: **92%**

1.1 **Reagents:** Methanol-d_4
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 96 h, 100 °C

Experimental Protocols

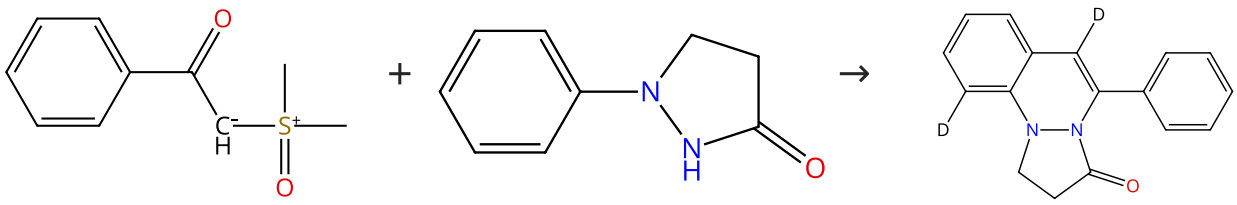
Highly Stereoselective Ruthenium(II)-Catalyzed Direct C2-syn-Alkenylation of Indoles with Alkynes

By: Zhang, Wei; et al

Organic Letters (2015), 17(6), 1349-1352.

Scheme 16 (1 Reaction)

Steps: **1** Yield: **92%**



Suppliers (38)

Suppliers (92)

31-614-CAS-24277173

Steps: **1** Yield: **92%**

1.1 **Reagents:** Methanol-d_4
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium), Zinc triflate
Solvents: 1,2-Dichloroethane; 10 min, 100 °C

Experimental Protocols

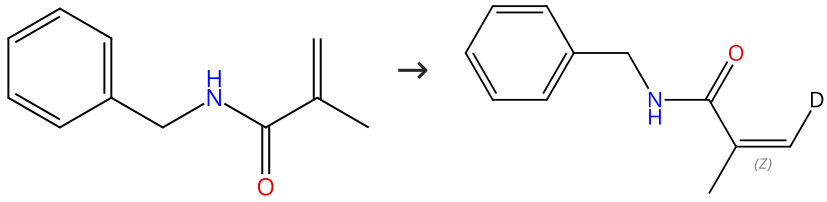
Ru(II)-Catalyzed C-H activation/annulation reactions of N-aryl-pyrazolidinones with sulfoxonium ylides: synthesis of cinnoline-fused pyrazolidinones

By: Jin, Hai-Shan; et al

Organic Chemistry Frontiers (2021), 8(22), 6350-6355.

Scheme 17 (2 Reactions)

Steps: **1** Yield: **78-92%**



Suppliers (20)

Double bond geometry shown

31-614-CAS-36010335

Steps: **1** Yield: **92%**

1.1 **Reagents:** Silver acetate, Methanol-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,4-Dioxane; 5 min, rt; 24 h, 120 °C

Experimental Protocols

Synthesis of Selenoflavones via Ruthenium-Catalyzed Selenylation of Unsaturated Acids

By: Logeswaran, Ravichandran; et al

Journal of Organic Chemistry (2023), 88(7), 4554-4568.

31-116-CAS-23869487

Steps: **1** Yield: **78%**

1.1 **Reagents:** Methanol-d_4, Copper diacetate monohydrate
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 24 h, 120 °C

Experimental Protocols

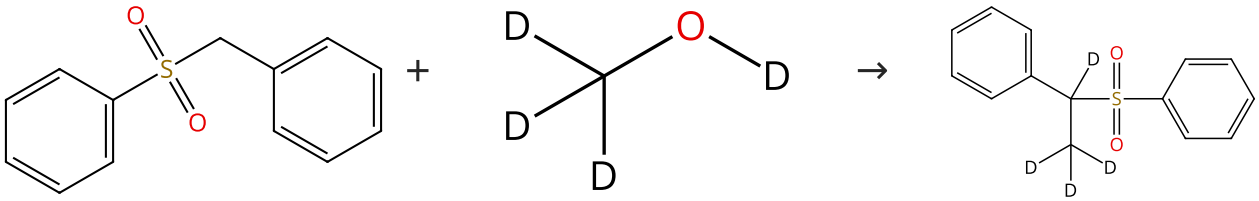
Effect of Transition Metals on Chemodivergent Cross-Coupling of Acrylamides with Vinyl Acetate via C-H Activation

By: Logeswaran, Ravichandran; et al

Organic Letters (2021), 23(15), 5679-5683.

Scheme 18 (1 Reaction)

Steps: **1** Yield: **91%**



Suppliers (74)

Suppliers (246)

31-116-CAS-23016004

Steps: **1** Yield: **91%**

1.1 **Reagents:** Potassium hydroxide
Catalysts: 1,2-Bis(diphenylphosphino)ethane, Dichloro[(1,2,5,6-η)-1,5-cyclooctadiene]ruthenium
Solvents: Methanol-d_4; 24 h, 120 °C

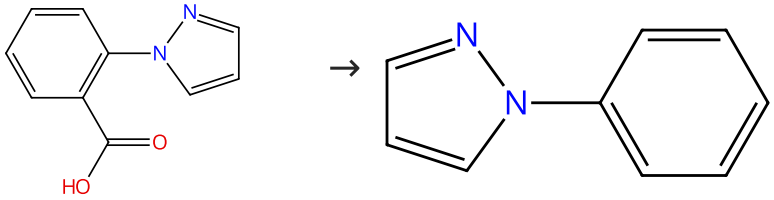
Ruthenium catalyzed α-methylation of sulfones with methanol as a sustainable C1 source

By: Song, Dingguo; et al

Organic Chemistry Frontiers (2021), 8(1), 120-126.

Scheme 19 (1 Reaction)

Steps: **1** Yield: **91%**



Suppliers (71)

31-614-CAS-29881543 Steps: **1** Yield: **91%**

1.1 **Reagents:** Potassium carbonate, Methanol-d_4
Catalysts: 2,4,6-Trimethylbenzoic acid, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: *o*-Xylene; 16 h, 120 °C

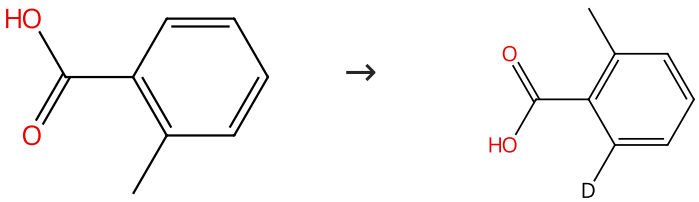
Experimental Protocols

Regiodivergent C-H and Decarboxylative C-C Alkylation by Ruthenium Catalysis: ortho versus meta Position-Selectivity

By: Korvorapun, Korkit; et al

Angewandte Chemie, International Edition (2020), 59(42), 18795-18803.

Scheme 20 (1 Reaction) Steps: **1** Yield: **90%**



Suppliers (91) Suppliers (3)

31-116-CAS-20589898 Steps: **1** Yield: **90%**

1.1 **Reagents:** Potassium carbonate
Catalysts: Sodium carbonate, Bis(dichloro(η^6-*p*-cymene) ruthenium)
Solvents: 2-Propan-*2-d*-ol-*d*, 1,1,1,3,3,3-hexafluoro-; 24 h, 55 °C; cooled

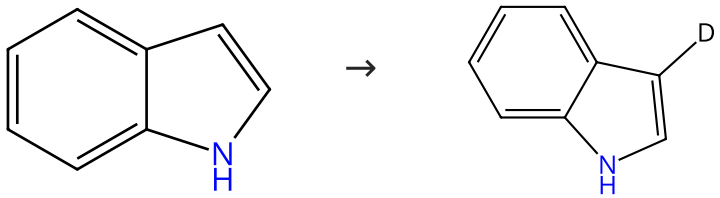
1.2 **Reagents:** Hydrochloric acid
Solvents: Water

Ring-Opening Ortho-C-H Allylation of Benzoic Acids with Vinylcyclopropanes: Merging Catalytic C-H and C-C Activation Concepts

By: Hu, Zhiyong; et al

Organic Letters (2019), 21(17), 6770-6773.

Scheme 21 (1 Reaction) Steps: **1** Yield: **90%**



Suppliers (116) Suppliers (10)

31-116-CAS-4766149 Steps: **1** Yield: **90%**

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 15 min, rt → 115 °C

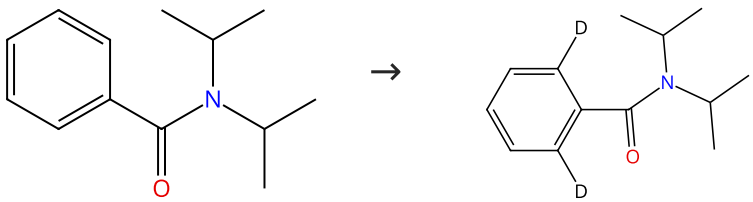
Experimental Protocols

Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

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



Suppliers (57) Supplier (1)

31-116-CAS-6633931 Steps: **1** Yield: **90%**

1.1 **Reagents:** Methanol-d_4
Catalysts: Triruthenium dodecacarbonyl, Tricyclo[3.3.1.1^{3,7}]decane-1-carboxylic acid, silver(1+) salt (1:1)
Solvents: 1,2-Dichloroethane; 16 h, 100 °C

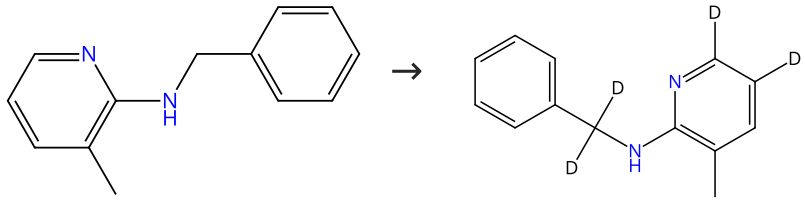
Experimental Protocols

Ruthenium-catalyzed ortho-C-H halogenations of benzamides

By: Wang, Lianhui; et al

Chemical Communications (Cambridge, United Kingdom) (2014), 50(9), 1083-1085.

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



Suppliers (11)

31-116-CAS-1345186 Steps: **1** Yield: **89%**

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 3 h, rt → 115 °C

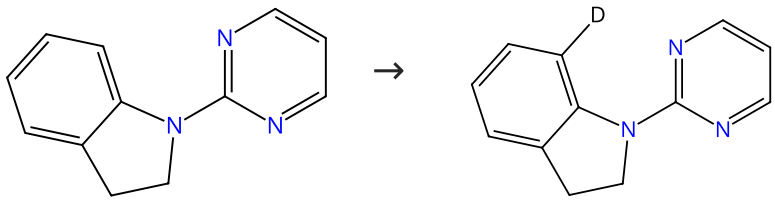
Experimental Protocols

Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

Scheme 24 (3 Reactions) Steps: **1** Yield: **73-88%**



Suppliers (10)

31-116-CAS-16199144 Steps: **1** Yield: **88%**

1.1 **Reagents:** Sodium acetate, Methanol-*d*
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 20 h, 60 °C

Experimental Protocols

Ruthenium(II)- or Rhodium(III)-Catalyzed Grignard-Type Addition of Indolines and Indoles to Activated Carbonyl Compounds

By: Jo, Hyeim; et al

Advanced Synthesis & Catalysis (2016), 358(17), 2714-2720.

31-614-CAS-42086613 Steps: **1** Yield: **73%**

1.1 **Reagents:** Acetic acid-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 2,2,2-Trifluoroethan-*1,1*-d_2-ol-*d*; 3 h, 100 °C

Experimental Protocols

Ru(II)-catalyzed C7 trifluoromethylthiolation and thioarylation of indolines using bench-stable reagents

By: Sumit; et al

Journal of Organic Chemistry (2024), 89(21), 15893-15900.

31-614-CAS-41582343 Steps: **1**

1.1 **Reagents:** Silver acetate, Methanol-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 5 h, 100 °C

Experimental Protocols

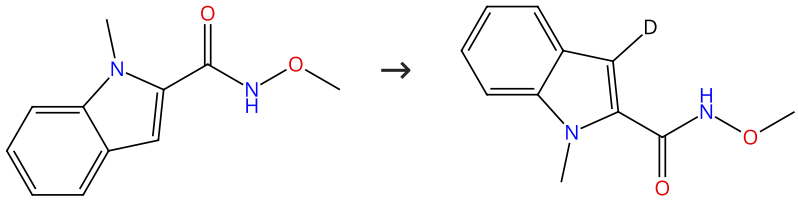
Ru(II)-catalyzed sustainable C-H methylation of indolines with organoboranes in ethanol

By: Sumit; et al

Journal of Organic Chemistry (2024), 89(20), 14880-14886.

Scheme 25 (1 Reaction)

Steps: **1** Yield: **88%**



Suppliers (2)

31-614-CAS-35261544

Steps: **1** Yield: **88%**

1.1 **Reagents:** Sodium acetate, Methanol-d_4
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 2,2,2-Trifluoroethanol; 30 min, rt

Experimental Protocols

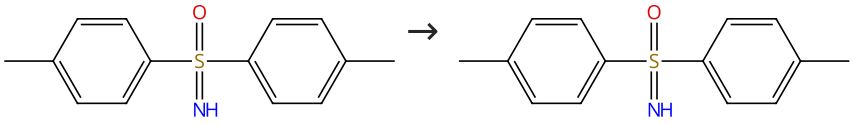
Annulation of Indole-2-Carboxamides with Bicycloalkenes Catalyzed by Ru(II) at Room Temperature: An Easy Access to β-Carboline-1-one Derivatives under Mild Conditions

By: Das Adhikari, Gopal Krushna; et al

Journal of Organic Chemistry (2023), 88(2), 952-959.

Scheme 26 (1 Reaction)

Steps: **1** Yield: **88%**



Suppliers (2)

31-614-CAS-34646247

Steps: **1** Yield: **88%**

1.1 **Reagents:** Methanol-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium), (1*S*)-2'-[[Bis(1-methylethyl)amino]carbonyl][1,1'-binaphthalene]-2-carboxylic acid
Solvents: 2-Methyl-2-butanol, Chlorobenzene; 12 h, 50 °C

Experimental Protocols

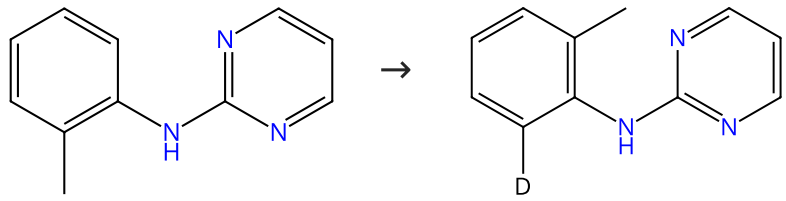
Ru(II)/Chiral Carboxylic Acid-Catalyzed Asymmetric [4 + 3] Annulation of Sulfoximines with α,β-Unsaturated Ketones

By: Qian, Pu-Fan; et al

ACS Catalysis (2022), 12(22), 13876-13883.

Scheme 27 (1 Reaction)

Steps: **1** Yield: **88%**



Suppliers (8)

31-116-CAS-19225357

Steps: **1** Yield: **88%**

1.1 **Reagents:** Water-d_2, 2-Propan-*1,1,1,2,3,3,3*-d_7-ol-*d*
Catalysts: Sodium acetate, Potassium hexafluorophosphate, Bis(dichloro(η^6-*p*-cymene)ruthenium); 2 h, rt

Experimental Protocols

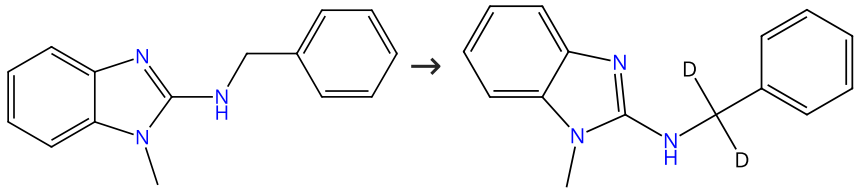
Ruthenium-Catalyzed Electrochemical Dehydrogenative Alkyne Annulation

By: Xu, Fan; et al

ACS Catalysis (2018), 8(5), 3820-3824.

Scheme 28 (1 Reaction)

Steps: **1** Yield: **88%**



Suppliers (16)

31-116-CAS-3493492

Steps: **1** Yield: **88%**

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 3 h, rt → 115 °C

Experimental Protocols

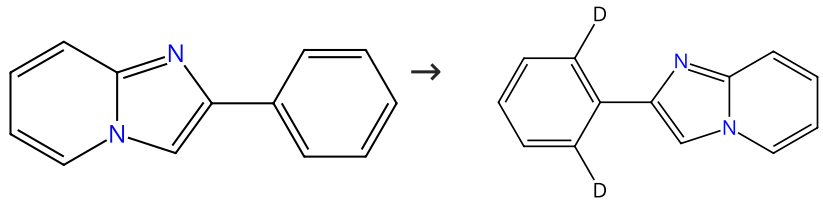
Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

Scheme 29 (2 Reactions)

Steps: **1** Yield: **82-88%**



Suppliers (83)

31-614-CAS-35771584

Steps: **1** Yield: **88%**

1.1 **Reagents:** Methanol-d_4, Propanoic acid, 2,2-dimethyl-, sodium salt (1:1)
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium); 10 h, 70 °C

Experimental Protocols

Unlocking Regiodivergence in Pd^{II}- and Rh^{III}-Mediated Site-Selective C-H Bond Alkynylation of Imidazopyridines

By: Zhang, Qiang; et al

Organic Letters (2023), 25(9), 1447-1452.

31-116-CAS-23057916

Steps: **1** Yield: **82%**

1.1 **Catalysts:** Propanoic acid, 2,2-dimethyl-, sodium salt (1:1), Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Methanol-d_4; 8 h, 70 °C

Experimental Protocols

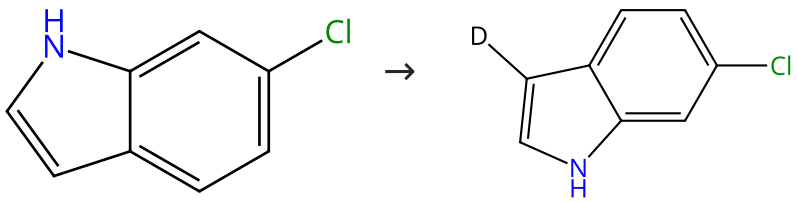
Ruthenium-Catalyzed C(sp^2)-H Bond Bisallylation with Imidazopyridines as Directing Groups

By: Liu, Shuang; et al

Journal of Organic Chemistry (2020), 85(23), 15167-15182.

Scheme 30 (1 Reaction)

Steps: **1** Yield: **87%**



Suppliers (100)

31-116-CAS-15069784

Steps: **1** Yield: **87%**

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 15 min, rt → 115 °C

Experimental Protocols

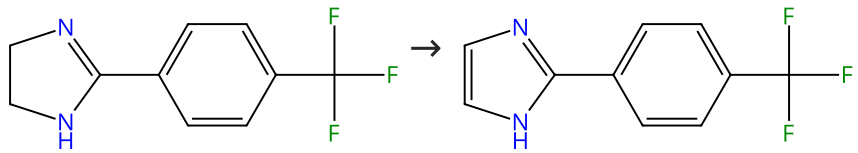
Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

Scheme 31 (1 Reaction)

Steps: **1** Yield: **87%**



Suppliers (8)

Suppliers (57)

31-478-CAS-14296507

Steps: **1** Yield: **87%**

1.1 **Reagents:** Potassium carbonate, Oxygen
Catalysts: Ruthenium(1+), chloro[2-(2-pyridinyl-κ*N*)phenyl-κ*C*](2,2':6',2''-terpyridine-κN^1,κ$N^{1'}$,κ$N^{1''}$)-, (*OC*-6-54)-, hexafluorophosphate(1-) (1:1)
Solvents: Methanol-d_4; 8 h, 55 °C

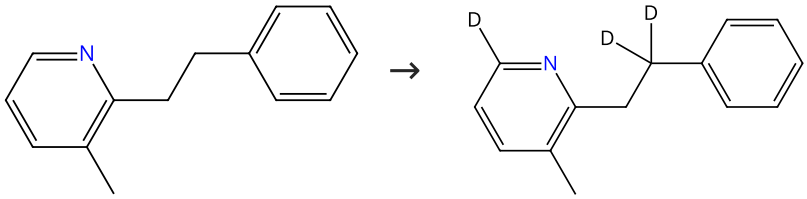
Aerobic Oxidative Dehydrogenation of 2-Substituted Imidazolines Promoted by a Cyclometalated Ruthenium Catalyst

By: Taketoshi, Ayako; et al

ChemCatChem (2010), 2(1), 58-60.

Scheme 32 (1 Reaction)

Steps: **1** Yield: **87%**



Suppliers (2)

Supplier (1)

31-116-CAS-5608140

Steps: **1** Yield: **87%**

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 3 h, rt → 115 °C

Experimental Protocols

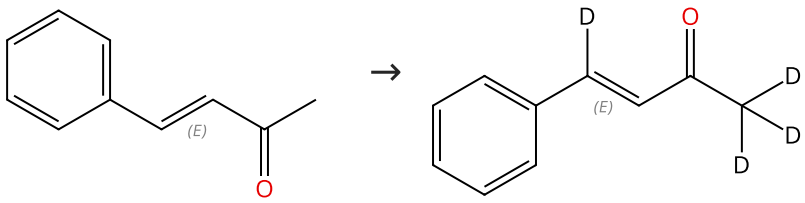
Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

Scheme 33 (1 Reaction)

Steps: **1** Yield: **86%**



Double bond geometry shown

Double bond geometry shown

Suppliers (84)

31-116-CAS-15147692

Steps: **1** Yield: **86%**

1.1 **Catalysts:** Triruthenium dodecacarbonyl
Solvents: Methanol-d_4; 12 h, 110 °C

Experimental Protocols

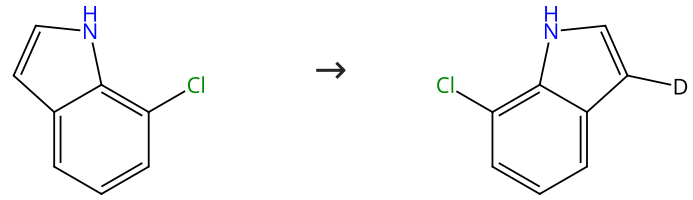
Synthesis of Tri- and Tetrasubstituted Pyrazoles via Ru(II) Catalysis: Intramolecular Aerobic Oxidative C-N Coupling

By: Hu, Jiantao; et al

Organic Letters (2012), 14(19), 5030-5033.

Scheme 34 (1 Reaction)

Steps: **1** Yield: **86%**



Suppliers (88)

31-116-CAS-1678749

Steps: **1** Yield: **86%**

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 15 min, rt → 115 °C

Experimental Protocols

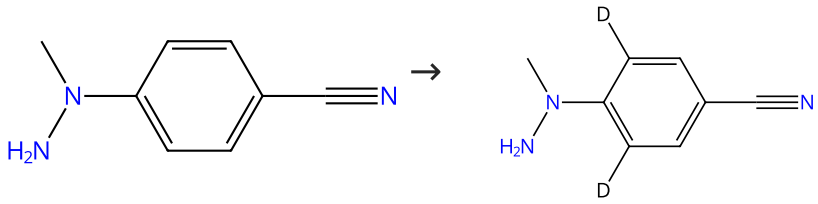
Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

Scheme 35 (1 Reaction)

Steps: **1** Yield: **86%**



Suppliers (5)

31-116-CAS-16305632

Steps: **1** Yield: **86%**

1.1 **Reagents:** Zinc triflate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Methanol-d_4; 6 h, 60 °C

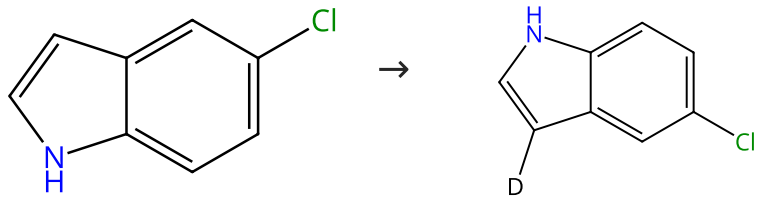
Ruthenium(II)-Catalyzed Traceless C-H Functionalization Using N-N Bond as an Internal Oxidant

By: Zhou, Shuguang; et al

Chemistry - A European Journal (2016), 22(41), 14508-14512.

Scheme 36 (1 Reaction)

Steps: **1** Yield: **85%**



Suppliers (97)

31-116-CAS-12938911

Steps: **1** Yield: **85%**

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 15 min, rt → 115 °C

Experimental Protocols

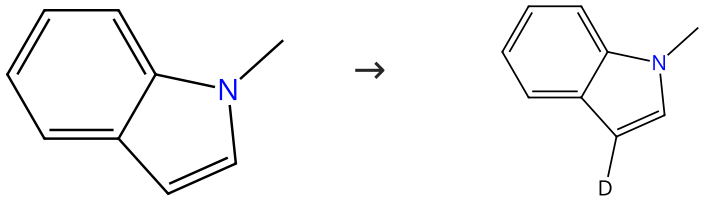
Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

Scheme 37 (1 Reaction)

Steps: **1** Yield: **85%**



Suppliers (106)

Suppliers (2)

31-116-CAS-3809463

Steps: **1** Yield: **85%**

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 15 min, rt → 115 °C

Experimental Protocols

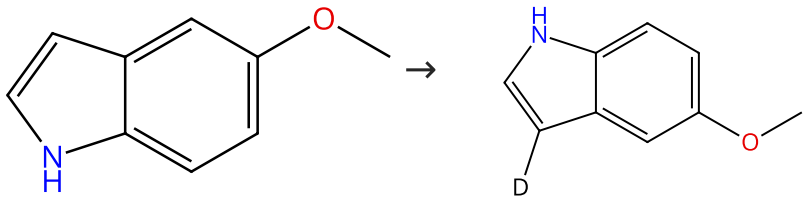
Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

Scheme 38 (1 Reaction)

Steps: **1** Yield: **84%**



Suppliers (114)

31-116-CAS-5045363

Steps: **1** Yield: **84%**

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 15 min, rt → 115 °C

Experimental Protocols

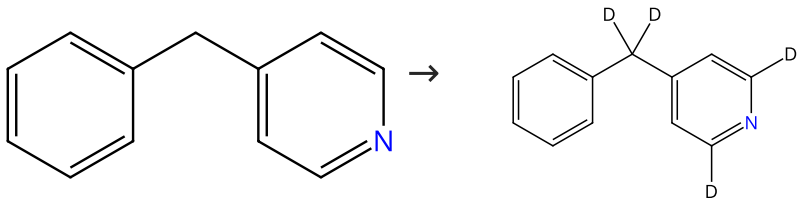
Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

Scheme 39 (1 Reaction)

Steps: **1** Yield: **84%**



Suppliers (65)

Supplier (1)

31-116-CAS-1079235

Steps: **1** Yield: **84%**

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 3 h, rt → 115 °C

Experimental Protocols

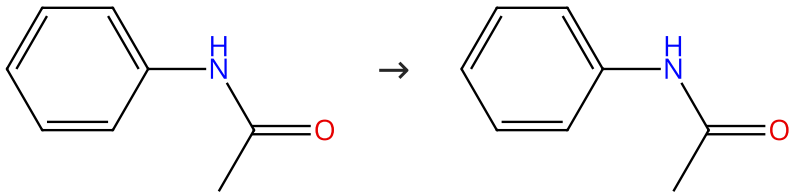
Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

Scheme 40 (1 Reaction)

Steps: **1** Yield: **83%**



Suppliers (108)

31-614-CAS-28620282

Steps: **1** Yield: **83%**

1.1 **Reagents:** Silver acetate, Methanol-d_4
Catalysts: Silver tetrafluoroborate, Copper(II) triflate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Toluene; 24 h, 100 °C

Experimental Protocols

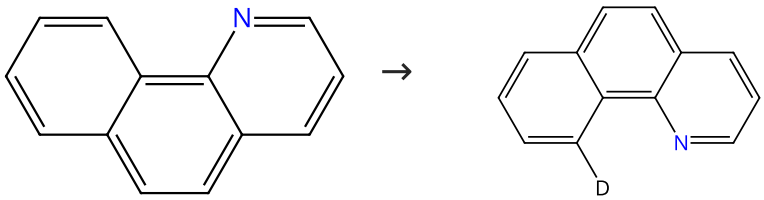
Ruthenium(II)-Catalyzed C-H Chalcogenation of Anilides

By: Ma, Wenbo; et al

Advanced Synthesis & Catalysis (2018), 360(4), 704-710.

Scheme 41 (1 Reaction)

Steps: **1** Yield: **82%**



Suppliers (81)

31-116-CAS-5872987

Steps: **1** Yield: **82%**

1.1 **Reagents:** Methanol-d_4
Catalysts: Dichloro(1,3-dibutyl-1,3-dihydro-2*H*-imidazol-2-ylidene)[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene] ruthenium; 5 h, 120 °C

Experimental Protocols

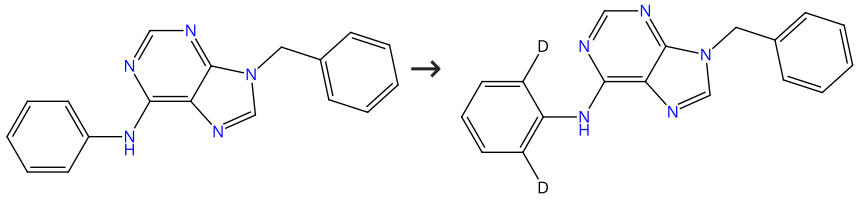
(η^6-Arene)ruthenium(N-heterocyclic carbene) Complexes for the Chelation-Assisted Arylation and Deuteration of Arylpyridines: Catalytic Studies and Mechanistic Insights

By: Prades, Amparo; et al

Advanced Synthesis & Catalysis (2010), 352(7), 1155-1162.

Scheme 42 (1 Reaction)

Steps: **1** Yield: **82%**



Suppliers (7)

31-116-CAS-10788828

Steps: **1** Yield: **82%**

1.1 **Reagents:** Cesium acetate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Methanol-d_4; 24 h, 70 °C

Experimental Protocols

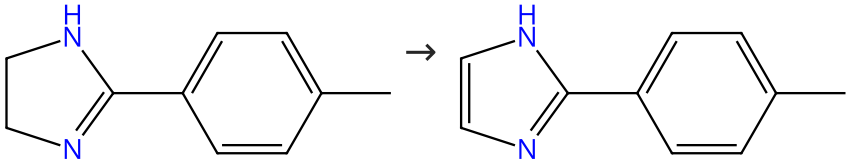
Ruthenium-Catalyzed Oxidative Annulation of 6-Anilinopurines with Alkynes via C-H Activation: Synthesis of Indole-Substituted Purines/Purine Nucleosides

By: Allu, Srinivasarao; et al

Advanced Synthesis & Catalysis (2015), 357(12), 2665-2680.

Scheme 43 (1 Reaction)

Steps: **1** Yield: **81%**



Suppliers (36)

Suppliers (23)

31-478-CAS-12167474

Steps: **1** Yield: **81%**

1.1 **Reagents:** Potassium carbonate, Oxygen
Catalysts: Ruthenium(1+), chloro[2-(2-pyridinyl-κ*N*)phenyl-κ*C*](2,2':6',2''-terpyridine-κN^1,κ$N^{1'}$,κ$N^{1''}$)-, (*OC*-6-54)-, hexafluorophosphate(1-) (1:1)
Solvents: Methanol-d_4; 8 h, 55 °C

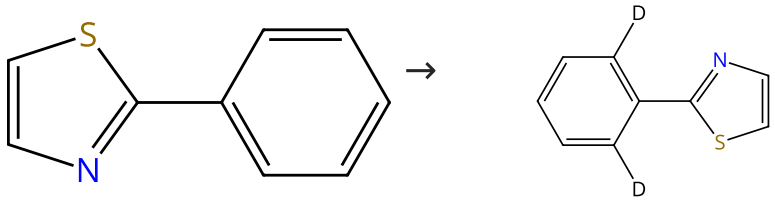
Aerobic Oxidative Dehydrogenation of 2-Substituted Imidazolines Promoted by a Cyclometalated Ruthenium Catalyst

By: Taketoshi, Ayako; et al

ChemCatChem (2010), 2(1), 58-60.

Scheme 44 (1 Reaction)

Steps: **1** Yield: **80%**



Suppliers (79)

31-614-CAS-41279972

Steps: **1** Yield: **80%**

1.1 **Reagents:** Sodium acetate, Silver acetate, Potassium carbonate, Methanol-d_4
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium), [1,1,1-Trifluoro-*N*-[(trifluoromethyl)sulfonyl-κ*O*]methanesulfonamidato-κ*O*]silver
Solvents: 1,2-Dichloroethane; 4 h, 120 °C

Experimental Protocols

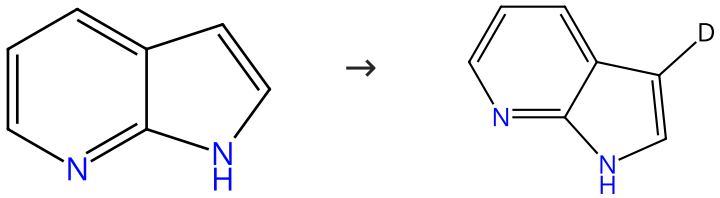
Regiodivergent Metal-Catalyzed Oxidative Alkynylation of 2-Arylthiazoles with Terminal Alkynes under Air Conditions

By: Zhou, Pengfei; et al

Journal of Organic Chemistry (2024), 89(15), 10953-10964.

Scheme 45 (1 Reaction)

Steps: **1** Yield: **80%**



Suppliers (123)

31-116-CAS-8077787

Steps: **1** Yield: **80%**

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 15 min, rt → 115 °C

Experimental Protocols

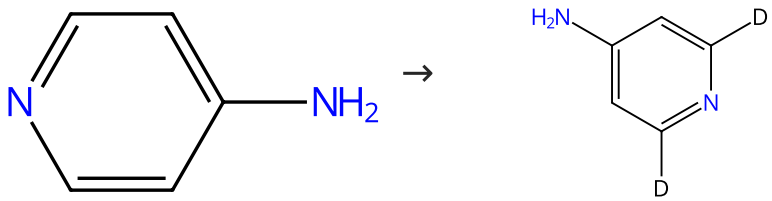
Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

Scheme 46 (1 Reaction)

Steps: **1** Yield: **80%**



Suppliers (101)

31-116-CAS-10482140

Steps: **1** Yield: **80%**

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 3 h, rt → 115 °C

Experimental Protocols

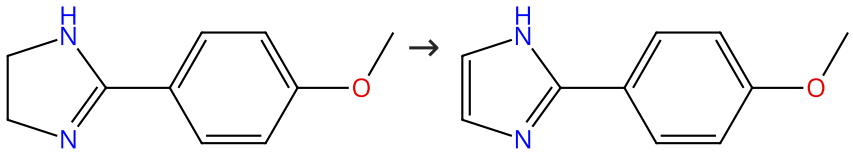
Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

Scheme 47 (1 Reaction)

Steps: **1** Yield: **80%**



Suppliers (23)

Suppliers (26)

31-478-CAS-10042061

Steps: **1** Yield: **80%**

1.1 **Reagents:** Potassium carbonate, Oxygen
Catalysts: Ruthenium(1+), chloro[2-(2-pyridinyl-κ*N*)phenyl-κ*C*](2,2':6',2''-terpyridine-κN^1,κ$N^{1'}$,κ$N^{1''}$)-, (*OC*-6-54)-, hexafluorophosphate(1-) (1:1)
Solvents: Methanol-d_4; 8 h, 55 °C

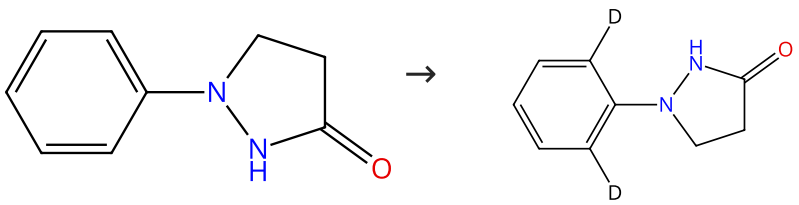
Aerobic Oxidative Dehydrogenation of 2-Substituted Imidazolines Promoted by a Cyclometalated Ruthenium Catalyst

By: Taketoshi, Ayako; et al

ChemCatChem (2010), 2(1), 58-60.

Scheme 48 (2 Reactions)

Steps: **1** Yield: **80%**



Suppliers (92)

31-614-CAS-24277168

Steps: **1** Yield: **80%**

1.1 **Reagents:** Methanol-d_4
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium), Zinc triflate
Solvents: 1,2-Dichloroethane; 3 min, 100 °C

Experimental Protocols

Ru(II)-Catalyzed C-H activation/annulation reactions of N-aryl-pyrazolidinones with sulfoxonium ylides: synthesis of cinnoline-fused pyrazolidinones

By: Jin, Hai-Shan; et al

Organic Chemistry Frontiers (2021), 8(22), 6350-6355.

31-614-CAS-40475269 Steps: 1

1.1 **Reagents:** Sodium carbonate, Methanol-d_4
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 3 h, 55 °C

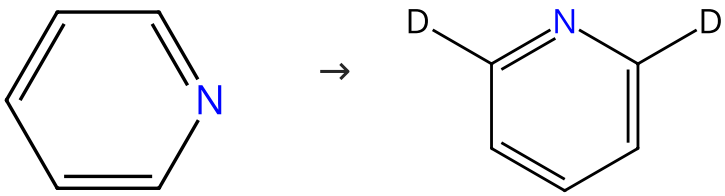
Experimental Protocols

Pyrazolidinone-Aided Ru(II)-Catalyzed Regioselective C-H Annulation with Allenes

By: Sontakke, Geetanjali S.; et al

Organic Letters (2024), 26(21), 4480-4485.

Scheme 49 (1 Reaction) Steps: **1** Yield: **79%**



Suppliers (221) Suppliers (24)

31-116-CAS-14468964 Steps: 1 Yield: 79%

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 3 h, rt → 115 °C

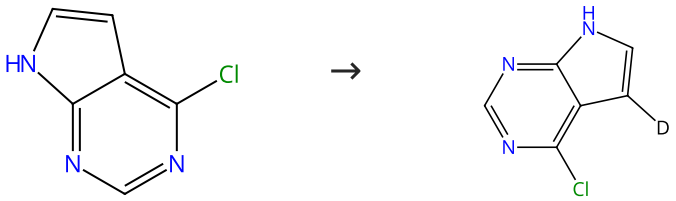
Experimental Protocols

Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

Scheme 50 (1 Reaction) Steps: **1** Yield: **78%**



Suppliers (123)

31-116-CAS-10209268 Steps: 1 Yield: 78%

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 3 h, rt → 115 °C

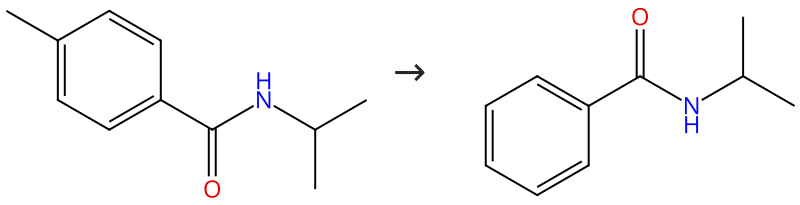
Experimental Protocols

Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

Scheme 51 (1 Reaction) Steps: **1** Yield: **77%**



Suppliers (19)

31-614-CAS-27573889 Steps: **1** Yield: **77%**

1.1 **Reagents:** Silver acetate, Methanol-d_4
Catalysts: Silver triflate, Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 2,2,2-Trifluoroethanol; 24 h, 100 °C

1.2 **Reagents:** Water; rt

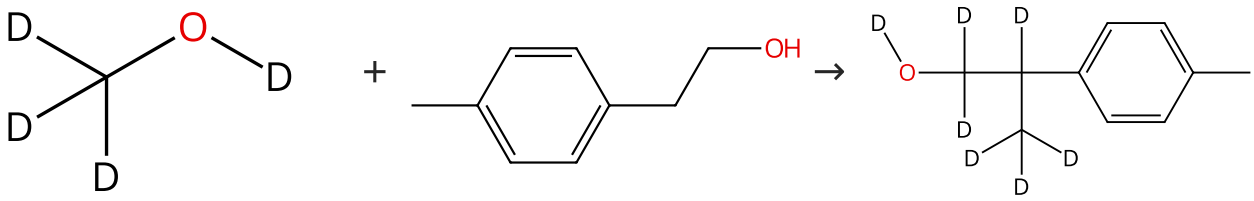
Experimental Protocols

Ruthenium-Catalyzed C-H Selenylations of Benzamides

By: Ma, Wenbo; et al

European Journal of Organic Chemistry (2019), 2019(1), 41-45.

Scheme 52 (1 Reaction) Steps: **1** Yield: **76%**



Suppliers (246) Suppliers (82)

31-116-CAS-23856650 Steps: **1** Yield: **76%**

1.1 **Reagents:** Potassium *tert*-butoxide
Catalysts: (*OC*-6-12)-Dichloro[4-[[(*S*)-ethylthio-κ*S*]methyl]acridine-κ*N*](triphenylphosphine)ruthenium; 36 h, 135 °C

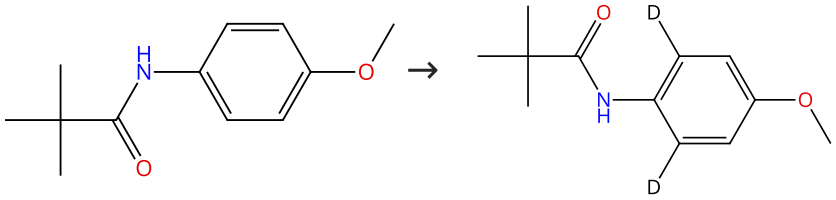
Experimental Protocols

Ru-Catalyzed Selective Catalytic Methylation and Methylenation Reaction Employing Methanol as the C1 Source

By: Biswas, Nandita; et al

Journal of Organic Chemistry (2021), 86(15), 10544-10554.

Scheme 53 (1 Reaction) Steps: **1** Yield: **75%**



Suppliers (28)

31-614-CAS-30037596 Steps: **1** Yield: **75%**

1.1 **Reagents:** Zinc acetate, Vinylene carbonate, Methanol-*d*
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dimethoxyethane; 24 h, 80 °C

1.2 **Solvents:** Water; rt

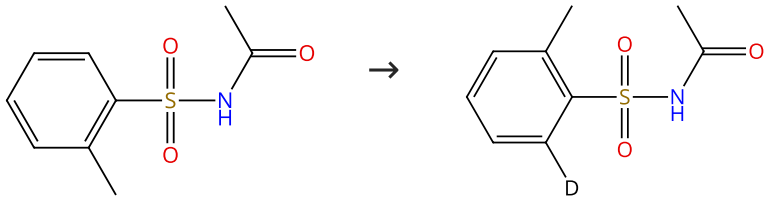
Experimental Protocols

Ruthenium-Catalyzed Vinylene Carbonate Annulation by C-H/N-H Functionalizations: Step-Economical Access to Indoles

By: Yu, Yao; et al

Advanced Synthesis & Catalysis (2022), 364(4), 838-844.

Scheme 54 (1 Reaction) Steps: **1** Yield: **72%**



Suppliers (5)

31-116-CAS-21885893 Steps: **1** Yield: **72%**

1.1 **Reagents:** Methyl acrylate, Potassium acetate, Methanol-d_4, Oxygen
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium); overnight, 110 °C

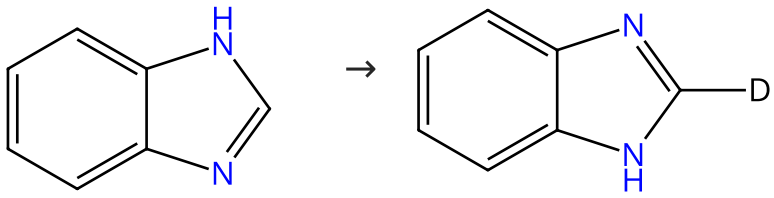
Experimental Protocols

Ruthenium-catalyzed selectively oxidative C-H alkenylation of N-acylated aryl sulfonamides by using molecular oxygen as an oxidant

By: Li, Xueyuan; et al

Journal of Organic Chemistry (2020), 85(9), 5916-5926.

Scheme 55 (1 Reaction) Steps: **1** Yield: **71%**



Suppliers (100) Suppliers (4)

31-116-CAS-12339711 Steps: **1** Yield: **71%**

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 3 h, rt → 115 °C

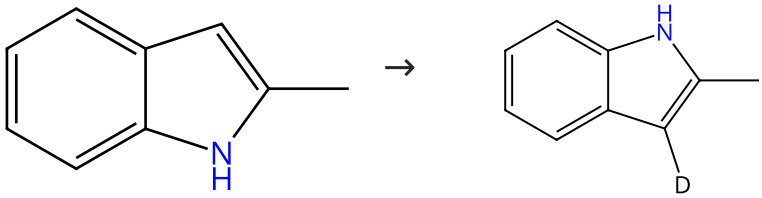
Experimental Protocols

Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

Scheme 56 (1 Reaction) Steps: **1** Yield: **70%**



Suppliers (98) Supplier (1)

31-116-CAS-5967262 Steps: **1** Yield: **70%**

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 15 min, rt → 115 °C

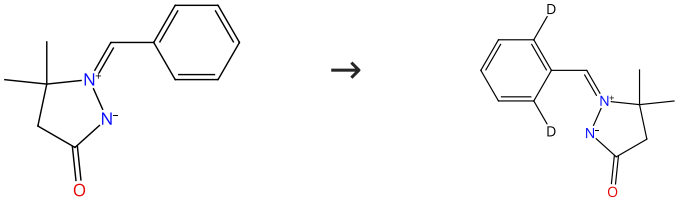
Experimental Protocols

Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

Scheme 57 (1 Reaction) Steps: **1** Yield: **65%**



Suppliers (2)

31-116-CAS-20330746 Steps: **1** Yield: **65%**

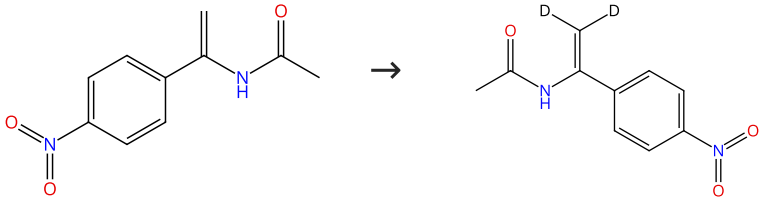
1.1 **Reagents:** Lithium acetate, Methanol-d_4, 3,3-Dimethoxy-1-propene
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,1,1,3,3,3-Hexafluoro-2-propanol; 12 h, 40 °C; 40 °C → rt

Allylic Acetals as Acrolein Oxonium Precursors in Tandem C-H Allylation and [3+2] Dipolar Cycloaddition

By: Lee, Heeyoung; et al

Angewandte Chemie, International Edition (2019), 58(28), 9470-9474.

Scheme 58 (1 Reaction) Steps: **1** Yield: **60%**



Suppliers (3)

31-116-CAS-9178188 Steps: **1** Yield: **60%**

1.1 **Reagents:** Cupric acetate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Methanol-d_4; 18 h, 80 °C

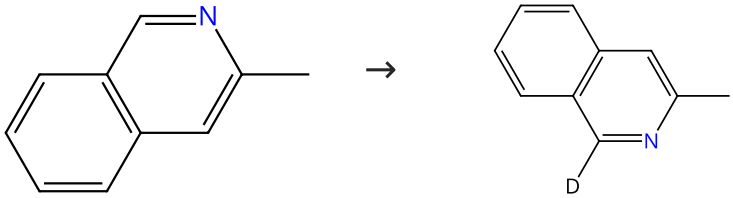
Experimental Protocols

Versatile Pyrrole Synthesis through Ruthenium(II)-Catalyzed Alkene C-H Bond Functionalization on Enamines

By: Wang, Lianhui; et al

Organic Letters (2013), 15(1), 176-179.

Scheme 59 (1 Reaction) Steps: **1** Yield: **58%**



Suppliers (45) Supplier (1)

31-116-CAS-14737654 Steps: **1** Yield: **58%**

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 3 h, rt → 115 °C

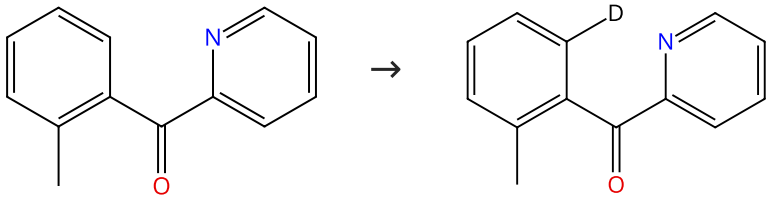
Experimental Protocols

Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

Scheme 60 (1 Reaction) Steps: **1** Yield: **58%**



Suppliers (30)

31-614-CAS-39285268 Steps: **1** Yield: **58%**

1.1 **Reagents:** Silver carbonate, Methanol-*d*
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 12 h, 120 °C

1.2 **Reagents:** Water; rt

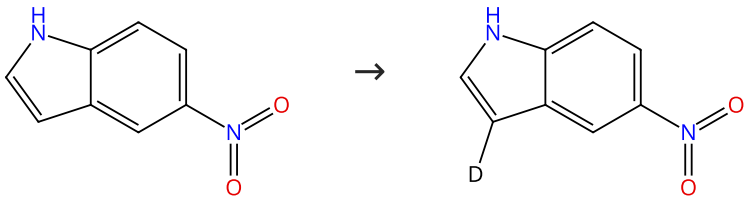
Experimental Protocols

Ruthenium(II)-Catalyzed Selective C(sp^2)-H Acyloxylation of 2-Aroyl-Pyridine Derivatives with Sodium Carboxylate

By: Ma, Wenbo; et al

Advanced Synthesis & Catalysis (2024), 366(3), 518-525.

Scheme 61 (1 Reaction) Steps: **1** Yield: **50%**



Suppliers (99)

31-116-CAS-3059510 Steps: **1** Yield: **50%**

1.1 **Reagents:** *tert*-Butyl alcohol-*d*
Catalysts: Triruthenium dodecacarbonyl; 15 min, rt → 115 °C

Experimental Protocols

Selective Ru(0)-catalyzed deuteration of electron-rich and electron-poor nitrogen-containing heterocycles

By: Groell, Birgit; et al

Journal of Organic Chemistry (2012), 77(9), 4432-4437.

Scheme 62 (1 Reaction) Steps: **1** Yield: **49%**

Suppliers (63) Suppliers (119)

31-478-CAS-918796 Steps: **1** Yield: **49%**

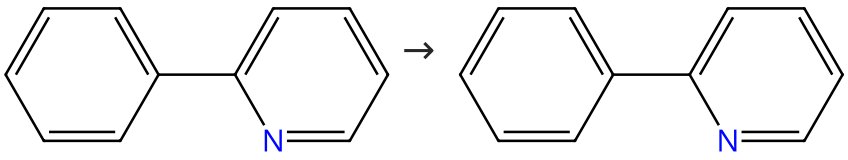
1.1 **Reagents:** Potassium carbonate, Oxygen
Catalysts: Ruthenium(1+), chloro[2-(2-pyridinyl-κ*N*)phenyl-κ*C*](2,2':6',2''-terpyridine-κ*N*^{1},κ*N*$^{1'}$,κ*N*$^{1''}$)-, (*OC*-6-54)-, hexafluorophosphate(1-) (1:1)
Solvents: Methanol-d_4; 8 h, 55 °C

Aerobic Oxidative Dehydrogenation of 2-Substituted Imidazolines Promoted by a Cyclometalated Ruthenium Catalyst

By: Taketoshi, Ayako; et al

ChemCatChem (2010), 2(1), 58-60.

Scheme 63 (1 Reaction) Steps: **1** Yield: **43%**



Suppliers (93)

31-614-CAS-26579183 Steps: **1** Yield: **43%**

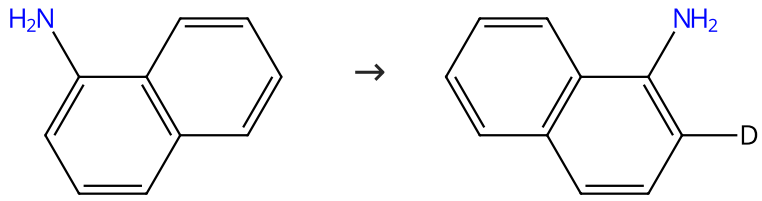
1.1 **Reagents:** Cupric acetate, Methanol-d_4
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium), 1-Butyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide, [1,1,1-Trifluoro-*N*-[(trifluoromethyl)sulfonyl-κ*O*]methanesulfonamidato-κ*O*]silver; 4 h, rt

The C-H activated controlled mono- and di-olefination of arenes in ionic liquids at room temperature

By: Du, Kaifeng; et al

RSC Advances (2020), 10(6), 3203-3211.

Scheme 64 (1 Reaction) Steps: **1** Yield: **30%**



Suppliers (71)

31-116-CAS-22269785 Steps: **1** Yield: **30%**

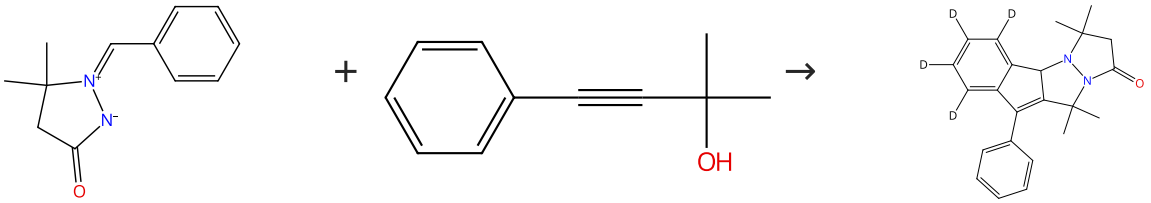
1.1 **Reagents:** Water-d_2
Catalysts: Cesium acetate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Methanol-d_4; 16 h, 65 °C

Ruthenium(II)-Catalyzed Ortho-C-H Alkylation of Naphthylamines with Diazo Compounds for Synthesis of 2, 2-Disubstituted π-Extended 3-Oxindoles in Water

By: Wang, Xiaogang; et al

Organic Letters (2020), 22(13), 5187-5192.

Scheme 65 (1 Reaction) Steps: **1** Yield: **30%**



Suppliers (2)

Suppliers (80)

31-116-CAS-23837760 Steps: **1** Yield: **30%**

1.1 **Reagents:** Methanol-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,1,1,3,3,3-Hexafluoro-2-propanol; 30 min, 60 °C

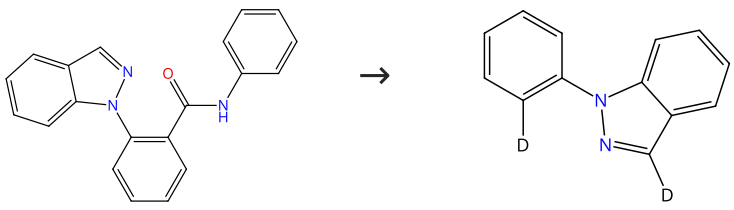
Experimental Protocols

Synthesis of tetracyclic indenopyrazolopyrazolones through cascade reactions of aryl azomethine imines with propargyl alcohols

By: Zhang, Linghua; et al

Organic Chemistry Frontiers (2021), 8(14), 3734-3739.

Scheme 66 (1 Reaction) Steps: **1** Yield: **21%**



31-108-CAS-17049677 Steps: **1** Yield: **21%**

1.1 **Reagents:** Potassium carbonate
Catalysts: 2,4,6-Trimethylbenzoic acid, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: *o*-Xylene, Methanol-d_4; 16 h, 120 °C

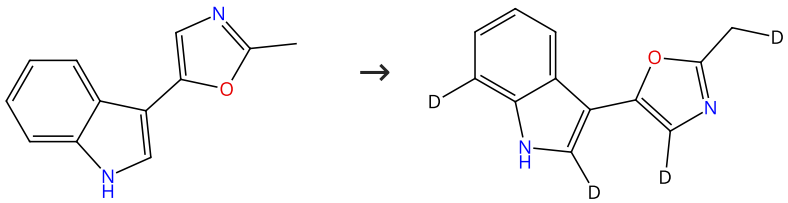
Experimental Protocols

Ruthenium(II)-Catalyzed C-C Arylations and Alkylations: Decarbamoylative C-C Functionalizations

By: Moselage, Marc; et al

Angewandte Chemie, International Edition (2017), 56(19), 5341-5344.

Scheme 67 (1 Reaction) Steps: **1** Yield: **20%**



Suppliers (32)

31-116-CAS-22001855 Steps: **1** Yield: **20%**

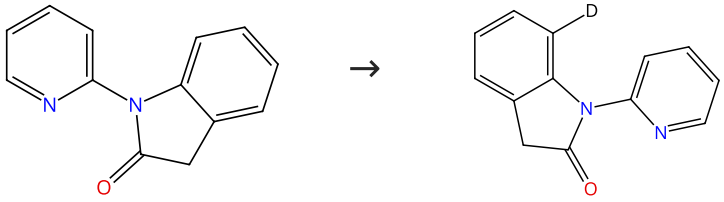
1.1 **Reagents:** Cesium carbonate, Methanol-*d*
Catalysts: Ruthenium; 24 h, 2 bar, 55 °C

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 68 (1 Reaction) Steps: **1** Yield: **15%**



Suppliers (2)

31-614-CAS-41757792 Steps: **1** Yield: **15%**

1.1 **Reagents:** Methanol-d_4
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium), [1,1,1-Trifluoro-*N*-[(trifluoromethyl)sulfonyl-κ*O*]methanesulfonamidato-κ*O*]silver
Solvents: 1,2-Dichloroethane; 1 min, rt

1.2 **Catalysts:** Silver carbonate; 30 min, 60 °C

Experimental Protocols

Ru(II)-Catalyzed Skeletal Editing of Oxindole with Internal Alkyne To Synthesize C7-Alkylated Indole Derivatives

By: Das, Sarbojit; et al

Organic Letters (2024), 26(38), 8051-8056.

Scheme 69 (2 Reactions) Steps: **1** Yield: **13%**

Suppliers (68)

Supplier (1)

31-116-CAS-20966837 Steps: **1** Yield: **13%**

1.1 **Reagents:** Methanol-d_4, Acetic acid-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,1,1,3,3,3-Hexafluoro-2-propanol; 5 h, 120 °C

Experimental Protocols

Ru(II)/Rh(III)-Catalyzed C(sp^3)-C(sp^3) Bond Formation through C(sp^3)-H Activation: Selective Linear Alkylation of 8-Methylquinolines and Ketoximes with Olefins

By: Kumar, Rohit; et al

Journal of Organic Chemistry (2020), 85(2), 1181-1192.

31-116-CAS-6152503 Steps: **1**

1.1 **Reagents:** Methanol-d_4
Catalysts: Dichloro(1,3-dibutyl-1,3-dihydro-2*H*-imidazol-2-ylidene)[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium; 10 h, 120 °C

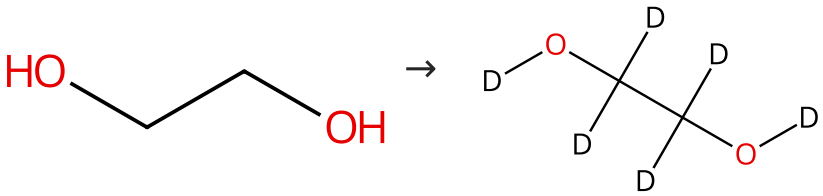
Experimental Protocols

(η^6-Arene)ruthenium(N-heterocyclic carbene) Complexes for the Chelation-Assisted Arylation and Deuteration of Arylpyridines: Catalytic Studies and Mechanistic Insights

By: Prades, Amparo; et al

Advanced Synthesis & Catalysis (2010), 352(7), 1155-1162.

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



Suppliers (179) Suppliers (33)

31-116-CAS-14321096 Steps: **1**

1.1 **Catalysts:** Potassium carbonate, (*OC*-6-52)-Carbonylchloro[2-(diphenylphosphino-κ*P*)-*N*-[2-(diphenylphosphino-κ*P*)ethyl]ethanamine-κ*N*]hydroruthenium
Solvents: 2-Propan-*1,1,1,2,3,3,3-*d_7-ol-*d*; 3 h, rt → 140 °C; 1.5 h, 140 °C → 0 °C

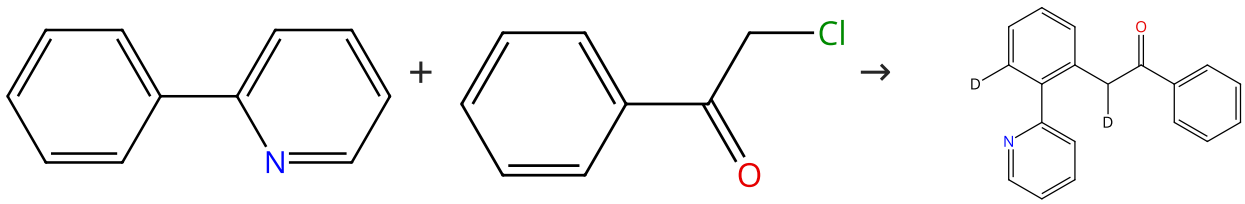
Experimental Protocols

Transfer Hydrogenation of Organic Formates and Cyclic Carbonates: An Alternative Route to Methanol from Carbon Dioxide

By: Kim, Seung Hyo; et al

ACS Catalysis (2014), 4(10), 3630-3636.

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



Suppliers (93) Suppliers (45)

31-085-CAS-20676691 Steps: **1**

1.1 **Reagents:** Sodium bicarbonate, Oxygen, 2-Propan-*2-d*-ol-*d*, 1,1,1,3,3,3-hexafluoro-
Catalysts: Silver acetate, Bis(dichloro(η^6-*p*-cymene)ruthenium); 4 h, 90 °C

Experimental Protocols

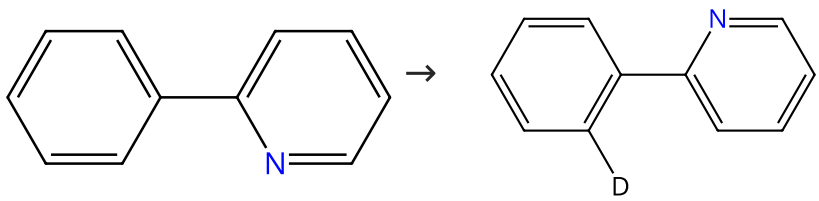
Ruthenium(II)-Catalyzed C-H Acylmethylation between (Hetero)arenes and α-Cl Ketones/Sulfoxonium Ylides

By: Li, Huihui; et al

Journal of Organic Chemistry (2019), 84(21), 13262-13275.

Scheme 72 (1 Reaction)

Steps: **1**



Suppliers (93)

Suppliers (6)

31-614-CAS-41866321

Steps: **1**

1.1 **Reagents:** Methanol-d_4, Sodium iodide, 2-Phenyl-1-tosylaziridine
Catalysts: 2-Ethylbutanoic acid, Dichlorotris(triphenylphosphine)ruthenium
Solvents: 1,4-Dioxane; 8 h, 80 °C

Experimental Protocols

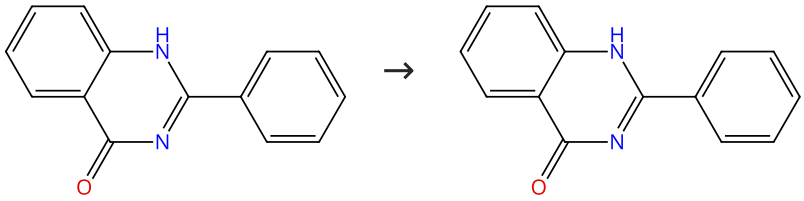
Ruthenium(II)-Catalyzed Remote C-H Alkylation of Arenes Using Diverse N-Directing Groups through Aziridine Ring Opening

By: Lan, Hongyan; et al

Organic Letters (2024), 26(38), 7993-7998.

Scheme 73 (2 Reactions)

Steps: **1**



Suppliers (72)

31-614-CAS-24079398

Steps: **1**

1.1 **Reagents:** Methanol-d_4, 1-Adamantanecarboxylic acid, Silver hexafluoroantimonate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 12 h, 130 °C

Experimental Protocols

Divergent Construction of Diverse Scaffolds through Catalyst-Controlled C-H Activation Cascades of Quinazolinones and Cyclopropenones

By: Shi, Yuesen; et al

Chemistry - A European Journal (2021), 27(53), 13346-13351.

31-614-CAS-29191701

Steps: **1**

1.1 **Reagents:** Sodium acetate, Methanol-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 12 h, 80 °C

Experimental Protocols

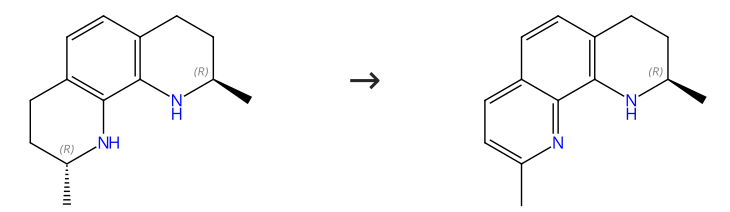
Ruthenium(II)-Catalyzed C-C/C-N Coupling of 2-Arylquinazolinones with Vinylene Carbonate: Access to Fused Quinazolinones

By: Wang, Zhao-Hui; et al

Organic Letters (2021), 23(3), 995-999.

Scheme 74 (1 Reaction)

Steps: **1**



Absolute stereochemistry shown, Rotation (+)

Absolute stereochemistry shown, Rotation (+)

Supplier (1)

31-478-CAS-14830715 Steps: **1**

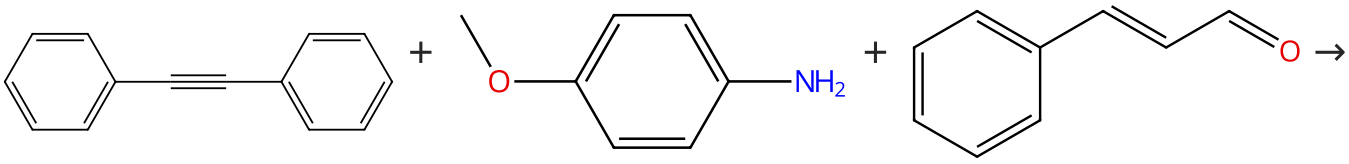
1.1 **Reagents:** Oxygen
Catalysts: [*N*-[(1*R*,2*R*)-2-(Amino-κ*N*)-1,2-diphenylethyl]-4-methylbenzenesulfonamidato-κ*N*][(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene](1,1,1-trifluoromethanesulfonato-κ*O*)ruthenium
Solvents: Methanol-d_4; 12 h, 25 °C

Asymmetric Ruthenium-Catalyzed Hydrogenation of 2- and 2,9-Substituted 1,10-Phenanthrolines

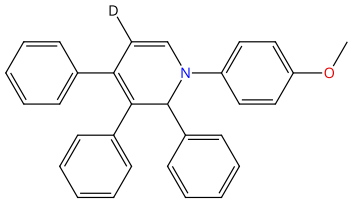
By: Wang, Tianli; et al

Angewandte Chemie, International Edition (2013), 52(28), 7172-7176.

Scheme 75 (1 Reaction) Steps: **1**



Suppliers (88) Suppliers (88) Suppliers (63)



31-614-CAS-35734688 Steps: **1**

1.1 **Reagents:** Cesium carbonate, Titania
Catalysts: Magnesium acetate, Benzyltributylammonium chloride, Dichloro[(1,2,5,6-η)-1,5-cyclooctadiene]ruthenium
Solvents: Methanol-*d*; 11 h, 100 °C

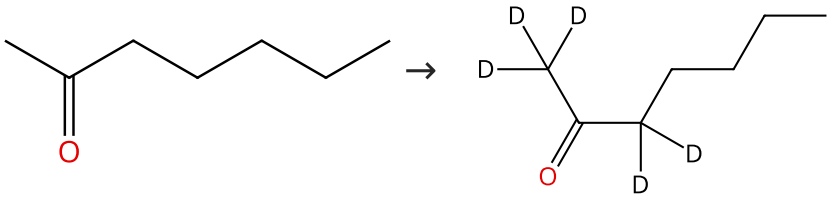
Experimental Protocols

Ru(II)-catalyzed One-pot Synthesis of 1,2-Hydropyridines via a Three-component Reaction

By: Yang, Juntao; et al

Organic Letters (2023), 25(9), 1476-1480.

Scheme 76 (1 Reaction) Steps: **1**



Suppliers (72) Suppliers (19)

31-116-CAS-16786890 Steps: **1**

1.1 **Reagents:** 2-Propan-*1,1,1,2,3,3,3*-d_7-ol-*d*
Catalysts: (*OC*-6-52)-[2-[6-[(Amino-κ*N*)methyl]-2-pyridinyl-κ*N*]-5-methylphenyl-κ*C*][1,1'-(1,4-butanediyl)bis[1,1-diphenylphosphine-κ*P*]]hydroruthenium
Solvents: THF-d_8; 6 min, 25 °C

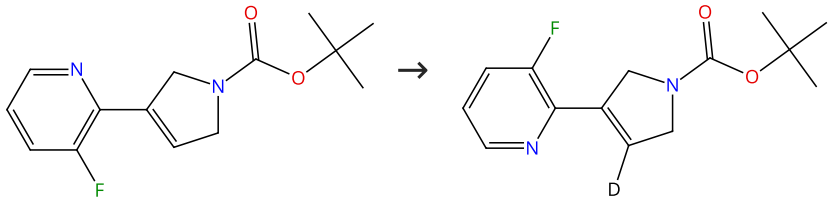
Electrocatalytic Alcohol Oxidation with Ruthenium Transfer Hydrogenation Catalysts

By: Waldie, Kate M.; et al

Journal of the American Chemical Society (2017), 139(2), 738-748.

Scheme 77 (1 Reaction)

Steps: **1**



Suppliers (4)

31-614-CAS-29438493

Steps: **1**

1.1 **Reagents:** Hydrogen, Methanol-*d*
Catalysts: Ruthenium(1+), [(1*R*)-1,1'-[1,1'-binaphthalene]-2,2'-diylbis[1,1-bis(4-methylphenyl)phosphine-κ*P*]]chloro[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]-, chloride; 30 min, 20 psi, 25 °C

Experimental Protocols

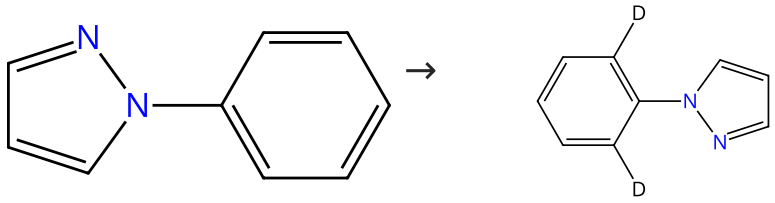
Ru-Catalyzed Enantioselective Hydrogenation of 2-Pyridyl-Substituted Alkenes and Substrate-Mediated H/D Exchange

By: Hao, Wei; et al

ACS Catalysis (2022), 12(2), 1150-1160.

Scheme 78 (1 Reaction)

Steps: **1**



Suppliers (90)

31-116-CAS-1890264

Steps: **1**

1.1 **Reagents:** Methanol-d_4
Catalysts: Dichloro(1,3-dibutyl-1,3-dihydro-2*H*-imidazol-2-ylidene)[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium; 10 h, 120 °C

Experimental Protocols

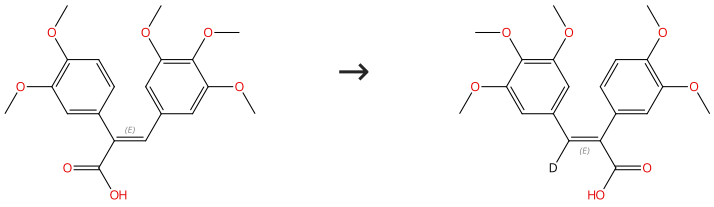
(η^6-Arene)ruthenium(N-heterocyclic carbene) Complexes for the Chelation-Assisted Arylation and Deuteration of Arylpyridines: Catalytic Studies and Mechanistic Insights

By: Prades, Amparo; et al

Advanced Synthesis & Catalysis (2010), 352(7), 1155-1162.

Scheme 79 (1 Reaction)

Steps: **1**



Double bond geometry shown

Double bond geometry shown

31-614-CAS-34388328

Steps: **1**

1.1 **Reagents:** Sodium acetate, Methanol-d_4
Catalysts: Silver tetrafluoroborate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,1,1,3,3,3-Hexafluoro-2-propanol; 3 h, 100 °C

Experimental Protocols

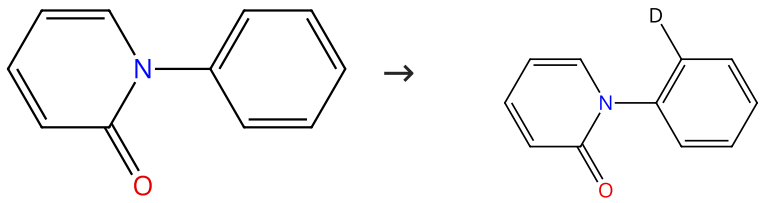
Synthesis of alpha-pyrones and chromen-2-ones by transition-metal catalyzed annulations of sulfoxonium and iodonium ylides with cis-stilbene acids

By: John, Stephy Elza; et al

New Journal of Chemistry (2022), 46(41), 19722-19730.

Scheme 80 (1 Reaction)

Steps: **1**



Suppliers (34)

31-614-CAS-31487799

Steps: **1**

1.1 **Reagents:** Methanol-d_4
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium), Antimonate (3-), hexafluoro-, silver(1+) hydrogen (1:1:2), (*OC*-6-11)-
Solvents: 1,2-Dichloroethane; 6 h, 100 °C

1.2 **Reagents:** Sodium bicarbonate
Solvents: Water

Experimental Protocols

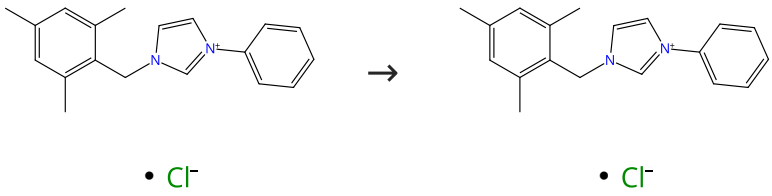
Ru-Catalyzed C-H alkenylation on the arene ring of pirfenidone using pyridone as a directing group

By: Raziullah; et al

Chemical Communications (Cambridge, United Kingdom) (2022), 58(21), 3481-3484.

Scheme 81 (1 Reaction)

Steps: **1**



31-614-CAS-28214306

Steps: **1**

1.1 **Reagents:** Cupric acetate
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Methanol-d_4; 12 h, 130 °C

Experimental Protocols

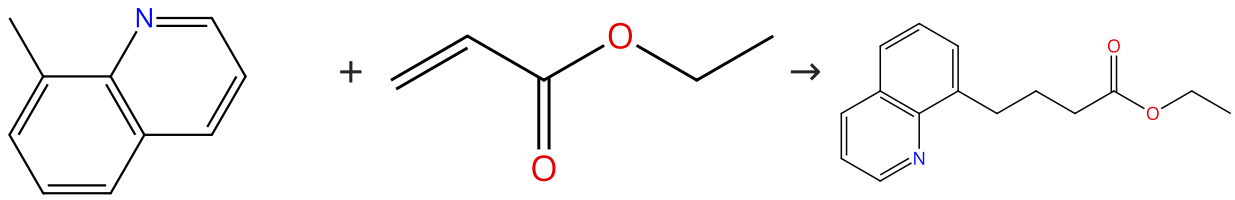
Ruthenium(II)-Catalyzed Oxidative Annulation Reactions of Arylimidazolium Salts via N-Heterocyclic Carbene-Directed C-H Activation

By: Li, Renhe; et al

Advanced Synthesis & Catalysis (2015), 357(18), 3885-3892.

Scheme 82 (1 Reaction)

Steps: **1**



Suppliers (68)

Suppliers (76)

31-614-CAS-25589872

Steps: **1**

1.1 **Reagents:** Methanol-d_4, Acetic acid-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,1,1,3,3,3-Hexafluoro-2-propanol; 5 h, 120 °C

Experimental Protocols

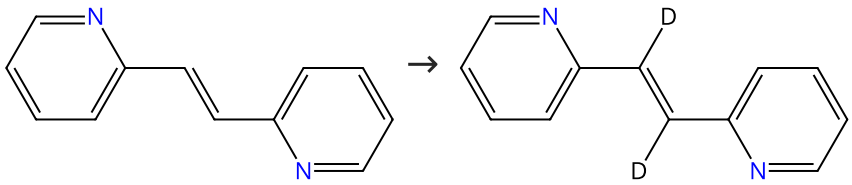
Ru(II)/Rh(III)-Catalyzed C(sp^3)-C(sp^3) Bond Formation through C(sp^3)-H Activation: Selective Linear Alkylation of 8-Methylquinolines and Ketoximes with Olefins

By: Kumar, Rohit; et al

Journal of Organic Chemistry (2020), 85(2), 1181-1192.

Scheme 83 (1 Reaction)

Steps: **1**



Suppliers (41)

31-116-CAS-8006826

Steps: **1**

1.1 **Reagents:** Methanol-d_4
Catalysts: Dichloro(1,3-dibutyl-1,3-dihydro-2*H*-imidazol-2-ylidene)[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene] ruthenium; 10 h, 120 °C

Experimental Protocols

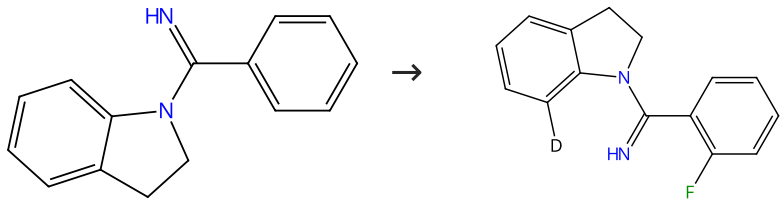
(η^6-Arene)ruthenium(N-heterocyclic carbene) Complexes for the Chelation-Assisted Arylation and Deuteration of Arylpyridines: Catalytic Studies and Mechanistic Insights

By: Prades, Amparo; et al

Advanced Synthesis & Catalysis (2010), 352(7), 1155-1162.

Scheme 84 (1 Reaction)

Steps: **1**



Suppliers (2)

31-614-CAS-38966808

Steps: **1**

1.1 **Reagents:** Acetic acid, Methanol-d_4
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 0.5 h, 80 °C; 80 °C → rt

1.2 **Reagents:** Sodium bicarbonate
Solvents: Water

Experimental Protocols

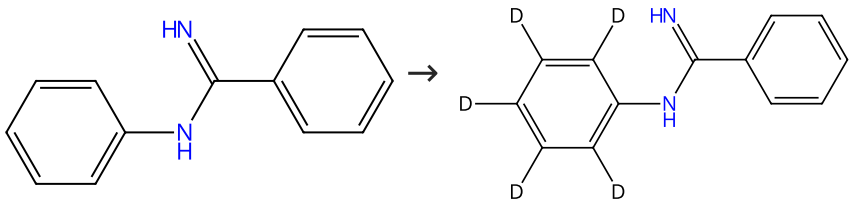
Synthesis of 1,7-Fused Indolines Tethered with Spiroindolinone Based on C-H Activation Strategy with Air as Sustainable Oxidant

By: He, Xing; et al

Journal of Organic Chemistry (2024), 89(3), 1880-1897.

Scheme 85 (1 Reaction)

Steps: **1**



Suppliers (63)

Supplier (1)

31-614-CAS-39593993

Steps: **1**

1.1 **Reagents:** Sodium bicarbonate, Methanol-d_4
Catalysts: Silver tetrafluoroborate, Bis(dichloro(η^6-*p*-cymene) ruthenium)
Solvents: 1,2-Dichloroethane; 12 h, 100 °C

Experimental Protocols

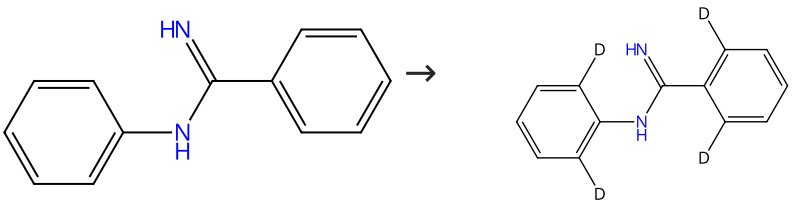
Ru(II)-catalyzed regioselective [4 + 1] redox-neutral spirocyclization of aryl amidines with diazopyrazolones: direct access to spiro[indole-3,4'-pyrazol]-5'-ones

By: Cui, Bo; et al

Organic Chemistry Frontiers (2024), 11(6), 1811-1816.

Scheme 86 (1 Reaction)

Steps: **1**



Suppliers (63)

31-614-CAS-35898041

Steps: **1**

1.1 **Reagents:** Methanol-d_4, Monopotassium phosphate, Silver hexafluoroantimonate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Toluene; 10 min, 80 °C

Experimental Protocols

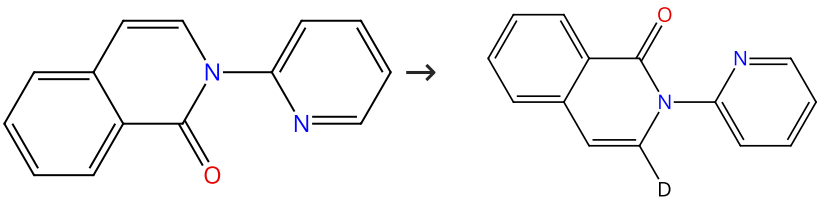
One-Pot Synthesis of Benzodiazepines through Ru^{II}-Catalyzed Regioselective [5+2] Annulation of N-Aryl Amidines with Alkynyl Cyclobutyl Acetates

By: Shen, Jian; et al

European Journal of Organic Chemistry (2023), 26(13), e202300064.

Scheme 87 (2 Reactions)

Steps: **1**



Supplier (1)

31-614-CAS-37732068

Steps: **1**

1.1 **Reagents:** Cupric acetate, Methanol-d_4, 1-[4-(Trifluoromethyl) phenyl]cyclopropanol
Catalysts: 1-Adamantanecarboxylic acid, Bis(dichloro(η^6-*p*-cymene)ruthenium); 3 min, 80 °C

Experimental Protocols

Regiocontrol via Electronics: Insights into a Ru- Catalyzed, Cu-Mediated Site-Selective Alkylation of Isoquinolones via a C-C Bond Activation of Cyclopropanols

By: Jha, Neha; et al

Chemistry - A European Journal (2023), 29(55), e202301551.

31-614-CAS-37732075

Steps: **1**

1.1 **Reagents:** Cupric acetate, Methanol-d_4
Catalysts: 1-Adamantanecarboxylic acid, Bis(dichloro(η^6-*p*-cymene)ruthenium); 30 min, 80 °C

Experimental Protocols

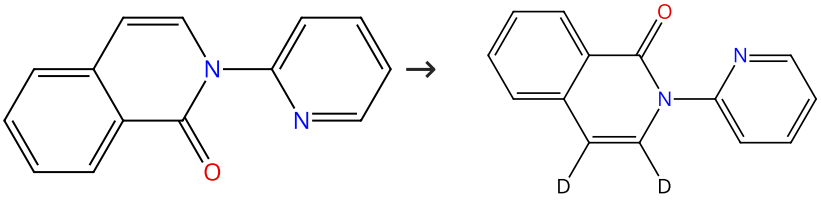
Regiocontrol via Electronics: Insights into a Ru- Catalyzed, Cu-Mediated Site-Selective Alkylation of Isoquinolones via a C-C Bond Activation of Cyclopropanols

By: Jha, Neha; et al

Chemistry - A European Journal (2023), 29(55), e202301551.

Scheme 88 (1 Reaction)

Steps: **1**



Supplier (1)

31-614-CAS-37732069 Steps: **1**

1.1 **Reagents:** Cupric acetate, Methanol-d_4, 1-(3,4-Dimethoxyphenyl)cyclopropanol
Catalysts: 1-Adamantanecarboxylic acid, Bis(dichloro(η^6-*p*-cymene)ruthenium); 6 min, 80 °C

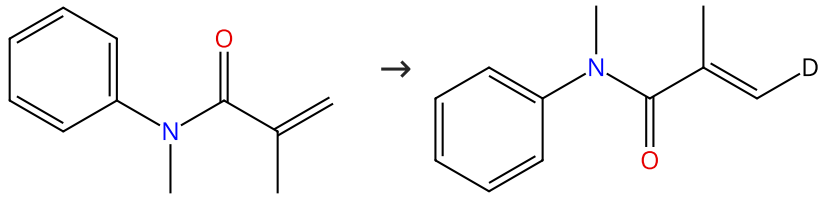
Experimental Protocols

Regiocontrol via Electronics: Insights into a Ru- Catalyzed, Cu-Mediated Site-Selective Alkylation of Isoquinolones via a C-C Bond Activation of Cyclopropanols

By: Jha, Neha; et al

Chemistry - A European Journal (2023), 29(55), e202301551.

Scheme 89 (1 Reaction) Steps: **1**



Suppliers (6)

31-116-CAS-20727314 Steps: **1**

1.1 **Reagents:** Cupric acetate, Methanol-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 5 min, rt; 16 h, 100 °C

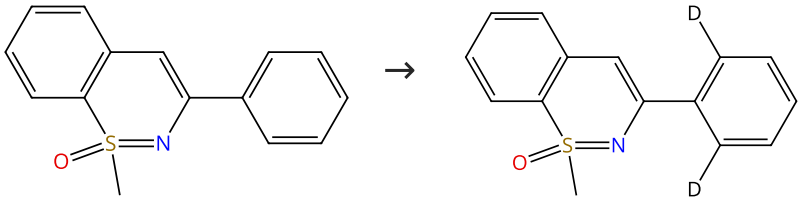
Experimental Protocols

Ru(II)- or Rh(III)-Catalyzed Difunctionalization of Alkenes by Tandem Cyclization of N-Aryl Acrylamides with Alkenes

By: Manoharan, Ramasamy; et al

Journal of Organic Chemistry (2019), 84(22), 14830-14843.

Scheme 90 (1 Reaction) Steps: **1**



Supplier (1)

31-116-CAS-19085642 Steps: **1**

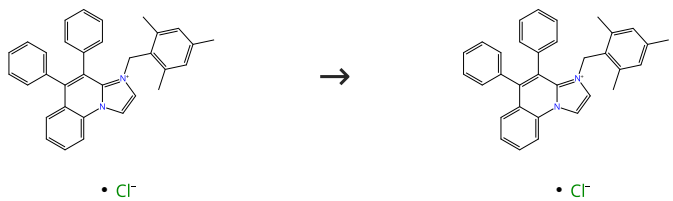
1.1 **Reagents:** Pivalic acid, Methanol-*d*
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 2 h, 100 °C

Ru (II)-Catalyzed Coupling-Cyclization of Sulfoximines with alpha-Carbonyl Sulfoxonium Ylides as an Approach to 1,2-Benzothiazines

By: Xie, Haisheng; et al

Advanced Synthesis & Catalysis (2018), 360(18), 3534-3543.

Scheme 91 (1 Reaction) Steps: **1**



31-614-CAS-29018943 Steps: **1**

1.1 **Reagents:** Cupric acetate
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Methanol-*d*$_4$; 24 h, 130 °C

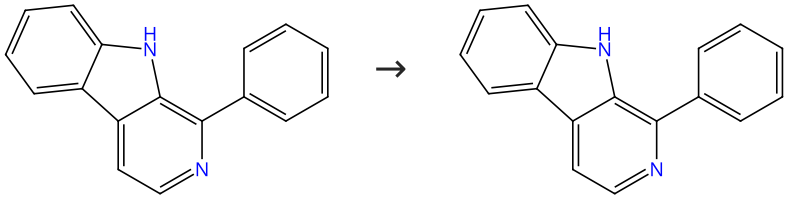
Experimental Protocols

Ruthenium(II)-Catalyzed Oxidative Annulation Reactions of Arylimidazolium Salts via N-Heterocyclic Carbene-Directed C-H Activation

By: Li, Renhe; et al

Advanced Synthesis & Catalysis (2015), 357(18), 3885-3892.

Scheme 92 (1 Reaction) Steps: **1**



Suppliers (21)

31-614-CAS-33409740 Steps: **1**

1.1 **Reagents:** Methanol-*d*$_4$, Silver hexafluoroantimonate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,1,1,3,3,3-Hexafluoro-2-propanol; 2 h, 70 °C

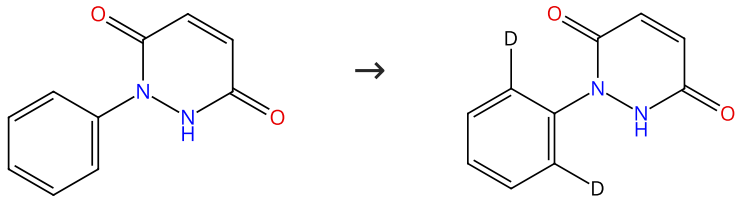
Experimental Protocols

Ru(II)-Catalyzed regioselective carbene insertion into β-carbolines and isoquinolines

By: John, Stephy Elza; et al

Organic & Biomolecular Chemistry (2022), 20(29), 5852-5860.

Scheme 93 (1 Reaction) Steps: **1**



Suppliers (50)

31-614-CAS-41965079 Steps: **1**

1.1 **Reagents:** Methanol-*d*$_4$, [1,1,1-Trifluoro-*N*-[(trifluoromethyl)sulfonyl-κ*O*]methanesulfonamidato-κ*O*]silver
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 0.5 h, 80 °C

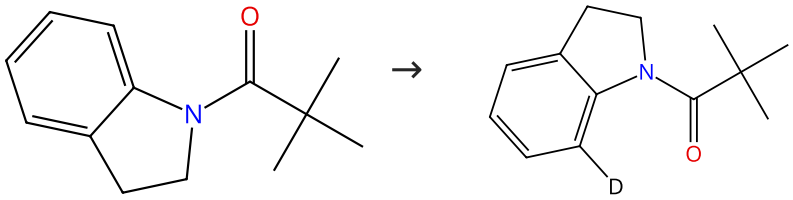
Experimental Protocols

Rh(III)- or Ru(II)-Catalyzed C-H Annulation with Vinylene Carbonate and an Unexpected Aerobic Oxidation/Deprotection Cascade to Yield Cinnolin-4(1H)-ones

By: Wang, Yuqin; et al

Journal of Organic Chemistry (2024), 89(19), 14233-14241.

Scheme 94 (1 Reaction) Steps: **1**



Suppliers (10)

31-116-CAS-23618178 Steps: **1**

1.1 **Reagents:** Pivalic acid, Methanol-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 6 h, 100 °C

1.2 **Reagents:** Sodium bicarbonate
Solvents: Water

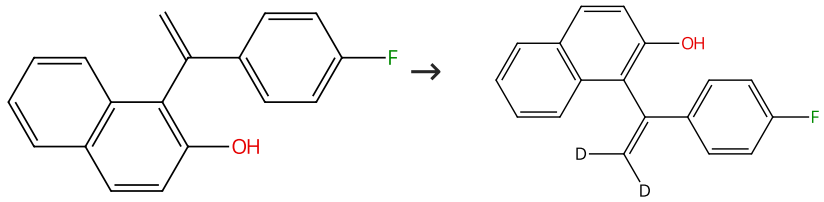
Experimental Protocols

Ru(II)-Catalyzed Regioselective Hydroarylative Coupling of Indolines with Internal Alkynes by C-H Activation

By: Raziullah; et al

European Journal of Organic Chemistry (2021), 2021(14), 2107-2113.

Scheme 95 (1 Reaction) Steps: **1**



31-116-CAS-19042416 Steps: **1**

1.1 **Reagents:** Methanol-d_4, Cesium acetate, Water-d_2
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium); 24 h, 90 °C

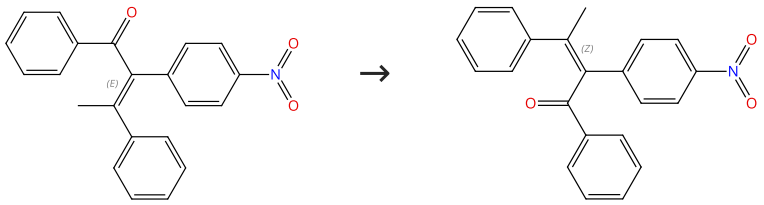
Experimental Protocols

Ruthenium(II)-Catalyzed Dearomatized C-H Activation and Annulation Reaction of Vinylnaphthols with Alkynes: Access to Spiro-Pentacyclic Naphthalenones

By: Duarah, Gauri; et al

Chemistry - A European Journal (2018), 24(40), 10196-10200.

Scheme 96 (1 Reaction) Steps: **1**



Double bond geometry shown Double bond geometry shown

31-117-CAS-5360407 Steps: **1**

1.1 **Catalysts:** Tris(2,2'-bipyridine)ruthenium(2+) bis(hexafluoro phosphate)
Solvents: Methanol-d_4; 24 h, rt

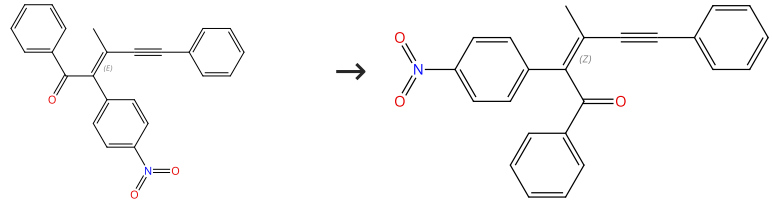
Experimental Protocols

Cross-Coupling of Meyer-Schuster Intermediates under Dual Gold-Photoredox Catalysis

By: Um, Jiwon; et al

Organic Letters (2016), 18(3), 484-487.

Scheme 97 (1 Reaction) Steps: **1**



Double bond geometry shown Double bond geometry shown

31-117-CAS-7502258 Steps: **1**

1.1 **Catalysts:** Tris(2,2'-bipyridine)ruthenium(2+) bis(hexafluoro phosphate)
Solvents: Methanol-d_4; 2 h, rt

Experimental Protocols

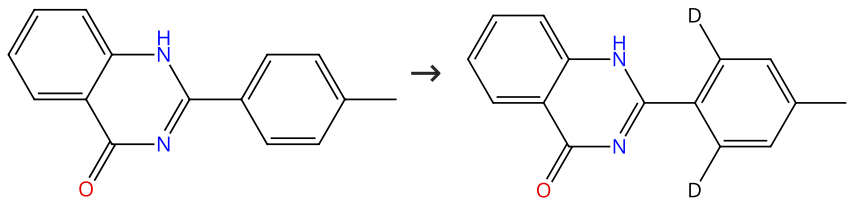
Cross-Coupling of Meyer-Schuster Intermediates under Dual Gold-Photoredox Catalysis

By: Um, Jiwon; et al

Organic Letters (2016), 18(3), 484-487.

Scheme 98 (1 Reaction)

Steps: **1**



Suppliers (36)

31-614-CAS-24450146

Steps: **1**

1.1 **Reagents:** Methanol-d_4
Catalysts: Silver triflate, Silver sulfate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 2 h, 110 °C

Experimental Protocols

Ru(II)-Catalyzed C-H Activation Reaction between 2-Phenylquinazolinone and Vinylene Carbonate

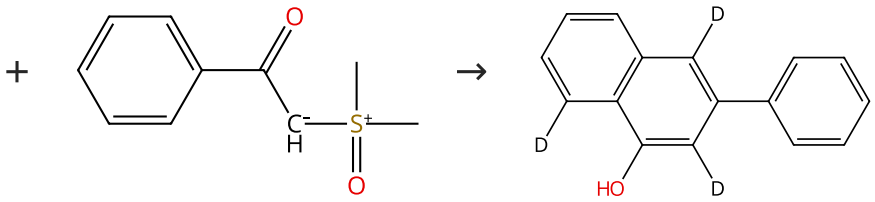
By: Chen, Yuncan; et al

Synlett (2021), 32(19), 1963-1968.

Scheme 99 (1 Reaction)

Steps: **1**

Multi-component structure image available in CAS SciFinder



Suppliers (38)

31-116-CAS-23613467

Steps: **1**

1.1 **Reagents:** Sodium acetate, Water-d_2
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Ethanol-d_6; 10 h, 120 °C

Experimental Protocols

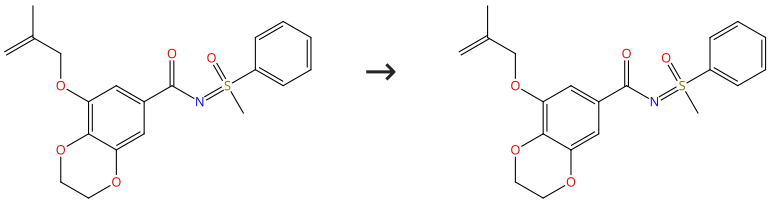
Ruthenium-catalyzed coupling of α-carbonyl phosphoniums with sulfoxonium ylides via C-H activation/Wittig reaction sequences

By: Chen, Tian; et al

Chemical Communications (Cambridge, United Kingdom) (2021), 57(21), 2665-2668.

Scheme 100 (1 Reaction)

Steps: **1**



31-614-CAS-28578657

Steps: **1**

1.1 **Reagents:** Cupric acetate, Silver hexafluoroantimonate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Methanol-d_4, Acetic acid-d_4; 6 h, rt

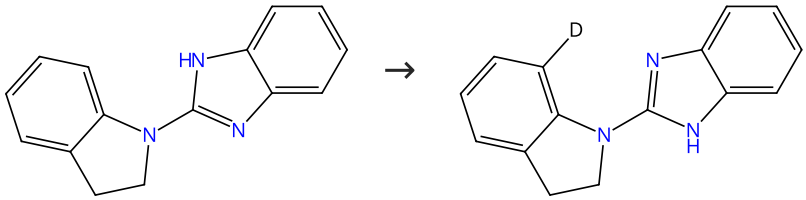
Ruthenium-Catalyzed Hydroarylation and One-Pot Twofold Unsymmetrical C-H Functionalization of Arenes

By: Ghosh, Koushik; et al

Angewandte Chemie, International Edition (2016), 55(27), 7821-7825.

Scheme 101 (1 Reaction)

Steps: **1**



Suppliers (2)

31-116-CAS-22577818

Steps: **1**

1.1 **Reagents:** Methanol-d_4, Cesium acetate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium); 8 h, 80 °C

Experimental Protocols

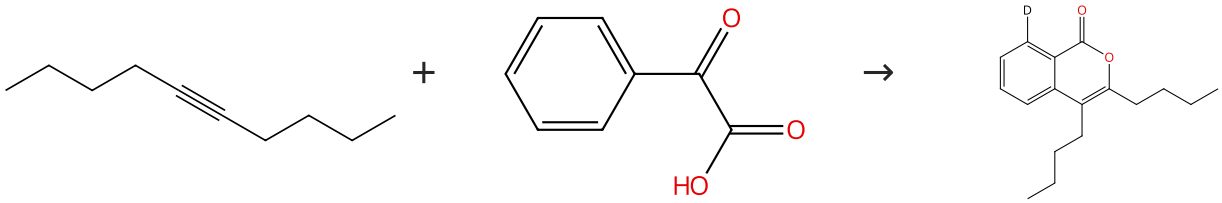
Ru(II)-Catalyzed and acidity-controlled tunable [5+1]/[5+2] annulation for building ring-fused quinazolines and 1,3-benzodiazepines

By: Yang, Yurong; et al

Chemical Communications (Cambridge, United Kingdom) (2020), 56(76), 11315-11318.

Scheme 102 (1 Reaction)

Steps: **1**



Suppliers (65)

Suppliers (111)

31-087-CAS-20311751

Steps: **1**

1.1 **Reagents:** Methanol-d_4, Propanoic acid, 2,2-dimethyl-, sodium salt (1:1), Water-d_2
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium); 24 h, 70 °C

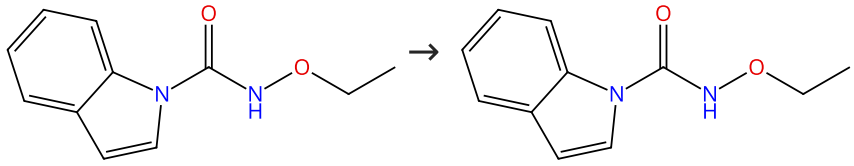
Decarboxylative [4+2] annulation of arylglyoxylic acids with internal alkynes using the anodic ruthenium catalysis

By: Luo, Mu-Jia; et al

Chemical Communications (Cambridge, United Kingdom) (2019), 55(50), 7251-7254.

Scheme 103 (1 Reaction)

Steps: **1**



Supplier (1)

31-614-CAS-25192282

Steps: **1**

1.1 **Reagents:** Cesium carbonate, Methanol-d_4
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Dichloromethane; rt; 2 h, 60 °C

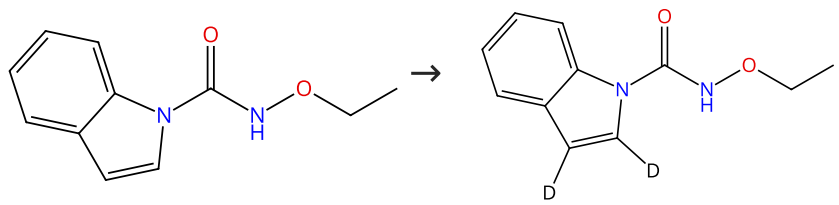
Experimental Protocols

Ruthenium(II)-Catalyzed Redox-Neutral [3+2] Annulation of Indoles with Internal Alkynes via C-H Bond Activation: Accessing a Pyrroloindolone Scaffold

By: Xie, Yanan; et al

Journal of Organic Chemistry (2017), 82(10), 5263-5273.

Scheme 104 (1 Reaction) Steps: **1**



Supplier (1)

31-116-CAS-18701277 Steps: **1**

1.1 **Reagents:** Sodium acetate, Methanol-d_4
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 6 h, 45 °C; 45 °C → rt

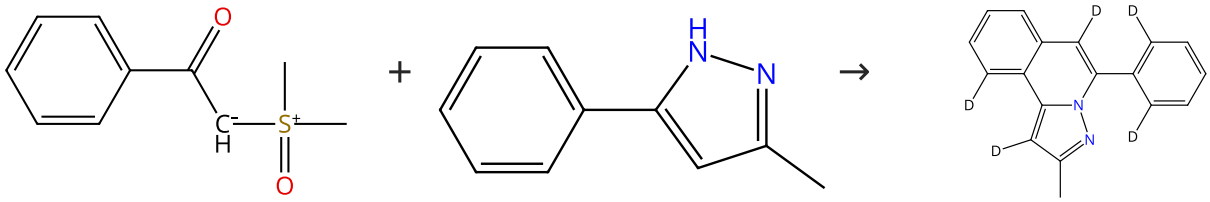
Experimental Protocols

Ruthenium(II)-Catalyzed Regio- and Stereoselective C-H Allylation of Indoles with Allyl Alcohols

By: Wu, Xiaowei; et al

Organic Letters (2018), 20(8), 2224-2227.

Scheme 105 (1 Reaction) Steps: **1**



Suppliers (38) Suppliers (76)

31-116-CAS-22742754 Steps: **1**

1.1 **Reagents:** Benzoic acid, Water-d_2
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Ethanol-d_6; 20 h, 120 °C

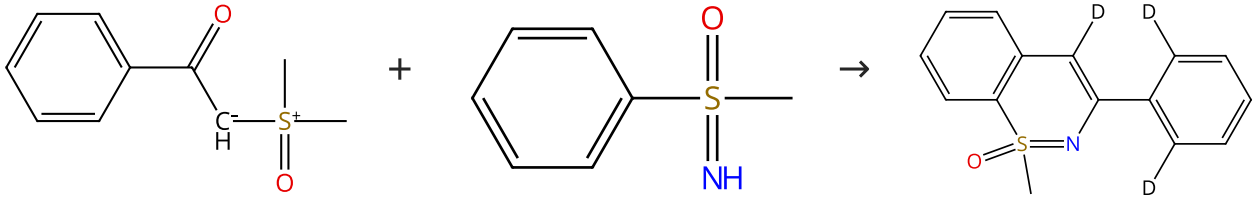
Experimental Protocols

Ruthenium-catalyzed α-carbonyl sulfoxonium ylide annulations with aryl substituted pyrazoles via C-H/N-H bond functionalizations

By: Chen, Zhangpei; et al

Organic & Biomolecular Chemistry (2020), 18(41), 8486-8490.

Scheme 106 (1 Reaction) Steps: **1**



Suppliers (38) Suppliers (49)

31-116-CAS-19085641 Steps: **1**

1.1 **Reagents:** Pivalic acid, Methanol-*d*
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 2 h, 100 °C

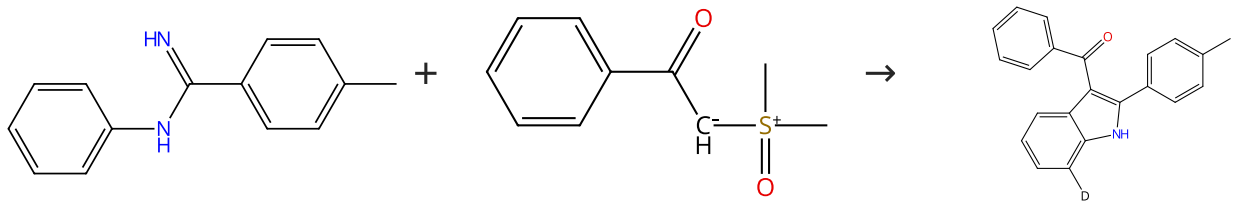
Ru (II)-Catalyzed Coupling-Cyclization of Sulfoximines with alpha-Carbonyl Sulfoxonium Ylides as an Approach to 1,2-Benzothiazines

By: Xie, Haisheng; et al

Advanced Synthesis & Catalysis (2018), 360(18), 3534-3543.

Scheme 107 (1 Reaction)

Steps: **1**



Suppliers (8)

Suppliers (38)

31-116-CAS-20237782

Steps: **1**

1.1 **Reagents:** Ethanol-*d*
Catalysts: Zinc acetate, Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium); < 1 s, rt

1.2 8 h, 90 °C

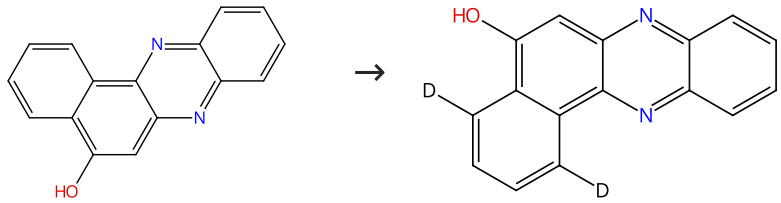
Ruthenium(II)-catalyzed selective C-H bond activation of imidamides and coupling with sulfoxonium ylides: an efficient approach for the synthesis of highly functional 3-ketoindoles

By: Wu, Chenglin; et al

Organic Chemistry Frontiers (2019), 6(8), 1183-1188.

Scheme 108 (1 Reaction)

Steps: **1**



Suppliers (33)

31-116-CAS-18971168

Steps: **1**

1.1 **Reagents:** Cupric acetate, Methanol-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 12 h, 100 °C

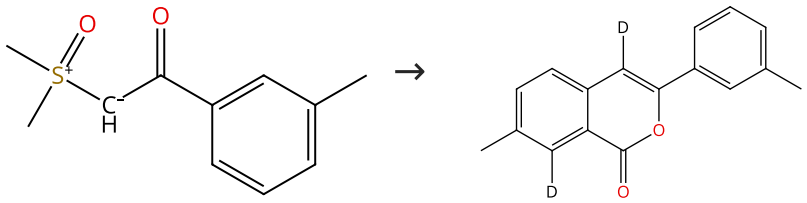
Ru(II)-Catalyzed Regiospecific C-H/O-H Oxidative Annulation to Access Isochromeno[8,1-ab]phenazines: Far-Red Fluore scence and Live Cancer Cell Imaging

By: Mayakrishnan, Sivakalai; et al

ACS Omega (2017), 2(6), 2694-2705.

Scheme 109 (1 Reaction)

Steps: **1**



Suppliers (6)

31-116-CAS-20876999

Steps: **1**

1.1 **Reagents:** 2,4,6-Trimethylbenzoic acid, Methanol-d_4, Trisodium phosphate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,1,1,3,3,3-Hexafluoro-2-propanol; 24 h, rt → 110 °C

Experimental Protocols

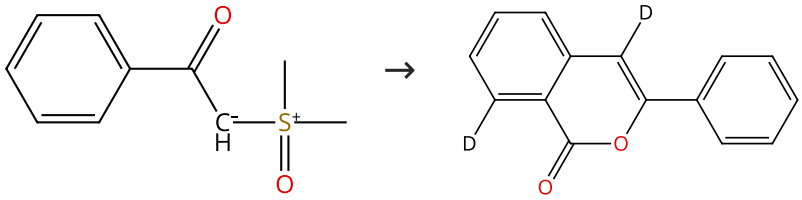
Ruthenium(II)-Catalyzed Construction of Isocoumarins via Dual C-H/C-C Activation of Sulfoxonium Ylides

By: Wen, Si; et al

Journal of Organic Chemistry (2020), 85(2), 1216-1223.

Scheme 110 (1 Reaction)

Steps: **1**



31-614-CAS-29224648

Steps: **1**

1.1 **Reagents:** 2,4,6-Trimethylbenzoic acid, Methanol-d_4, Trisodium phosphate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,1,1,3,3,3-Hexafluoro-2-propanol; 24 h, rt → 110 °C

Experimental Protocols

Ruthenium(II)-Catalyzed Construction of Isocoumarins via Dual C-H/C-C Activation of Sulfoxonium Ylides

By: Wen, Si; et al

Journal of Organic Chemistry (2020), 85(2), 1216-1223.

Scheme 111 (1 Reaction)

Steps: **1**

31-614-CAS-33544217

Steps: **1**

1.1 **Reagents:** Methanol-d_4
Catalysts: 1-Adamantanecarboxylic acid, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Ethanol; 12 h, 100 °C

Experimental Protocols

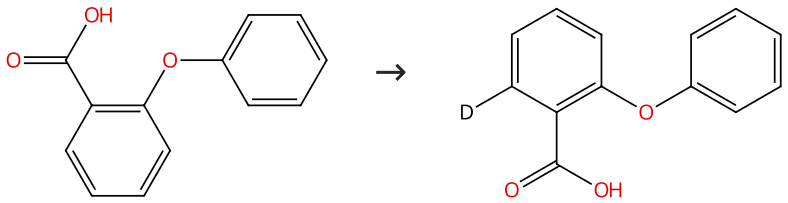
Ru(II)-catalyzed P(III)-assisted C8-alkylation of naphthphosphines

By: Ma, Wen-Tao; et al

Chemical Communications (Cambridge, United Kingdom) (2022), 58(51), 7152-7155.

Scheme 112 (1 Reaction)

Steps: **1**



Suppliers (81)

31-116-CAS-23162707

Steps: **1**

1.1 **Catalysts:** Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Methanol-d_4, Water-d_2; 48 h, 50 °C

Experimental Protocols

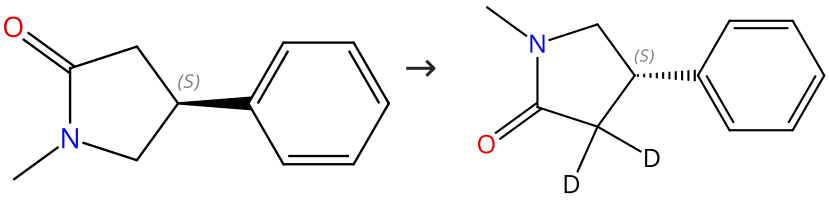
Nickel-catalyzed C-O/N-H, C-S/N-H, and C-CN/N-H annulation of aromatic amides with alkynes: C-O, C-S, and C-CN activation

By: Iyori, Yasuaki; et al

Chemical Science (2021), 12(5), 1772-1777.

Scheme 113 (1 Reaction)

Steps: **1**



Absolute stereochemistry shown, Rotation (+)

Absolute stereochemistry shown

Supplier (1)

31-614-CAS-41544026

Steps: **1**

1.1 **Reagents:** Sodium hydroxide, Hydrogen, 2-Propan-*1,1,1,2,3,3,3-d*$_7$-ol-*d*
Catalysts: [μ-[(2*R*,2'*R*)-1,1'-Bis[(4*S*)-4-(1,1-dimethylethyl)-4,5-dihydro-2-oxazolyl-κ*N*^{3}]-2,2'-bis(diphenylphosphino-κ*P*)ruthenocene]]tetrachlorobis(triphenylphosphine)diruthenium; 48 h, 50 atm, 35 °C

1.2 **Reagents:** Hydrochloric acid
Solvents: Water; < pH 7

Experimental Protocols

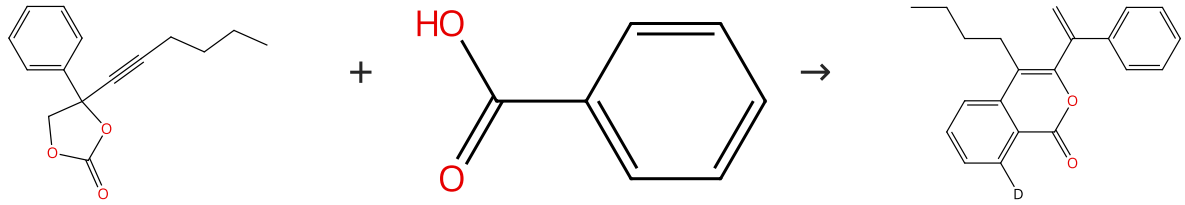
Ru-Catalyzed Asymmetric Hydrogenation of α,β-Unsaturated γ-Lactams

By: Ding, Zhengdong; et al

Journal of the American Chemical Society (2024), 146(36), 25312-25320.

Scheme 114 (1 Reaction)

Steps: **1**



Suppliers (192)

31-614-CAS-41630874

Steps: **1**

1.1 **Reagents:** Methanol-d_4, Tripotassium phosphate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 3 h, 60 °C

Experimental Protocols

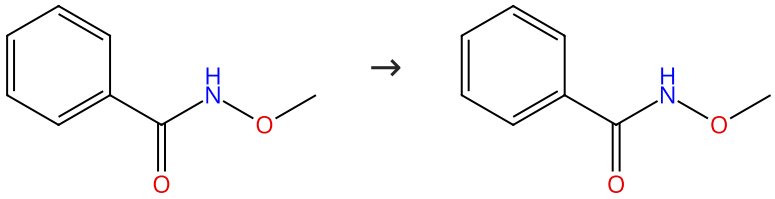
Ru(II)-Catalyzed Decarboxylative (4 + 2)-Annulation of Benzoic Acids and Benzamides with Propargyl Cyclic Carbonates

By: Jana, Debasish; et al

Organic Letters (2024), 26(36), 7590-7595.

Scheme 115 (1 Reaction)

Steps: **1**



Suppliers (49)

31-116-CAS-4598249

Steps: **1**

1.1 **Reagents:** Methanol-*d*
Catalysts: Sodium acetate, Bis(dichloro(η^6-*p*-cymene) ruthenium); 8 h, rt

Experimental Protocols

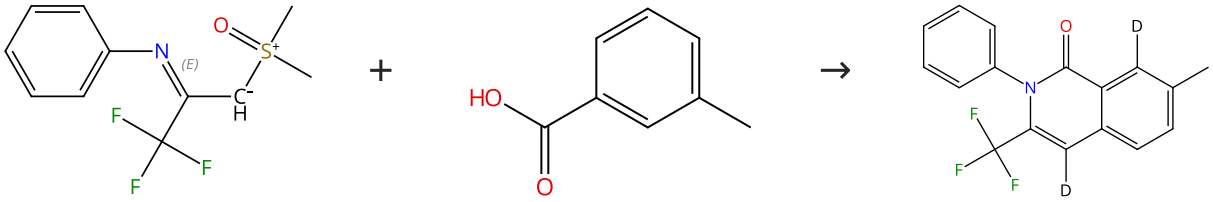
Ruthenium-Catalyzed Isoquinolone Synthesis through C-H Activation Using an Oxidizing Directing Group

By: Li, Bin; et al

Chemistry - A European Journal (2011), 17(45), 12573-12577, S12573/1-S12573/126.

Scheme 116 (1 Reaction)

Steps: **1**



Double bond geometry shown

Suppliers (91)

31-614-CAS-32979096

Steps: **1**

1.1 **Reagents:** Triethylamine, Methanol-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Acetonitrile; 24 h, 100 °C

Experimental Protocols

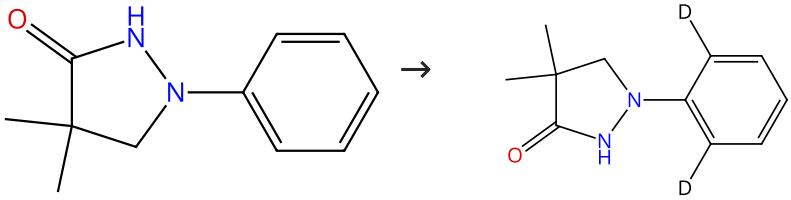
Ruthenium(II)-catalyzed synthesis of CF_3-isoquinolinones via C-H activation/annulation of benzoic acids and CF_3-imidoyl sulfoxonium ylides

By: Wen, Si; et al

Organic Chemistry Frontiers (2022), 9(16), 4388-4393.

Scheme 117 (1 Reaction)

Steps: **1**



Suppliers (25)

31-614-CAS-35261295

Steps: **1**

1.1 **Reagents:** Zinc acetate, Methanol-d_4
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 30 min, 100 °C

Experimental Protocols

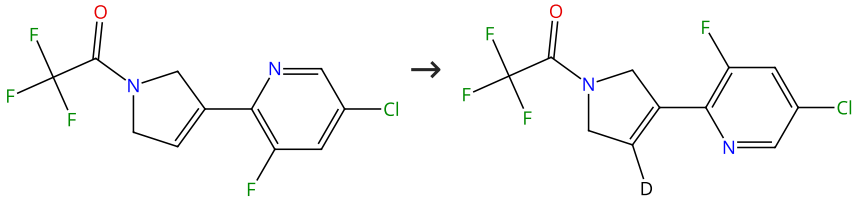
Selective Construction of Spiro or Fused Heterocyclic Scaffolds via One-pot Cascade Reactions of 1-Arylpyrazolidinones with Maleimides

By: Li, Na; et al

Journal of Organic Chemistry (2023), 88(1), 60-74.

Scheme 118 (1 Reaction)

Steps: **1**



31-614-CAS-29438491

Steps: **1**

1.1 **Reagents:** Methanol-d_4, Hydrogen
Catalysts: Ruthenium(1+), [1,1'-(4*S*)-[4,4'-bi-1,3-benzodioxole]-5,5'-diylbis[1,1-bis[3,5-bis(1,1-dimethylethyl)-4-methoxyphenyl]phosphine-κ*P*]]chloro[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]-, chloride (1:1); 20 psi, 25 °C

Experimental Protocols

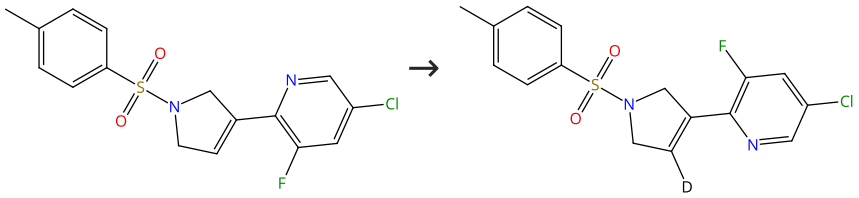
Ru-Catalyzed Enantioselective Hydrogenation of 2-Pyridyl-Substituted Alkenes and Substrate-Mediated H/D Exchange

By: Hao, Wei; et al

ACS Catalysis (2022), 12(2), 1150-1160.

Scheme 119 (1 Reaction)

Steps: **1**



31-614-CAS-29438488

Steps: **1**

1.1 **Reagents:** Methanol-d_4, Hydrogen
Catalysts: Ruthenium(1+), [1,1'-(4*S*)-[4,4'-bi-1,3-benzodioxole]-5,5'-diylbis[1,1-bis[3,5-bis(1,1-dimethylethyl)-4-methoxy phenyl]phosphine-κ*P*]]chloro[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]-, chloride (1:1); 20 psi, 25 °C

Experimental Protocols

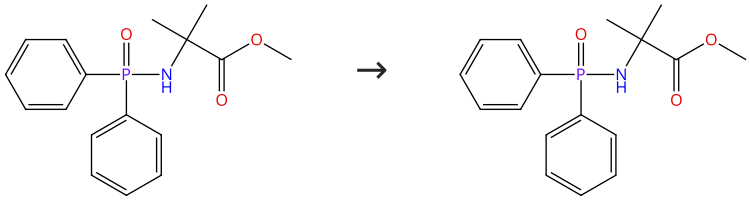
Ru-Catalyzed Enantioselective Hydrogenation of 2-Pyridyl-Substituted Alkenes and Substrate-Mediated H/D Exchange

By: Hao, Wei; et al

ACS Catalysis (2022), 12(2), 1150-1160.

Scheme 120 (1 Reaction)

Steps: **1**



31-614-CAS-31460471

Steps: **1**

1.1 **Reagents:** Silver acetate, Acetic acid-d_4, Oxygen
Catalysts: Silver hexafluoroantimonate, Dichloro[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium
Solvents: 1,2-Dichloroethane, Methanol-d_4; 30 min, 150 °C

Experimental Protocols

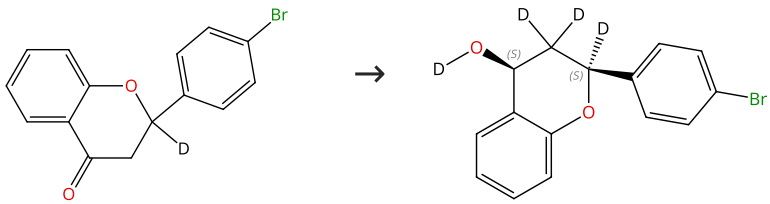
Microwave-Assisted Ruthenium- and Rhodium-Catalyzed Couplings of α-Amino Acid Ester-Derived Phosphinamides with Alkynes

By: Li, Xue-Hong; et al

Chemistry - An Asian Journal (2022), 17(2), e202101158.

Scheme 121 (1 Reaction)

Steps: **1**



Absolute stereochemistry shown

31-614-CAS-37448821

Steps: **1**

1.1 **Reagents:** Sodium formate, Methanol-d_4
Catalysts: Ruthenium (complexes with trimethylbenzene, Cl and copolymer of EGDMA-NIPMAM-viny...), 2973383-97-8 (ruthenium complexes with trimethylbenzene and Cl)
Solvents: Water-d_2; 40 °C

Experimental Protocols

Harmonization of an incompatible aqueous aldol condensation/oxa-Michael addition/reduction cascade process over a core-shell-structured thermoresponsive catalyst

By: Su, Yu; et al

Green Chemistry (2023), 25(17), 6859-6868.

Scheme 122 (1 Reaction)

Steps: **1**

Suppliers (5)

31-614-CAS-27186958

Steps: **1**

1.1 **Reagents:** Methanol-d_4
Catalysts: Benzoic acid, Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium), Zinc triflate
Solvents: 1,2-Dichloroethane; 12 h, 100 °C

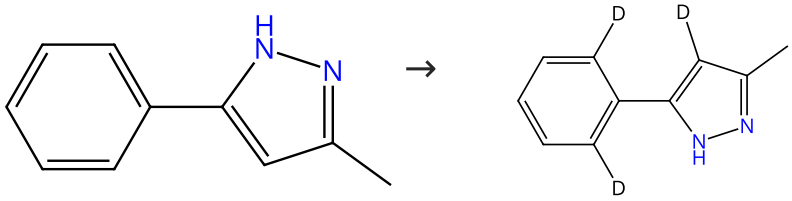
Ruthenium(II)-Catalyzed Regioselective [3 + 2] Spiroannulation of 2H-Imidazoles with 2-Alkynoates

By: Song, Zhenyu; et al

Organic Letters (2020), 22(16), 6272-6276.

Scheme 123 (1 Reaction)

Steps: **1**



Suppliers (76)

31-116-CAS-22738333

Steps: **1**

1.1 **Reagents:** Benzoic acid, Water-d_2
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Ethanol-d_6; 20 h, 120 °C

Experimental Protocols

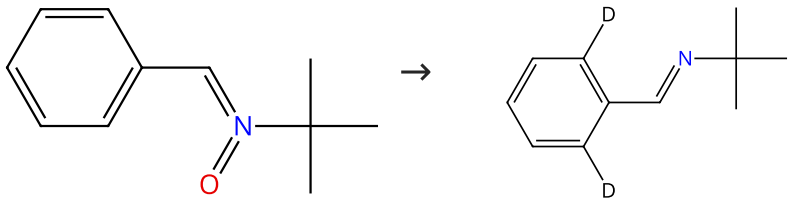
Ruthenium-catalyzed α-carbonyl sulfoxonium ylide annulations with aryl substituted pyrazoles via C-H/N-H bond functionalizations

By: Chen, Zhangpei; et al

Organic & Biomolecular Chemistry (2020), 18(41), 8486-8490.

Scheme 124 (1 Reaction)

Steps: **1**



Suppliers (82)

31-614-CAS-34216392

Steps: **1**

1.1 **Reagents:** Quinone, Cupric acetate, Methanol-d_4, Silver hexafluoroantimonate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 1 h, 100 °C

Experimental Protocols

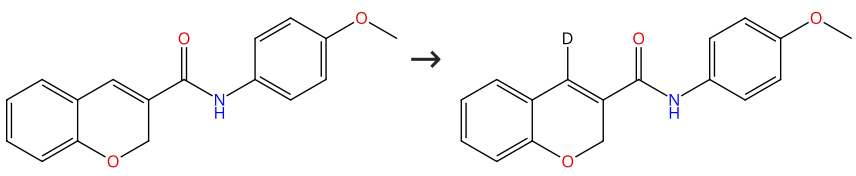
Synthesis of 2-arylethenesulfonyl fluorides and isoindolinones: Ru-catalyzed C-H activation of nitrones with ethenesulfonyl fluoride

By: Wang, Tong-Tong; et al

Chemical Communications (Cambridge, United Kingdom) (2022), 58(79), 11099-11102.

Scheme 125 (1 Reaction)

Steps: **1**



Suppliers (17)

31-116-CAS-17188542

Steps: **1**

1.1 **Reagents:** Methanol-d_4, Copper diacetate monohydrate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium), [1,1,1-Trifluoro-*N*-[(trifluoromethyl)sulfonyl-κ*O*]methanesulfonamidato-κ*O*]silver; 30 h, 70 °C

Experimental Protocols

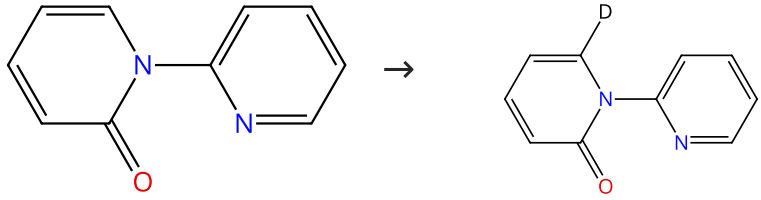
Ruthenium-Catalyzed Oxidative Annulation and Hydroarylation of Chromene-3-carboxamides with Alkynes via Double C-H Functionalization

By: Tulichala, R. N. Prasad; et al

Journal of Organic Chemistry (2017), 82(10), 5068-5079.

Scheme 126 (1 Reaction)

Steps: **1**



Suppliers (8)

31-116-CAS-21619170

Steps: **1**

1.1 **Reagents:** Methanol-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,1,1,3,3,3-Hexafluoro-2-propanol; 24 h, 60 °C

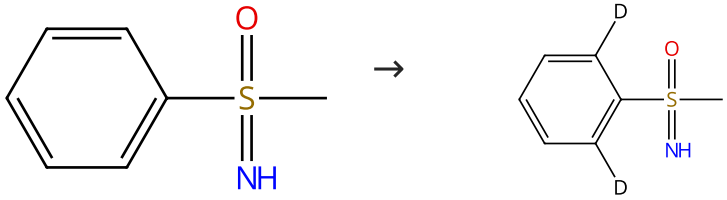
Ru(II)-catalyzed C6-selective C-H acylmethylation of pyridones using sulfoxonium ylides as carbene precursors

By: Fu, Yangjie; et al

RSC Advances (2020), 10(11), 6351-6355.

Scheme 127 (1 Reaction)

Steps: **1**



Suppliers (49)

31-116-CAS-19085640

Steps: **1**

1.1 **Reagents:** Pivalic acid, Methanol-*d*
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 12 h, 100 °C

Ru (II)-Catalyzed Coupling-Cyclization of Sulfoximines with alpha-Carbonyl Sulfoxonium Ylides as an Approach to 1,2-Benzothiazines

By: Xie, Haisheng; et al

Advanced Synthesis & Catalysis (2018), 360(18), 3534-3543.

Scheme 128 (1 Reaction)

Steps: **1**

Suppliers (63)

31-614-CAS-35205436

Steps: **1**

1.1 **Reagents:** Methanol-d_4
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Acetonitrile; 5 h, 100 °C

Experimental Protocols

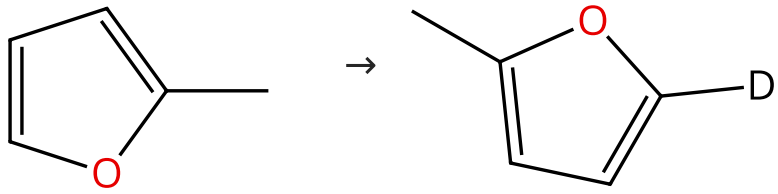
Selective Synthesis of Pyrazolonyl Spirodihydroquinolines or Pyrazolonyl Spiroindolines under Aerobic or Anaerobic Conditions

By: Yu, Caiyun; et al

Organic Letters (2022), 24(51), 9473-9478.

Scheme 129 (1 Reaction)

Steps: **1**



Suppliers (62)

Supplier (1)

31-116-CAS-1482567

Steps: **1**

1.1 **Reagents:** 2-Propan-*1,1,1,2,3,3,3-*d_7-ol-*d*
Catalysts: Ruthenium, Carbon, Ruthenium dioxide
Solvents: Toluene; 5 h, 300 psi, 140 °C

Experimental Protocols

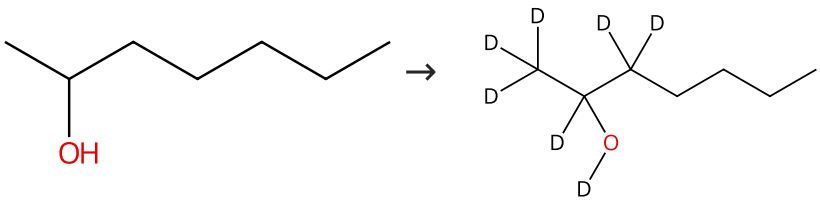
Ring Activation of Furanic Compounds on Ruthenium-Based Catalysts

By: Mironenko, Alexander V.; et al

Journal of Physical Chemistry C (2015), 119(11), 6075-6085.

Scheme 130 (1 Reaction)

Steps: **1**



Suppliers (83)

31-116-CAS-14459573

Steps: **1**

1.1 **Reagents:** 2-Propan-*1,1,1,2,3,3,3-*d_7-ol-*d*
Catalysts: Potassium *tert*-butoxide, (*OC*-6-23)-[2-[6-[(Amino-κ*N*)methyl]-2-pyridinyl-κ*N*]-5-methylphenyl-κ*C*][1,1'-(1,4-butanediyl)bis[1,1-diphenylphosphine-κ*P*]]chlororuthenium
Solvents: 2-Propan-*1,1,1,2,3,3,3-*d_7-ol-*d*; 4 h, 70 °C

Experimental Protocols

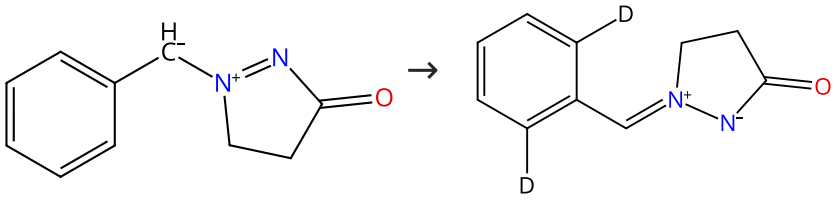
Pincer Ru and Os complexes as efficient catalysts for racemization and deuteration of alcohols

By: Bossi, Gianluca; et al

Dalton Transactions (2011), 40(35), 8986-8995.

Scheme 131 (1 Reaction)

Steps: **1**



Suppliers (3)

31-614-CAS-37788093

Steps: **1**

1.1 **Reagents:** Methanol-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 20 min, rt

Experimental Protocols

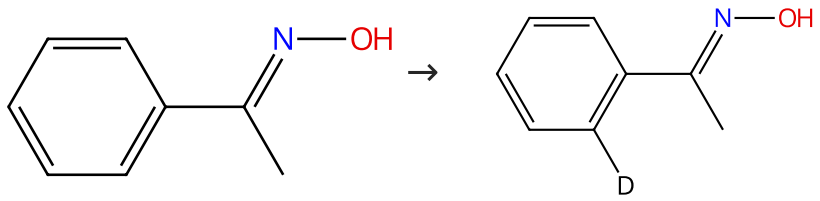
Ru(II)-catalyzed synthesis of indolo[2,3-c]isoquinolines via [3+3] annulation of N,N'-cyclic azomethine ylides and 3-diazoindolin-2-imines

By: Valapil, Durgesh Gurukkala; et al

New Journal of Chemistry (2023), 47(37), 17586-17591.

Scheme 132 (2 Reactions)

Steps: **1**



Suppliers (59)

31-116-CAS-21788661

Steps: **1**

1.1 **Catalysts:** Potassium hexafluorophosphate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Methanol-d_4; 5 h, 90 °C

Experimental Protocols

Ru(II)-Catalyzed C-H Functionalization of N-Hydroxyoximes with 1,3-Diynes Unveils a Regioselective Disparity

By: Kumar, Shreemoyee; et al

Organic Letters (2020), 22(6), 2141-2146.

31-116-CAS-3372179

Steps: **1**

1.1 **Catalysts:** Potassium hexafluorophosphate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Methanol-*d*; 24 h, 60 °C

Experimental Protocols

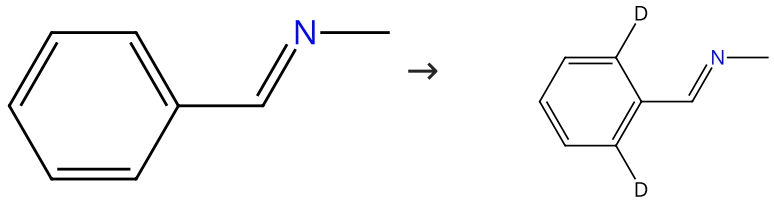
Cationic Ruthenium Catalysts for Alkyne Annulations with Oximes by C-H/N-O Functionalizations

By: Kornhaass, Christoph; et al

Journal of Organic Chemistry (2012), 77(20), 9190-9198.

Scheme 133 (1 Reaction)

Steps: **1**



Suppliers (59)

31-116-CAS-4012553 Steps: 1

1.1 **Reagents:** Methanol-d_4
Catalysts: Dichloro(1,3-dibutyl-1,3-dihydro-2*H*-imidazol-2-ylidene)[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium; 10 h, 120 °C

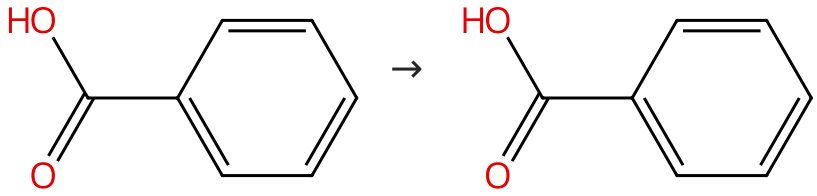
Experimental Protocols

(η^6-Arene)ruthenium(N-heterocyclic carbene) Complexes for the Chelation-Assisted Arylation and Deuteration of Arylpyridines: Catalytic Studies and Mechanistic Insights

By: Prades, Amparo; et al

Advanced Synthesis & Catalysis (2010), 352(7), 1155-1162.

Scheme 134 (1 Reaction) Steps: **1**



Suppliers (192)

31-614-CAS-41630873 Steps: 1

1.1 **Reagents:** Methanol-d_4, Tripotassium phosphate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 3 h, 60 °C

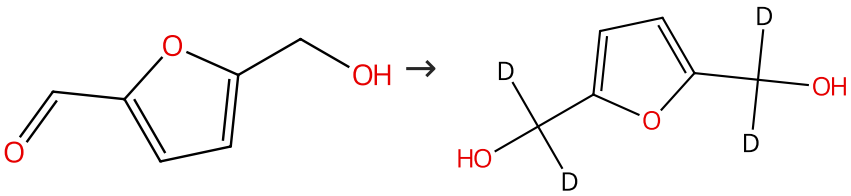
Experimental Protocols

Ru(II)-Catalyzed Decarboxylative (4 + 2)-Annulation of Benzoic Acids and Benzamides with Propargyl Cyclic Carbonates

By: Jana, Debasish; et al

Organic Letters (2024), 26(36), 7590-7595.

Scheme 135 (1 Reaction) Steps: **1**



Suppliers (130)

31-614-CAS-35498688 Steps: 1

1.1 **Reagents:** Ethanol-d_6
Catalysts: (*OC*-6-13)-Carbonyl[2-(diphenylphosphino-κ*P*)-*N*-[2-(diphenylphosphino-κ*P*)ethyl]ethanamine-κ*N*][tetrahydroborato(1-)-κ*H*]ruthenium; 24 h, 80 °C

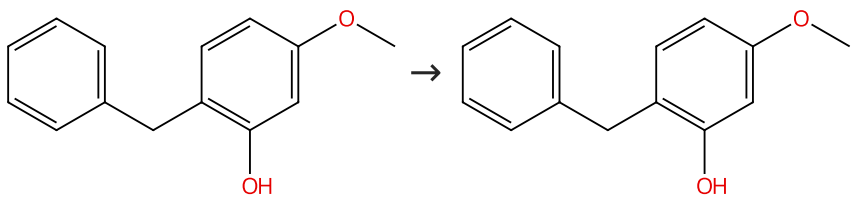
Experimental Protocols

Catalytic Base-Free Transfer Hydrogenation of Biomass Derived Furanic Aldehydes with Bioalcohols and PNP Pincer Complexes

By: Padilla, Rosa; et al

ChemCatChem (2023), 15(2), e202200819.

Scheme 136 (1 Reaction) Steps: **1**



Suppliers (10)

31-614-CAS-31523326 Steps: **1**

1.1 **Reagents:** 2-Propan-*1,1,1,2,3,3,3-d*$_7$-ol-*d*
Catalysts: Ruthenium(1+), carbonylhydro(η^6-benzene)(tricyclohexylphosphine)-, tetrafluoroborate(1-) (1:1)
Solvents: 1,2-Dichloroethane; 12 h, 120 °C

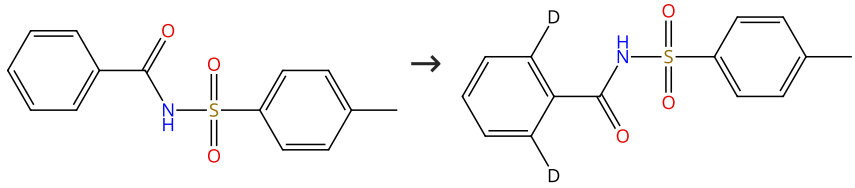
Experimental Protocols

Experimental and Computational Studies on the Ruthenium-Catalyzed Dehydrative C-H Coupling of Phenols with Aldehydes for the Synthesis of 2-Alkylphenol, Benzofuran and Xanthene Derivatives

By: Pannilawithana, Nuwan; et al

Journal of the American Chemical Society (2021), 143(33), 13428-13440.

Scheme 137 (1 Reaction) Steps: **1**



Suppliers (50)

31-116-CAS-23644211 Steps: **1**

1.1 **Reagents:** Sodium acetate, Methanol-*d*$_4$
Catalysts: Potassium hexafluorophosphate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 3 h, 70 °C

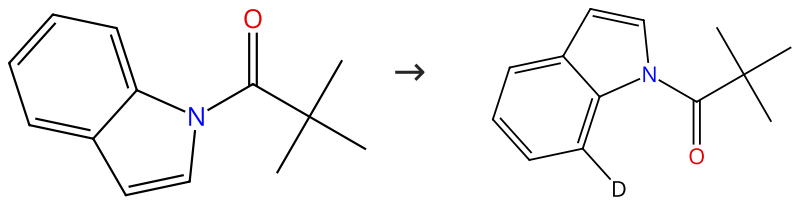
Experimental Protocols

Ru(II)-catalyzed allenylation and sequential annulation of N-tosylbenzamides with propargyl alcohols

By: Kumar, Shreemoyee; et al

Chemical Communications (Cambridge, United Kingdom) (2021), 57(51), 6280-6283.

Scheme 138 (1 Reaction) Steps: **1**



Suppliers (8)

31-116-CAS-23185189 Steps: **1**

1.1 **Reagents:** Pivalic acid, 2-Propan-*2-d*-ol-*d*, 1,1,1,3,3,3-hexafluoro-
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium); 24 h, 25 °C

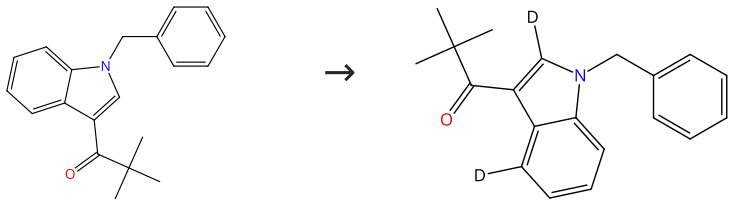
Experimental Protocols

Ruthenium(II)-Catalyzed Direct C7-Selective Amidation of Indoles with Dioxazolones at Room Temper ature

By: Sheng, Yaoguang; et al

Journal of Organic Chemistry (2021), 86(3), 2827-2839.

Scheme 139 (1 Reaction) Steps: **1**



Suppliers (3)

31-614-CAS-42417801 Steps: **1**

1.1 **Reagents:** 2,4,6-Trimethylbenzoic acid, Methanol-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,1,1,3,3,3-Hexafluoro-2-propanol; 6 h, 80 °C

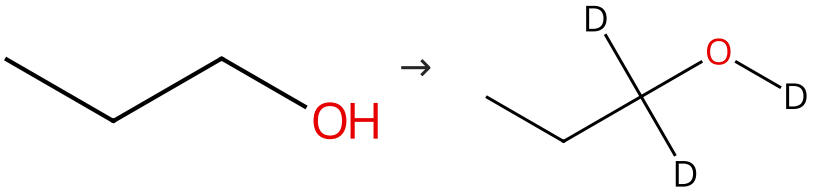
1.2 **Reagents:** Sodium bicarbonate
Solvents: Water

Ru(II)-Catalyzed Weak Chelation-Assisted Regioselective C4-H Aminomethyl Alkenylation of Indole

By: Raziullah; et al

Advanced Synthesis & Catalysis (2025), 367(1), e202400863.

Scheme 140 (1 Reaction) Steps: **1**



Suppliers (169)

31-116-CAS-5532996 Steps: **1**

1.1 **Reagents:** 2-Propan-*1,1,1,2,3,3,3-d*$_7$-ol-*d*
Catalysts: Potassium *tert*-butoxide, (*OC*-6-23)-[2-[6-[(Amino-κ*N*)methyl]-2-pyridinyl-κ*N*]-5-methylphenyl-κ*C*][1,1'-(1,4-butanediyl)bis[1,1-diphenylphosphine-κ*P*]]chlororuthenium
Solvents: 2-Propan-*1,1,1,2,3,3,3-d*$_7$-ol-*d*; 1 h, 50 °C

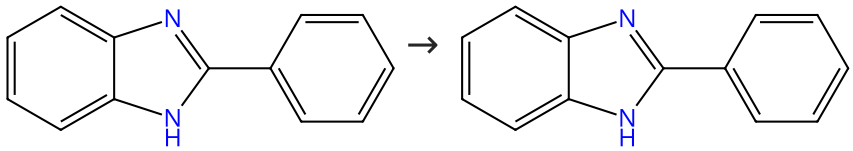
Experimental Protocols

Pincer Ru and Os complexes as efficient catalysts for racemization and deuteration of alcohols

By: Bossi, Gianluca; et al

Dalton Transactions (2011), 40(35), 8986-8995.

Scheme 141 (1 Reaction) Steps: **1**



Suppliers (78)

31-614-CAS-34645544 Steps: **1**

1.1 **Reagents:** Methanol-d_4, Propanoic acid, 2,2-dimethyl-, cesium salt (1:1)
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 2,2,2-Trifluoroethanol; 1 h, 65 °C

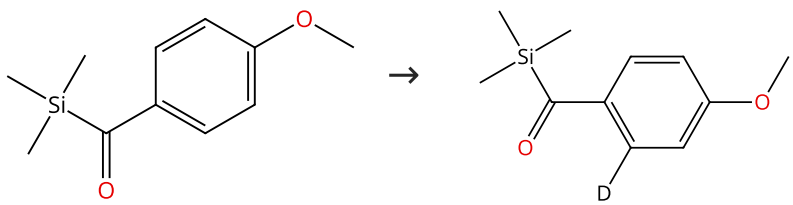
Experimental Protocols

Ru(II)-Catalyzed C-H Functionalization of 2-Arylbenzimidazoles with Iodonium Ylides: A Straightforward Access to Bridgehead Polycyclic N-Heterocycles

By: Nunewar, Saiprasad; et al

Journal of Organic Chemistry (2022), 87(21), 13757-13762.

Scheme 142 (1 Reaction) Steps: **1**



Suppliers (4)

31-614-CAS-42504509 Steps: **1**

1.1 **Reagents:** Cupric acetate
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 5 min, rt

1.2 **Reagents:** Methanol-d_4
Solvents: 1,2-Dichloroethane; 4 h, 60 °C

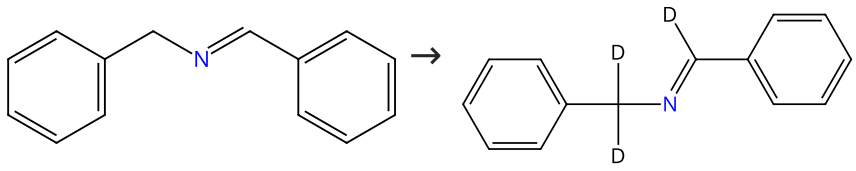
Experimental Protocols

Benzocyclobutenone synthesis exploiting acylsilanes as photofunctional directing groups

By: Pilkington, Rowan L.; et al

Chemical Science (2024), 15(46), 19328-19335.

Scheme 143 (1 Reaction) Steps: **1**



Suppliers (48)

31-614-CAS-35215256 Steps: **1**

1.1 **Reagents:** Methanol-d_4
Catalysts: Zirconium dioxide, Ruthenium; 4 h, 120 °C

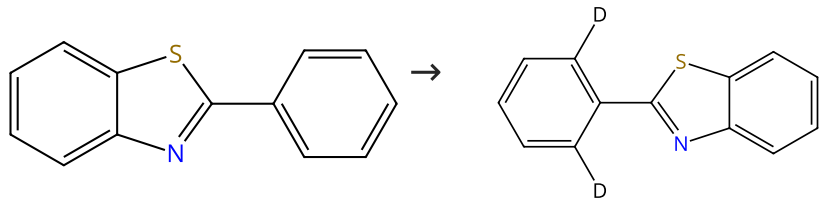
Experimental Protocols

Switching Amine Oxidation from Imines to Nitriles by Carbon-Hydrogen Bond Activation via Strong Base Modified Strategy

By: Zhu, Guozhi; et al

ACS Applied Materials & Interfaces (2022), 14(47), 52758-52765.

Scheme 144 (1 Reaction) Steps: **1**



Suppliers (77)

31-614-CAS-40258837 Steps: **1**

1.1 **Reagents:** Methanol-d_4
Catalysts: Pivalic acid, Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Water; 1 min, 140 °C

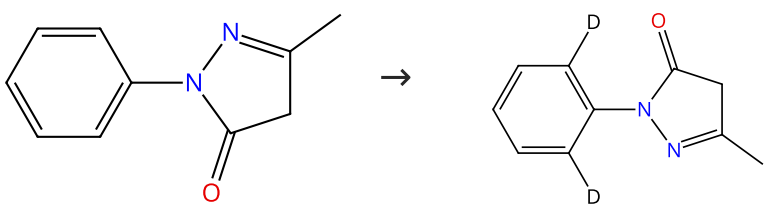
Experimental Protocols

Microwave-Assisted Ru(II)-Catalyzed Regioselective Methyl Acylation of 2-Arylbenzoazoles: Synthesis of Benzofuran Conjugates via C-H Activation/Annulation

By: Dastari, Sowmya; et al

Journal of Organic Chemistry (2024), 89(10), 7027-7035.

Scheme 145 (1 Reaction) Steps: **1**



Suppliers (131)

31-116-CAS-18947318 Steps: **1**

1.1 **Reagents:** Cupric acetate
Catalysts: (±)-1,1'-Binaphthyl-2,2'-diamine, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Methanol-d_4; 24 h, 64 °C

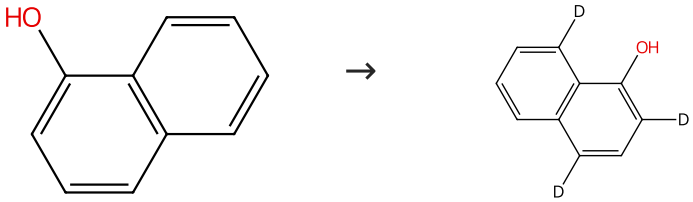
Experimental Protocols

Ru(II)-Catalyzed and Ligand-Controlled C-H Activation and Annulation via 1,2-Phenyl Shift: Synthesis of Quaternary Carbon-Centered Pyrimidoindolones

By: Baruah, Swagata; et al

Organic Letters (2018), 20(13), 3753-3757.

Scheme 146 (1 Reaction) Steps: **1**



Suppliers (132)

31-116-CAS-23873778 Steps: **1**

1.1 **Reagents:** Potassium acetate, Cupric acetate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Dichloromethane, Methanol-*d*; 16 h, 100 °C

1.2 **Solvents:** Water; rt

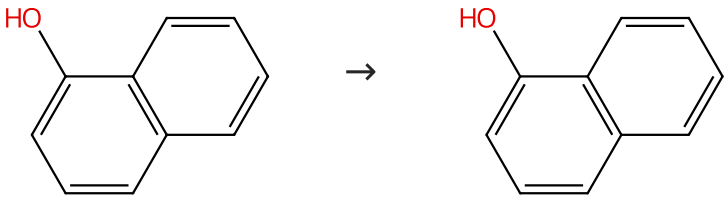
Experimental Protocols

Hydroxyl-Directed Ruthenium-Catalyzed peri-Selective C-H Acylmethylation and Annulation of Naphthols with Sulfoxonium Ylides

By: Ma, Wenbo; et al

Organic Letters (2021), 23(16), 6200-6205.

Scheme 147 (1 Reaction) Steps: **1**



Suppliers (132)

31-614-CAS-34405507 Steps: **1**

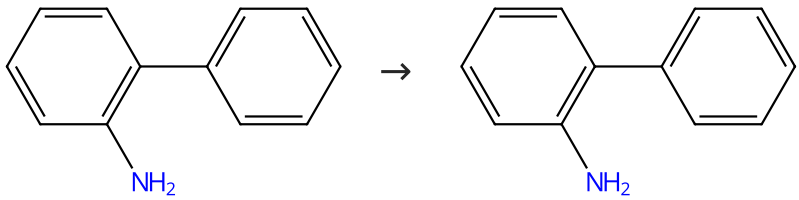
1.1 **Reagents:** Methanol-d_4, Propanoic acid, 2,2-dimethyl-, potassium salt (1:1)
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 16 h, 100 °C

Ruthenium-Catalyzed Hydroxyl-Directed peri-Selective C-H Activation and Annulation of 1-Naphthols with CF_3-Imidoyl Sulfoxonium Ylides for the Synthesis of 2-(Trifluoromethyl)-2,3-dihydrobenzo[de]chromen-2-amines

By: Yang, Zuguang; et al

Organic Letters (2022), 24(40), 7288-7293.

Scheme 148 (1 Reaction) Steps: **1**



Suppliers (70)

31-614-CAS-26626724 Steps: **1**

1.1 **Reagents:** Acetic acid, Methanol-d_4
Catalysts: Silver triflate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Tetrahydrofuran; 2 h, 60 °C

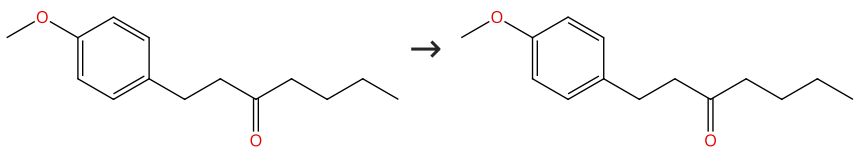
1.2 **Reagents:** Sodium bicarbonate
Solvents: Water

Selective Synthesis of Dihydrophenanthridine and Phenanthridine Derivatives from the Cascade Reactions of o-Arylanilines with Alkynoates through C-H/N-H/C-C Bond Cleavage

By: Xu, Yuanshuang; et al

Journal of Organic Chemistry (2021), 86(8), 5805-5819.

Scheme 149 (1 Reaction) Steps: **1**



Suppliers (10)

31-614-CAS-39366732 Steps: **1**

1.1 **Reagents:** 2-Propan-*1,1,1,2,3,3,3-d*$_7$-ol-*d*
Catalysts: *o*-Chloranil, Ruthenium(1+), carbonylhydro(η^6-benzene)(tricyclohexylphosphine)-, tetrafluoroborate(1-) (1:1)
Solvents: 1,4-Dioxane; 20 h, 135 °C

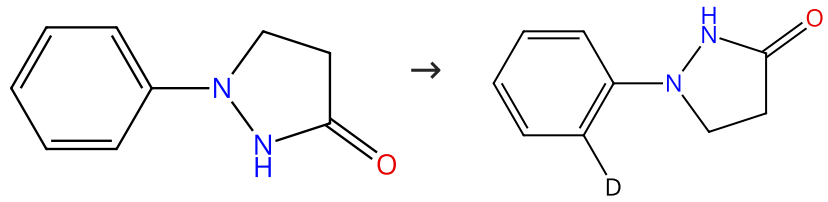
Experimental Protocols

Scope and Mechanism of the Ruthenium-Catalyzed Deaminative Coupling Reaction of Enones with Amines via Regioselective C_α-C_β Bond Cleavage

By: Thennakoon, Dulanjali S.; et al

Organometallics (2023), 42(19), 2867-2880.

Scheme 150 (1 Reaction) Steps: **1**



Suppliers (92)

31-614-CAS-34386271 Steps: **1**

1.1 **Reagents:** Methanol-d_4
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Chlorobenzene; 30 min, 100 °C

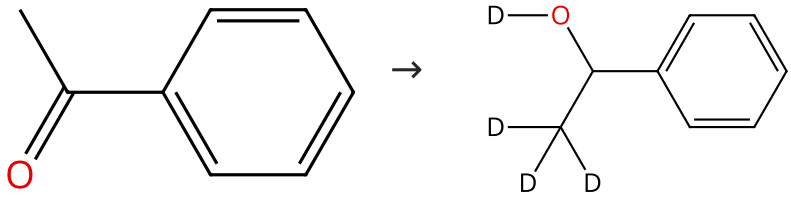
Experimental Protocols

Regioselective Dichotomy in Ru(II)-Catalyzed C-H Annulation of Aryl Pyrazolidinones with 1,3-Diynes

By: Sontakke, Geetanjali S.; et al

Journal of Organic Chemistry (2022), 87(21), 14103-14114.

Scheme 151 (1 Reaction) Steps: **1**



Suppliers (109) Supplier (1)

31-116-CAS-14366935 Steps: **1**

1.1 **Catalysts:** Dichlorotris(triphenylphosphine)ruthenium, (2*R*,2'*R*)-1,1'-Bis[(4*S*)-4-(1,1-dimethylethyl)-4,5-dihydro-2-oxazolyl]-2,2'-bis(diphenylphosphino)ruthenocene
Solvents: Isopropanol; 1 h, reflux; reflux → 0 °C

1.2 **Reagents:** Potassium *tert*-butoxide, Hydrogen
Solvents: 2-Propan-*1,1,1,2,3,3,3*-d_7-ol-*d*; 10 atm, 0 °C

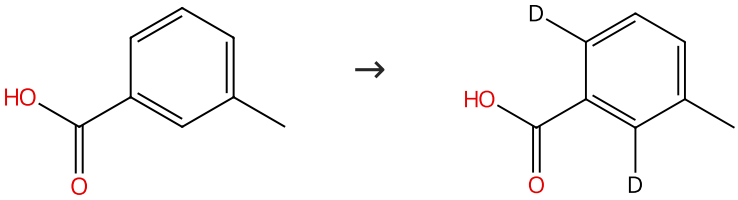
Experimental Protocols

Efficient Ru(II)-catalyzed asymmetric hydrogenation of simple ketones with C_2-symmetric planar chiral metallocenyl phosphinooxazoline ligands

By: Guo, Hui; et al

Tetrahedron (2012), 68(16), 3295-3299.

Scheme 152 (1 Reaction) Steps: **1**



Suppliers (91)

31-614-CAS-32979104 Steps: **1**

1.1 **Reagents:** Triethylamine, Methanol-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Acetonitrile; 24 h, 100 °C

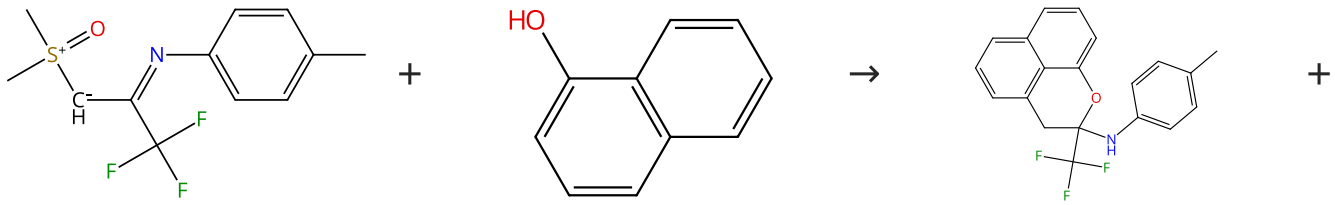
Experimental Protocols

Ruthenium(II)-catalyzed synthesis of CF_3-isoquinolinones via C-H activation/annulation of benzoic acids and CF_3-imidoyl sulfoxonium ylides

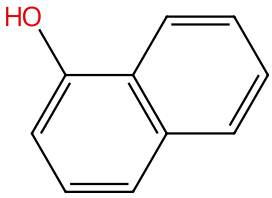
By: Wen, Si; et al

Organic Chemistry Frontiers (2022), 9(16), 4388-4393.

Scheme 153 (1 Reaction) Steps: **1** Yield: **90%**



Suppliers (132)



31-614-CAS-34405505 Steps: **1** Yield: **90%**

1.1 **Reagents:** Methanol-d_4, Propanoic acid, 2,2-dimethyl-, potassium salt (1:1)
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 16 h, 100 °C

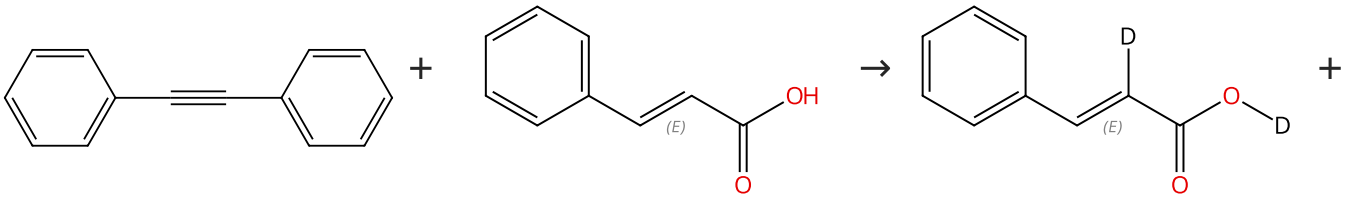
Ruthenium-Catalyzed Hydroxyl-Directed peri-Selective C-H Activation and Annulation of 1-Naphthols with CF_3-Imidoyl Sulfoxonium Ylides for the Synthesis of 2-(Trifluoromethyl)-2,3-dihydrobenzo[de]chromen-2-amines

By: Yang, Zuguang; et al

Organic Letters (2022), 24(40), 7288-7293.

Scheme 154 (1 Reaction)

Steps: **1** Yield: **78%**

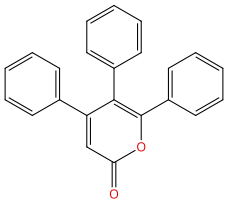


Suppliers (88)

Double bond geometry shown

Suppliers (163)

Double bond geometry shown



Suppliers (5)

31-116-CAS-2558522

Steps: **1** Yield: **78%**

1.1 **Reagents:** Cupric acetate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Methanol-d_4; 20 h, 64 °C

Experimental Protocols

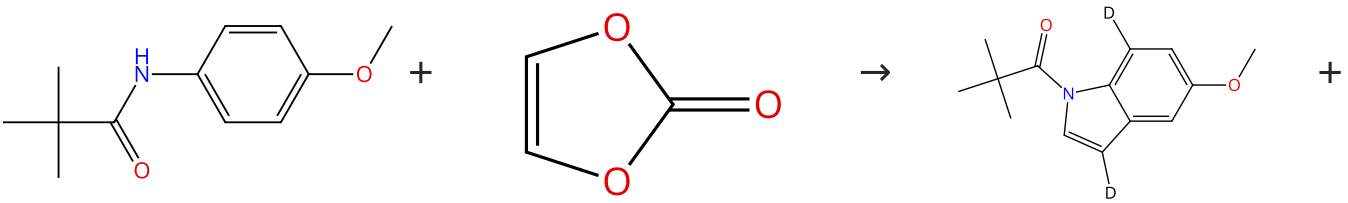
Ruthenium(II)-Catalyzed Alkene C-H Bond Functionalization on Cinnamic Acids: A Facile Synthesis of Versatile α-Pyrones

By: Prakash, Rashmi; et al

Organic Letters (2015), 17(21), 5264-5267.

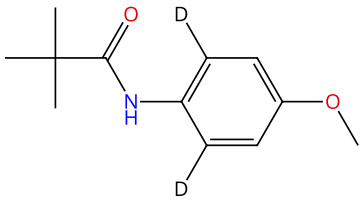
Scheme 155 (1 Reaction)

Steps: **1** Yield: **77%**



Suppliers (28)

Suppliers (74)



31-614-CAS-30037593

Steps: **1** Yield: **77%**

1.1 **Reagents:** Zinc acetate, Methanol-*d*
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dimethoxyethane; 24 h, 80 °C

1.2 **Solvents:** Water; rt

Experimental Protocols

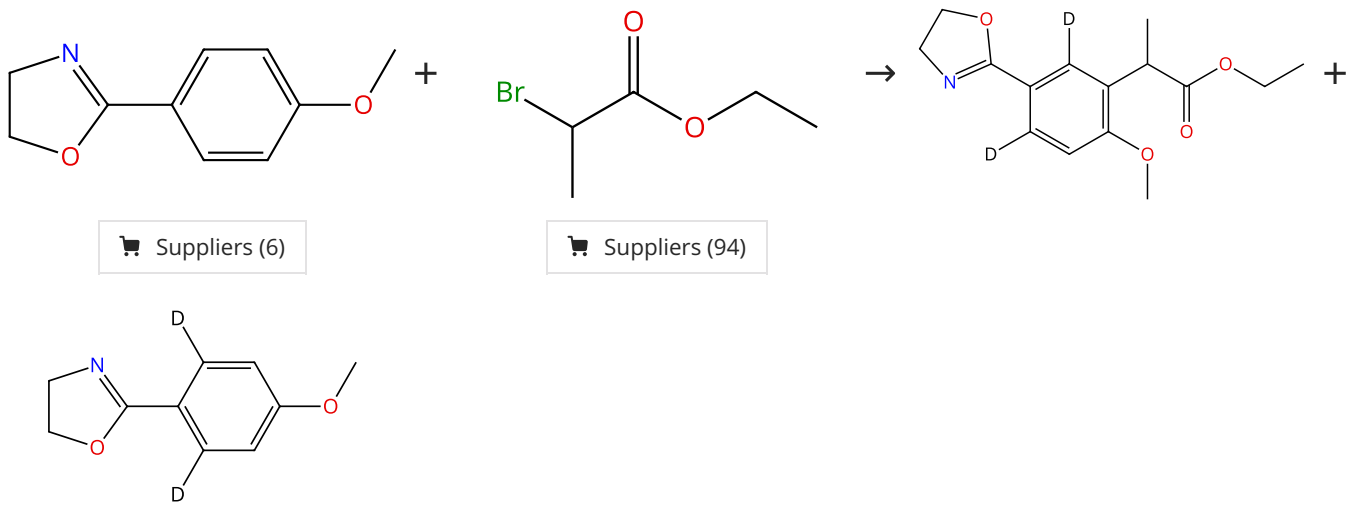
Ruthenium-Catalyzed Vinylene Carbonate Annulation by C-H/N-H Functionalizations: Step-Economical Access to Indoles

By: Yu, Yao; et al

Advanced Synthesis & Catalysis (2022), 364(4), 838-844.

Scheme 156 (1 Reaction)

Steps: **1** Yield: **71%**



Suppliers (6)

Suppliers (94)

31-085-CAS-22785776

Steps: **1** Yield: **71%**

1.1 **Reagents:** Potassium acetate, Methanol-d_4
Catalysts: Triphenylphosphine, Polystyrene (catalyst support), Bis(dichloro(η^6-*p*-cymene)ruthenium) (polymer-supported)
Solvents: 2-Methyltetrahydrofuran; 24 h, 60 °C

Experimental Protocols

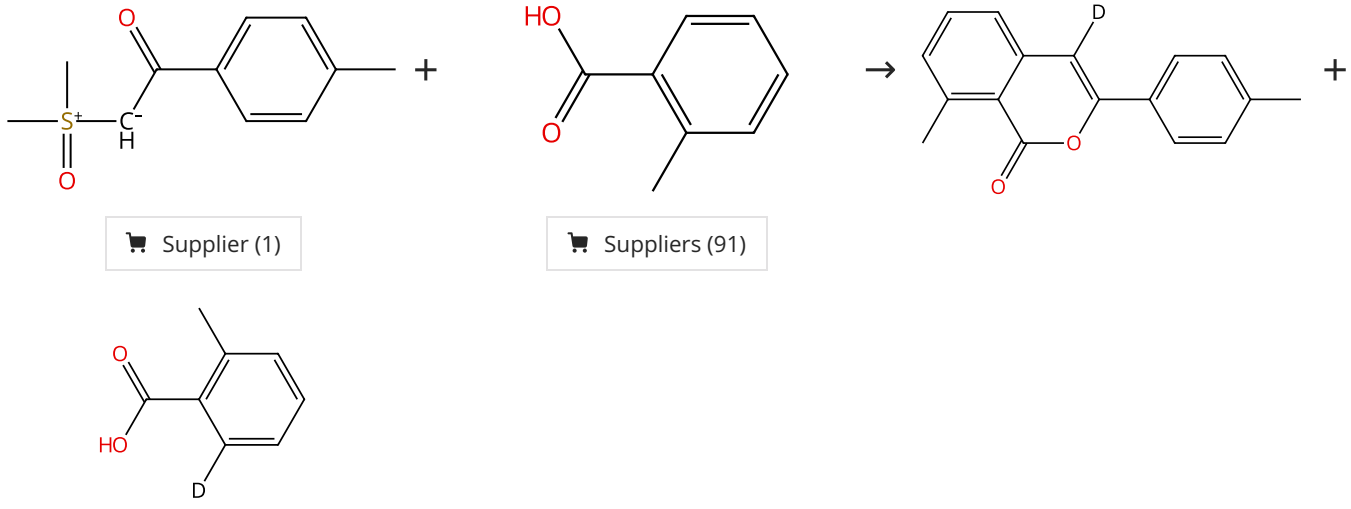
Recyclable Ruthenium Catalyst for Distal meta- C-H Activation

By: Choi, Isaac; et al

Chemistry - A European Journal (2020), 26(66), 15290-15297.

Scheme 157 (1 Reaction)

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



Supplier (1)

Suppliers (91)

Suppliers (3)

31-116-CAS-19732601

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

1.1 **Reagents:** Triethylamine, Methanol-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 2 h, 100 °C

Experimental Protocols

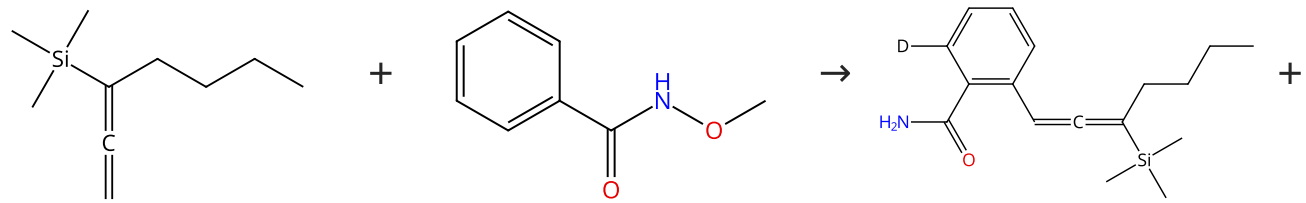
Ruthenium(IV) Intermediates in C-H Activation/Annulation by Weak O-Coordination

By: Liang, Yu-Feng; et al

Chemistry - A European Journal (2018), 24(62), 16548-16552.

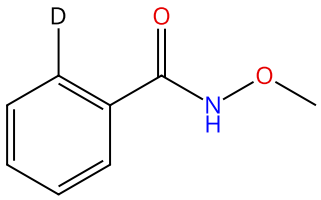
Scheme 158 (1 Reaction)

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



Suppliers (3)

Suppliers (49)



Supplier (1)

31-116-CAS-8063143

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

1.1 **Reagents:** Methanol-d_4
Catalysts: Sodium acetate, Bis(dichloro(η^6-*p*-cymene) ruthenium); 18 h, 22 °C

Experimental Protocols

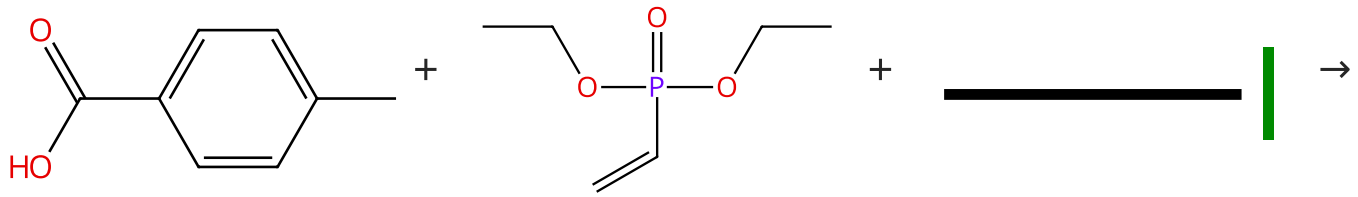
Ruthenium(II)-Catalyzed C-H Functionalizations with Allenes: Versatile Allenylations and Allylations

By: Nakanowatari, Sachiyo; et al

Chemistry - A European Journal (2015), 21(45), 16246-16251.

Scheme 159 (1 Reaction)

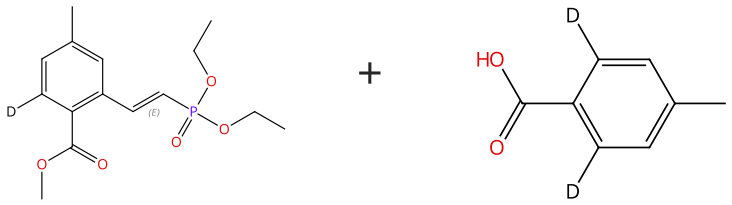
Steps: **1** Yield: **64%**



Suppliers (103)

Suppliers (75)

Suppliers (94)



Double bond geometry shown

31-017-CAS-20448565

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

1.1 **Reagents:** Oxygen
Catalysts: Cupric acetate, Bis(dichloro(η^6-*p*-cymene) ruthenium)
Solvents: Methanol; 24 h, 100 °C; 100 °C → rt

1.2 **Reagents:** Methanol-d_4
Catalysts: Cupric acetate; 8 h, 100 °C

1.3 **Reagents:** Potassium carbonate
Solvents: Acetonitrile; 4 h, rt

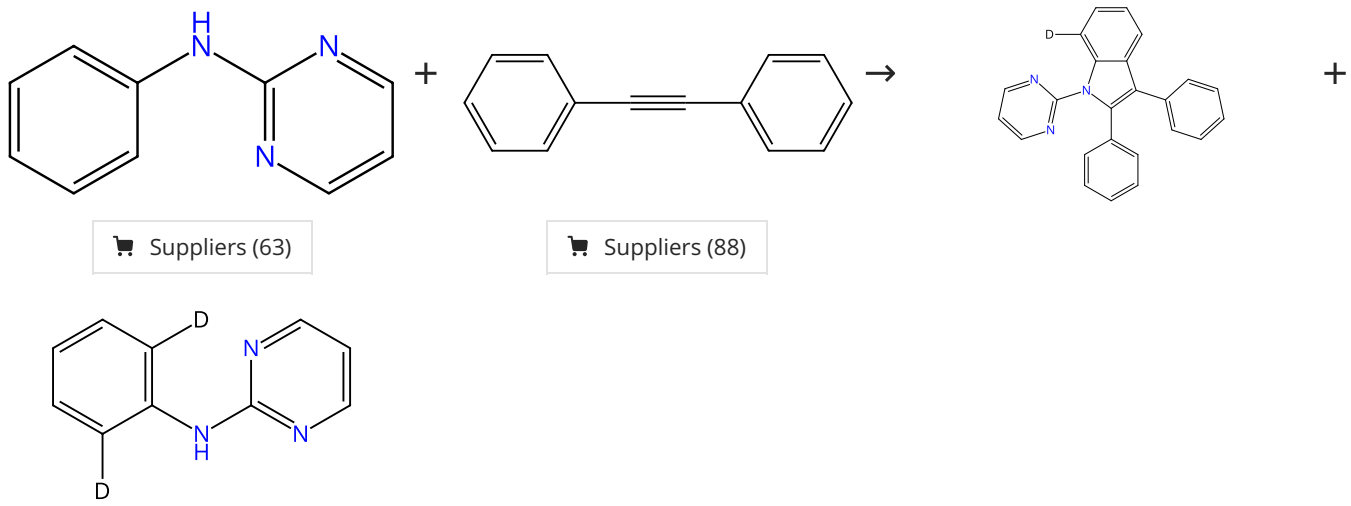
Streamlined Ruthenium(II) Catalysis for One-Pot 2-fold Unsymmetrical C-H Olefination of (Hetero)Arenes

By: Mandal, Anup; et al

Organic Letters (2019), 21(15), 5879-5883.

Scheme 160 (1 Reaction)

Steps: **1** Yield: **60%**



Suppliers (63)

Suppliers (88)

31-116-CAS-19225358

Steps: **1** Yield: **60%**

1.1 **Reagents:** 2-Propan-*1,1,1,2,3,3,3-d*$_7$-ol-*d*
Catalysts: Sodium acetate, Potassium hexafluorophosphate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Water-*d*$_2$; 30 min, reflux

Experimental Protocols

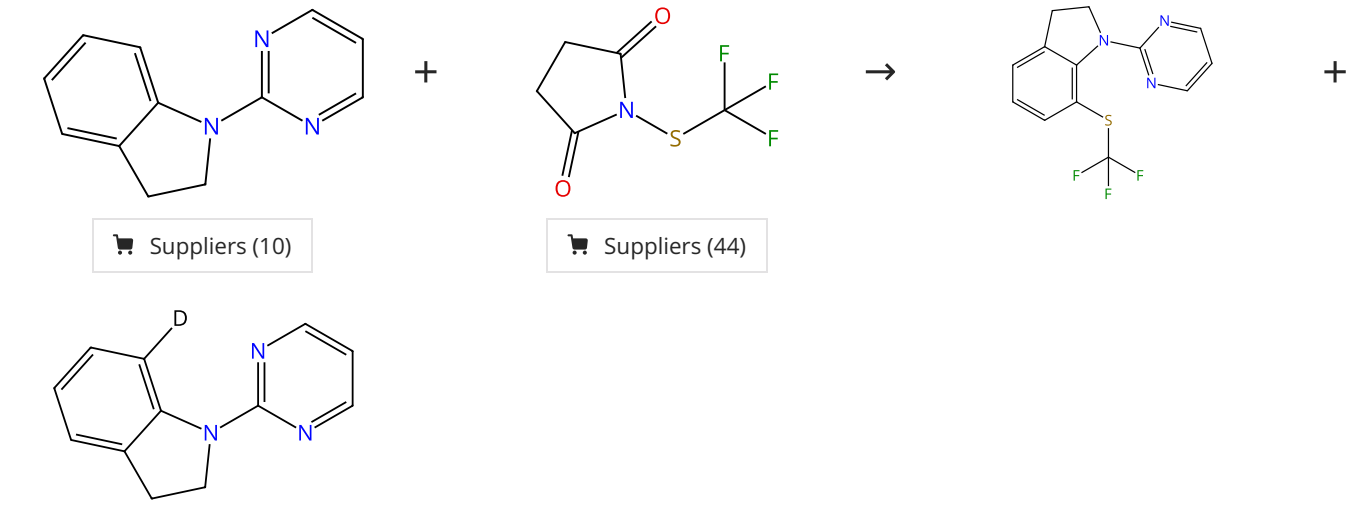
Ruthenium-Catalyzed Electrochemical Dehydrogenative Alkyne Annulation

By: Xu, Fan; et al

ACS Catalysis (2018), 8(5), 3820-3824.

Scheme 161 (1 Reaction)

Steps: **1** Yield: **58%**



Suppliers (10)

Suppliers (44)

31-614-CAS-42086605

Steps: **1** Yield: **58%**

1.1 **Reagents:** Acetic acid-*d*$_4$
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 2,2,2-Trifluoroethan-*1,1-d*$_2$-ol-*d*; 3 h, 100 °C

Experimental Protocols

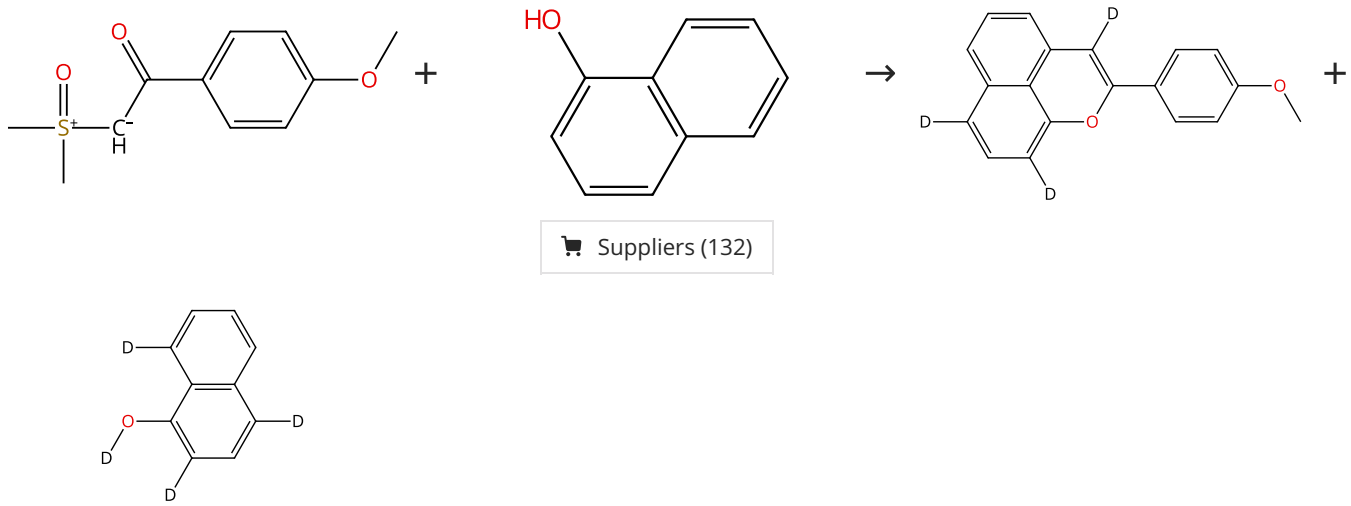
Ru(II)-catalyzed C7 trifluoromethylthiolation and thioarylation of indolines using bench-stable reagents

By: Sumit; et al

Journal of Organic Chemistry (2024), 89(21), 15893-15900.

Scheme 162 (1 Reaction)

Steps: **1** Yield: **53%**



Suppliers (132)

31-116-CAS-23873286

Steps: **1** Yield: **53%**

1.1 **Reagents:** Potassium acetate, Cupric acetate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Dichloromethane, Methanol-*d*; 16 h, 100 °C

1.2 **Reagents:** Trifluoromethanesulfonic anhydride; 2 h, rt

1.3 **Solvents:** Water; rt

Experimental Protocols

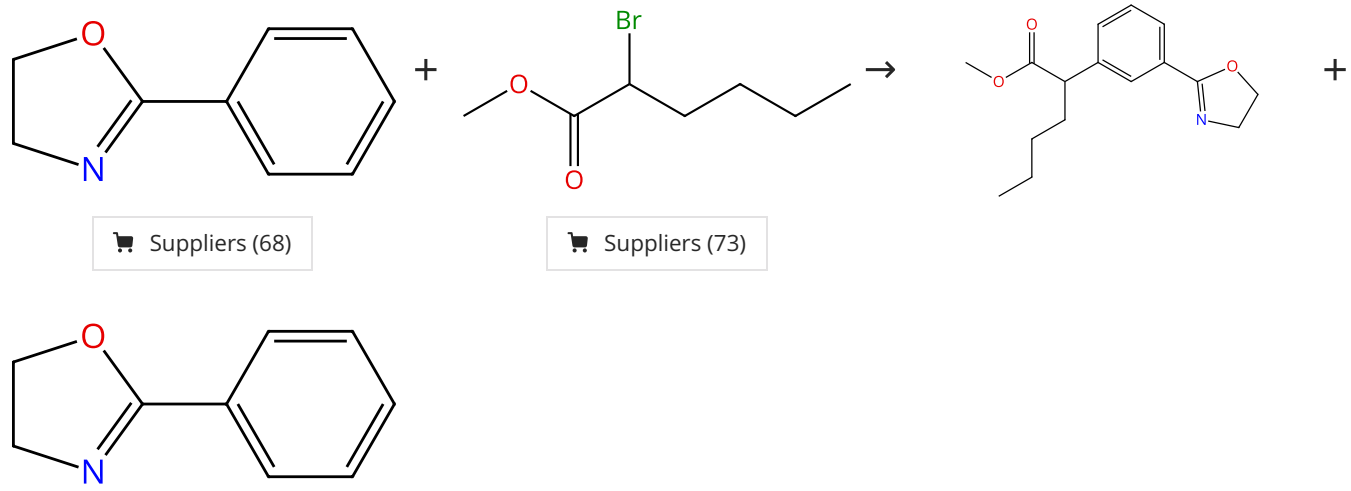
Hydroxyl-Directed Ruthenium-Catalyzed peri-Selective C-H Acylmethylation and Annulation of Naphthols with Sulfox onium Ylides

By: Ma, Wenbo; et al

Organic Letters (2021), 23(16), 6200-6205.

Scheme 163 (1 Reaction)

Steps: **1** Yield: **53%**



Suppliers (68)

Suppliers (73)

31-614-CAS-26574156

Steps: **1** Yield: **53%**

1.1 **Reagents:** Potassium carbonate, Methanol-d_4
Catalysts: Triphenylphosphine, [(1,2,3,4,5,6-η)-1-Methyl-4-(1-methylethyl)benzene](2,4,6-trimethylbenzoato-κ*O*)(2,4,6-trimethylbenzoato-κ*O*,κ*O*')ruthenium
Solvents: 1,4-Dioxane; 4 h, 60 °C

Experimental Protocols

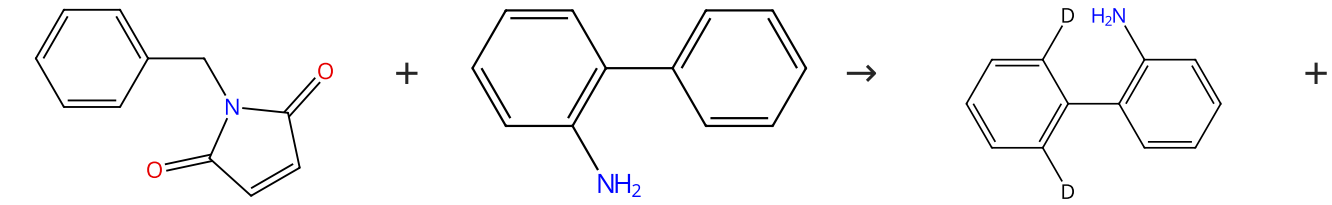
Sequential meta-/ortho-C-H Functionalizations by One-Pot Ruthenium(II/III) Catalysis

By: Korvorapun, Korkit; et al

ACS Catalysis (2018), 8(2), 886-892.

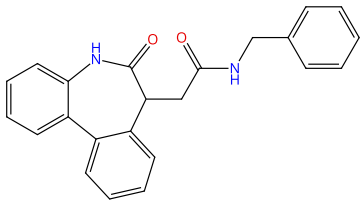
Scheme 164 (1 Reaction)

Steps: **1** Yield: **52%**



Suppliers (100)

Suppliers (70)



31-614-CAS-30681514

Steps: **1** Yield: **52%**

1.1 **Reagents:** Acetic acid, 1-Adamantanecarboxylic acid, Methanol-*d*
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Tetrahydrofuran; 36 h, 80 °C

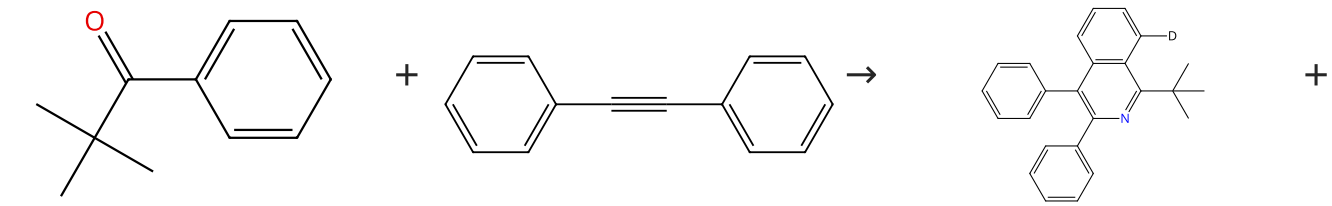
Ruthenium-Catalyzed Site-Selective C-H Bond Activation/Annulation Cascade toward Dibenzoazepinone Skeletons

By: Chowdhury, Deepan; et al

Organic Letters (2020), 22(17), 6760-6764.

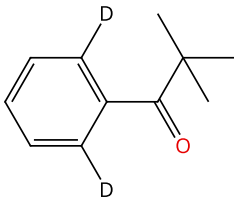
Scheme 165 (1 Reaction)

Steps: **1** Yield: **52%**



Suppliers (67)

Suppliers (88)



31-614-CAS-24707611

Steps: **1** Yield: **52%**

1.1 **Reagents:** Ammonium acetate, Methanol-d_4
Catalysts: Bis(acetato-κ*O*)[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium
Solvents: 2,2,2-Trifluoroethanol; 12 h, 110 °C

Experimental Protocols

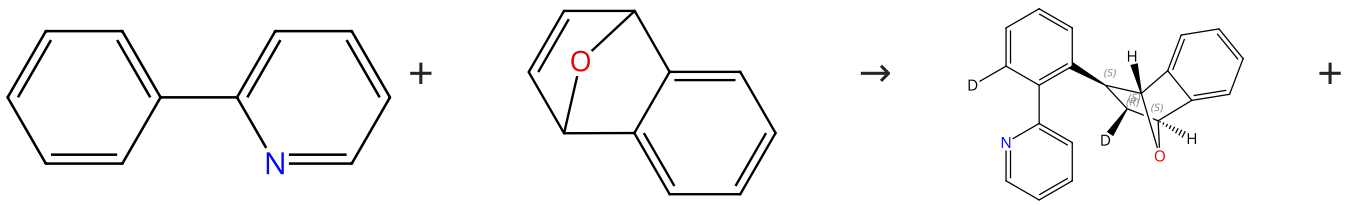
Ruthenaelectro-Catalyzed Domino Three-Component Alkyne Annulation Expedient Isoquinoline Assembly

By: Tan, Xuefeng; et al

Angewandte Chemie, International Edition (2021), 60(9), 4619-4624.

Scheme 166 (1 Reaction)

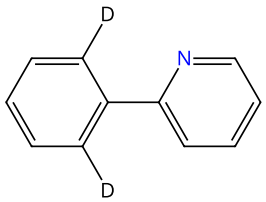
Steps: **1** Yield: **51%**



Suppliers (93)

Suppliers (71)

Relative stereochemistry shown



Supplier (1)

31-085-CAS-13623240

Steps: **1** Yield: **51%**

1.1 **Reagents:** Oxygen
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Toluene, Methanol-d_4; 3 h, 120 °C

Experimental Protocols

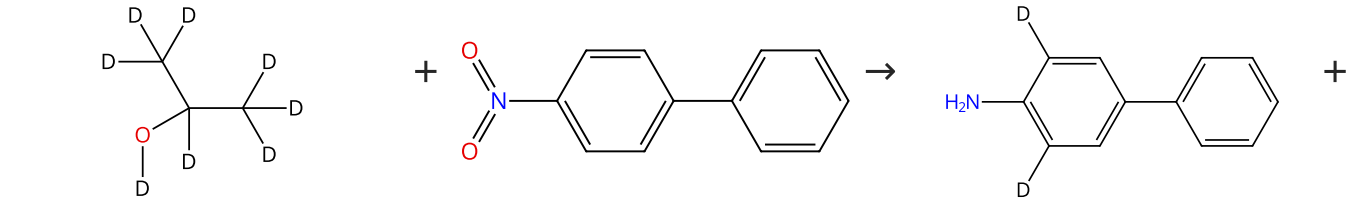
Ruthenium-Catalyzed Hydroarylations of Oxa- and Azabicyclic Alkenes

By: Cheng, Hanchao; et al

ACS Catalysis (2015), 5(5), 2770-2773.

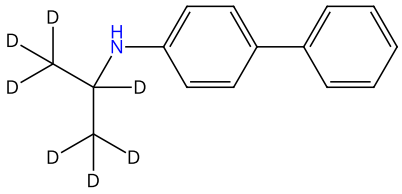
Scheme 167 (1 Reaction)

Steps: **1** Yield: **51%**



Suppliers (49)

Suppliers (53)



31-614-CAS-24607045

Steps: **1** Yield: **51%**

1.1 **Reagents:** *p*-Toluenesulfonic acid, Sodium carbonate
Catalysts: Chloro[2-(diphenylphosphino-κ*P*)benzenesulfonato-κ*O*][(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene] ruthenium
Solvents: Toluene; 12 h, 150 °C

Experimental Protocols

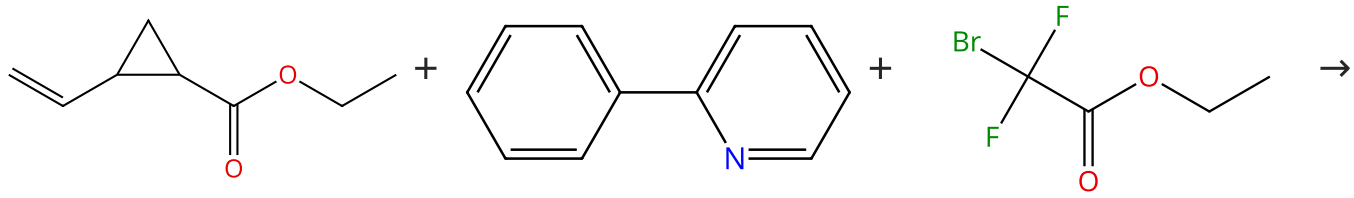
Ruthenium-catalyzed chemoselective alkylation of nitroa renes with alkanols

By: Ma, Shuang-Shuang; et al

Organic Chemistry Frontiers (2021), 8(23), 6710-6719.

Scheme 168 (1 Reaction)

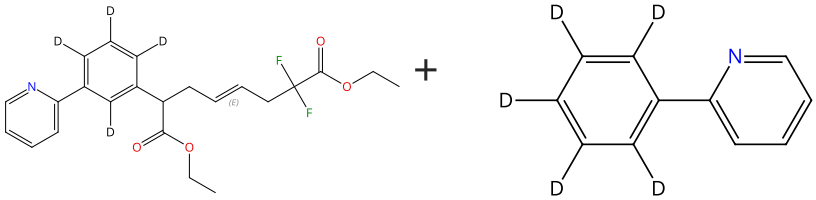
Steps: **1** Yield: **50%**



Suppliers (7)

Suppliers (93)

Suppliers (86)



Double bond geometry shown

Supplier (1)

31-614-CAS-40035001

Steps: **1** Yield: **50%**

1.1 **Reagents:** Potassium carbonate, Methanol-d_4
Catalysts: Tris(2-furyl)phosphine, [(1,2,3,4,5,6-η)-1-Methyl-4-(1-methylethyl)benzene](2,4,6-trimethylbenzoato-κ*O*)(2,4,6-trimethylbenzoato-κ*O*,κ*O*')ruthenium
Solvents: 1,4-Dioxane; 16 h, 70 °C

Experimental Protocols

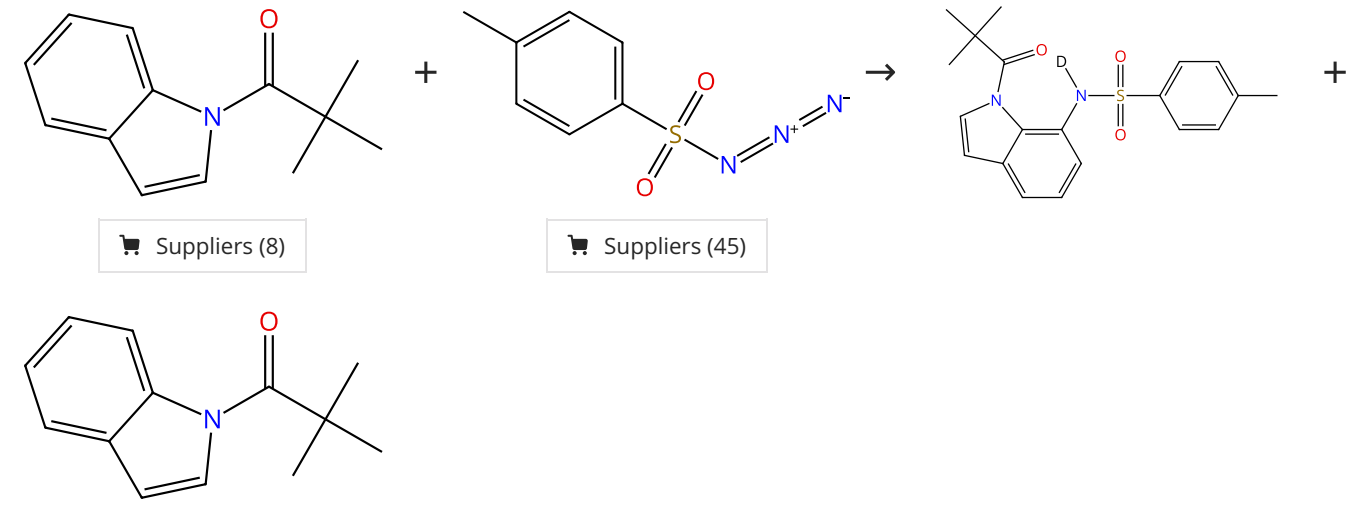
Ruthenium-Catalyzed Difunctionalization of Vinyl Cyclopropanes for Double m-C(sp^2)-H/C-5(sp^3)-H Functionalization

By: Luan, Yu-Yong; et al

Organic Letters (2024), 26(15), 3213-3217.

Scheme 169 (1 Reaction)

Steps: **1** Yield: **49%**



Suppliers (8)

Suppliers (45)

31-614-CAS-29446722

Steps: **1** Yield: **49%**

1.1 **Catalysts:** Silver hexafluoroantimonate, Bis(acetato-κ*O*)[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]ruthenium
Solvents: 2,2,2-Trifluoroethanol-*d*; 6 h, 40 °C

Experimental Protocols

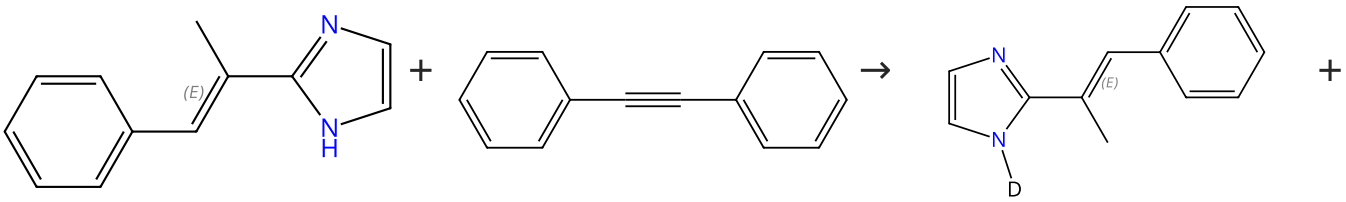
C7-Indole Amidations and Alkenylations by Ruthenium(II) Catalysis

By: Choi, Isaac; et al

Angewandte Chemie, International Edition (2020), 59(30), 12534-12540.

Scheme 170 (1 Reaction)

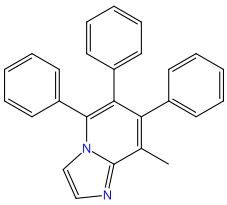
Steps: **1** Yield: **48%**



Double bond geometry shown

Suppliers (88)

Double bond geometry shown



31-116-CAS-22058834

Steps: **1** Yield: **48%**

1.1 **Reagents:** Methanol-d_4, Potassium hexafluorophosphate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Dimethylformamide; 2 h, 100 °C

Experimental Protocols

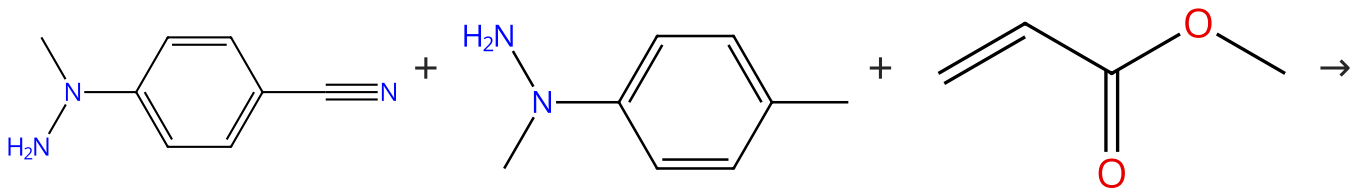
Azaruthena(II)-bicyclo[3.2.0]heptadiene: Key Intermediate for Ruthenaelectro(II/III/I)-catalyzed Alkyne Annulations

By: Yang, Long; et al

Angewandte Chemie, International Edition (2020), 59(27), 11130-11135.

Scheme 171 (1 Reaction)

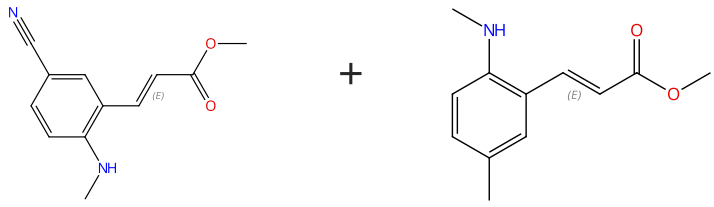
Steps: **1** Yield: **48%**



Suppliers (5)

Suppliers (12)

Suppliers (65)



Double bond geometry shown

Double bond geometry shown

Supplier (1)

31-614-CAS-25335486

Steps: **1** Yield: **48%**

1.1 **Reagents:** Dimethyl sulfone, Potassium acetate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Methanol-d_4; 2 h, 70 °C

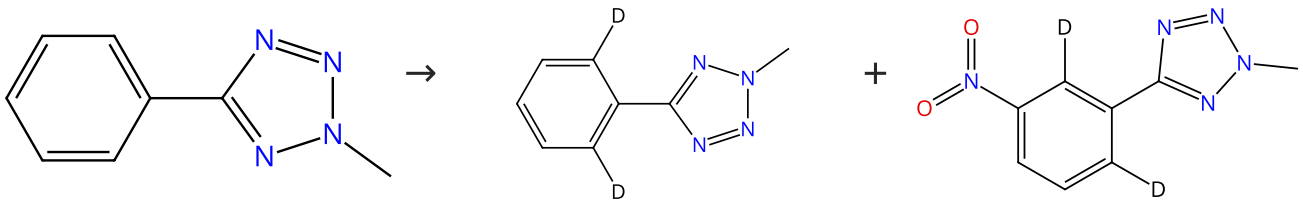
Ruthenium(II)-Catalyzed Traceless C-H Functionalization Using N-N Bond as an Internal Oxidant

By: Zhou, Shuguang; et al

Chemistry - A European Journal (2016), 22(41), 14508-14512.

Scheme 172 (1 Reaction)

Steps: **1** Yield: **47%**



Suppliers (22)

31-076-CAS-22251051

Steps: **1** Yield: **47%**

1.1 **Reagents:** Bis(trifluoroacetoxy)iodobenzene, Cupric nitrate
Catalysts: Triphenylphosphine, Triruthenium dodecacarbonyl
Solvents: Methanol-d_4, 1,1,1,3,3,3-Hexafluoro-2-propanol; 24 h, 100 °C

Experimental Protocols

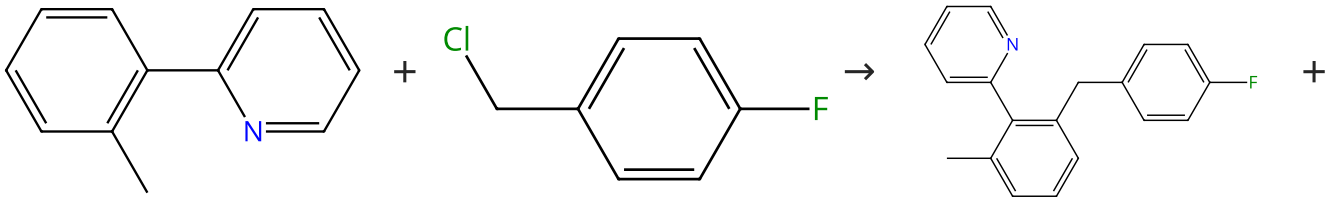
Ruthenium-Catalyzed meta-Selective C-H Nitration of Biologically Important Aryltetrazoles

By: Chen, Jian; et al

Advanced Synthesis & Catalysis (2020), 362(14), 2984-2989.

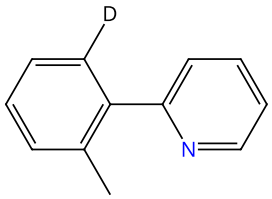
Scheme 173 (1 Reaction)

Steps: **1** Yield: **46%**



Suppliers (67)

Suppliers (92)



31-614-CAS-24401200

Steps: **1** Yield: **46%**

1.1 **Reagents:** Sodium acetate, Methanol-d_4
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,4-Dioxane; 24 h, 30 - 33 °C

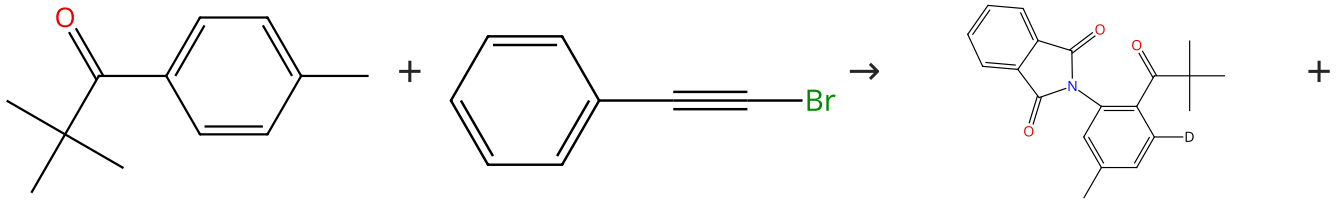
Photo-Induced Ruthenium-Catalyzed C-H Benzylations and Allylations at Room Temperature

By: Struwe, Julia; et al

Chemistry - A European Journal (2021), 27(65), 16237-16241.

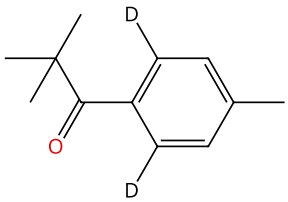
Scheme 174 (1 Reaction)

Steps: **1** Yield: **46%**



Suppliers (56)

Suppliers (60)



31-116-CAS-15585868 Steps: **1** Yield: **46%**

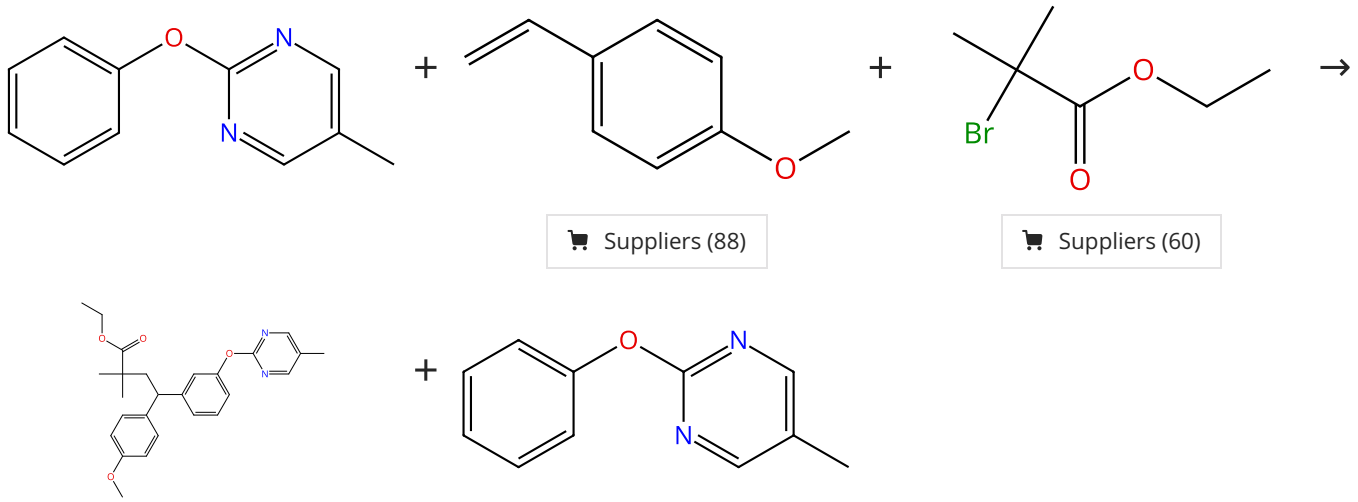
1.1 **Reagents:** Cupric acetate
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,4-Dioxane, Methanol-d_4; 24 h, 100 °C

Ketone-Assisted Ruthenium(II)-Catalyzed C-H Imidation: Access to Primary Aminoketones by Weak Coordination

By: Raghuvanshi, Keshav; et al

ACS Catalysis (2016), 6(5), 3172-3175.

Scheme 175 (1 Reaction) Steps: **1** Yield: **45%**



Suppliers (88) Suppliers (60)

31-614-CAS-31154750 Steps: **1** Yield: **45%**

1.1 **Reagents:** Sodium carbonate, Methanol-d_4
Catalysts: Sodium acetate, Tris(4-chlorophenyl)phosphine, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: *tert*-Butyl methyl ether; 15 min, rt; 12 h, 120 °C

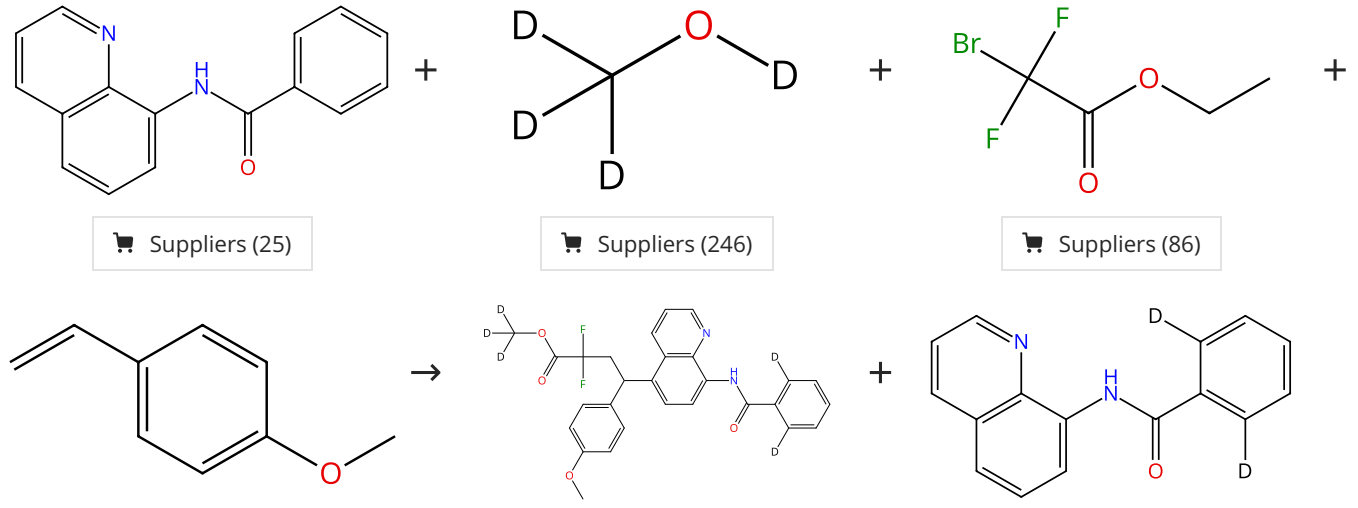
Experimental Protocols

Three-Component Ruthenium-Catalyzed meta-C-H Alkylation of Phenol Derivatives

By: Luan, Yu-Yong; et al

Organic Letters (2022), 24(5), 1136-1140.

Scheme 176 (1 Reaction) Steps: **1** Yield: **43%**



Suppliers (25) Suppliers (246) Suppliers (86)

Suppliers (88)

31-116-CAS-22769548 Steps: **1** Yield: **43%**

1.1 **Reagents:** *N*-Acetylvaline, Propanoic acid, 2,2-dimethyl-, potassium salt (1:1)
Catalysts: Tris[4-(trifluoromethyl)phenyl]phosphine, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Chlorobenzene; 24 h, 105 °C

Experimental Protocols

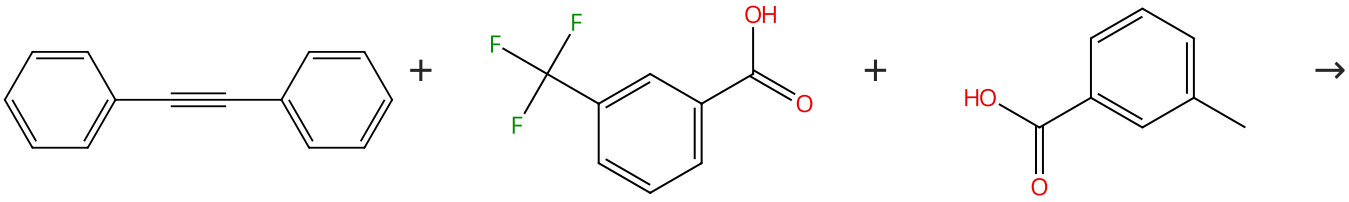
Three-component ruthenium-catalyzed remote C-H functionalization of 8-aminoquinoline amides

By: Shi, Wei-Yu; et al

Chemical Communications (Cambridge, United Kingdom) (2020), 56(84), 12729-12732.

Scheme 177 (1 Reaction)

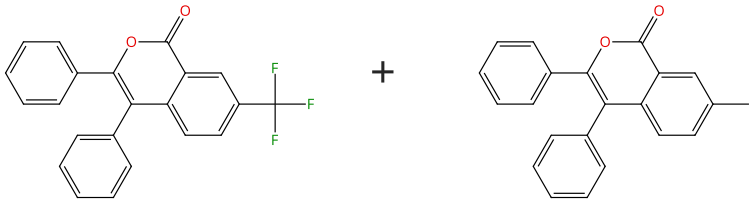
Steps: **1** Yield: **43%**



Suppliers (88)

Suppliers (96)

Suppliers (91)



Suppliers (3)

31-614-CAS-30299990

Steps: **1** Yield: **43%**

1.1 **Reagents:** Propanoic acid, 2,2-dimethyl-, sodium salt, hydrate (1:1:?)
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Methanol-d_4; 16 h, 60 °C

Experimental Protocols

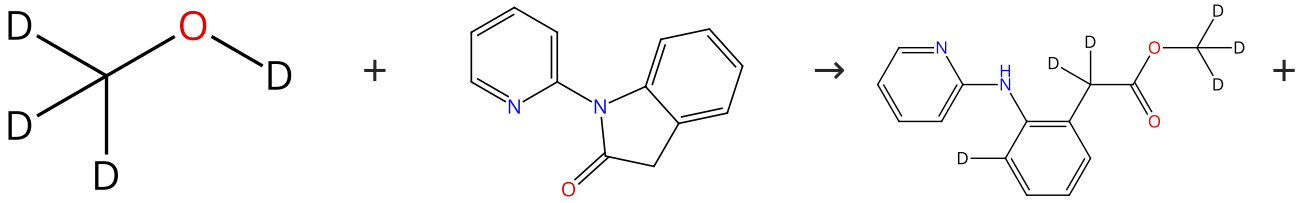
Electrooxidative Ruthenium-Catalyzed C-H/O-H Annulation by Weak O-Coordination

By: Qiu, Youai; et al

Angewandte Chemie, International Edition (2018), 57(20), 5818-5822.

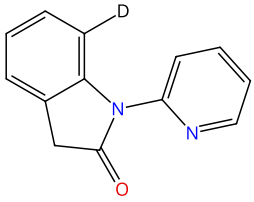
Scheme 178 (1 Reaction)

Steps: **1** Yield: **38%**



Suppliers (246)

Suppliers (2)



31-614-CAS-41757795

Steps: **1** Yield: **38%**

1.1 **Catalysts:** Bis(dichloro(η^6-*p*-cymene)ruthenium), [1,1,1-Trifluoro-*N*-[(trifluoromethyl)sulfonyl-κ*O*]methanesulfonamidato-κ*O*]silver
Solvents: 1,2-Dichloroethane; 1 min, rt

1.2 **Catalysts:** Silver carbonate; 5 h, 60 °C

Experimental Protocols

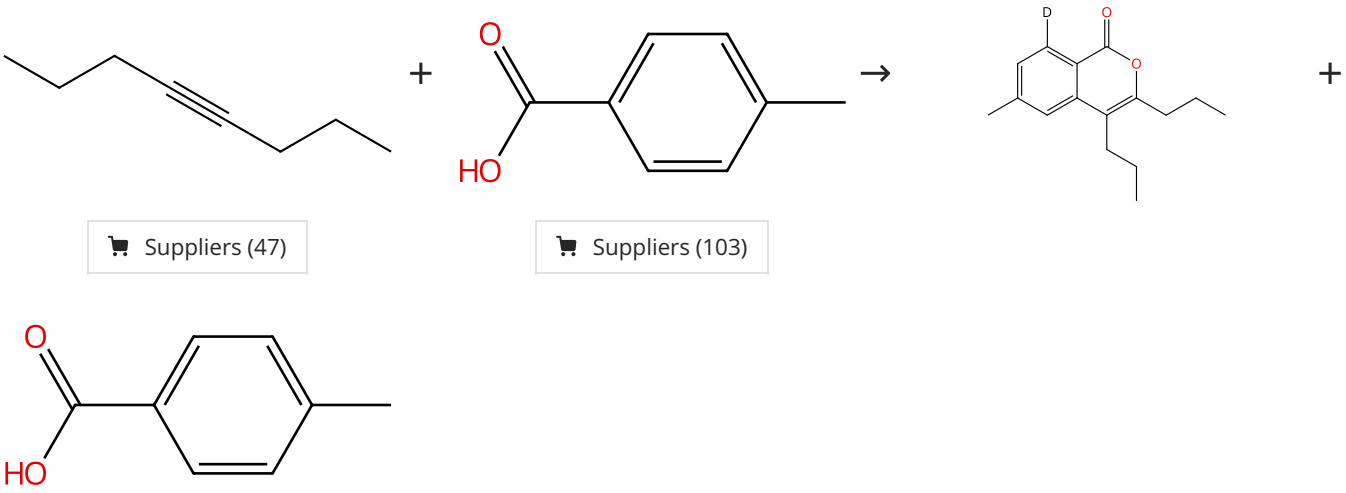
Ru(II)-Catalyzed Skeletal Editing of Oxindole with Internal Alkyne To Synthesize C7-Alkylated Indole Derivatives

By: Das, Sarbojit; et al

Organic Letters (2024), 26(38), 8051-8056.

Scheme 179 (1 Reaction)

Steps: **1** Yield: **37%**



Suppliers (47)

Suppliers (103)

31-614-CAS-29499453

Steps: **1** Yield: **37%**

1.1 **Reagents:** Propanoic acid, 2,2-dimethyl-, sodium salt, hydrate (1:1:?)
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Methanol-d_4; 16 h, 60 °C

Experimental Protocols

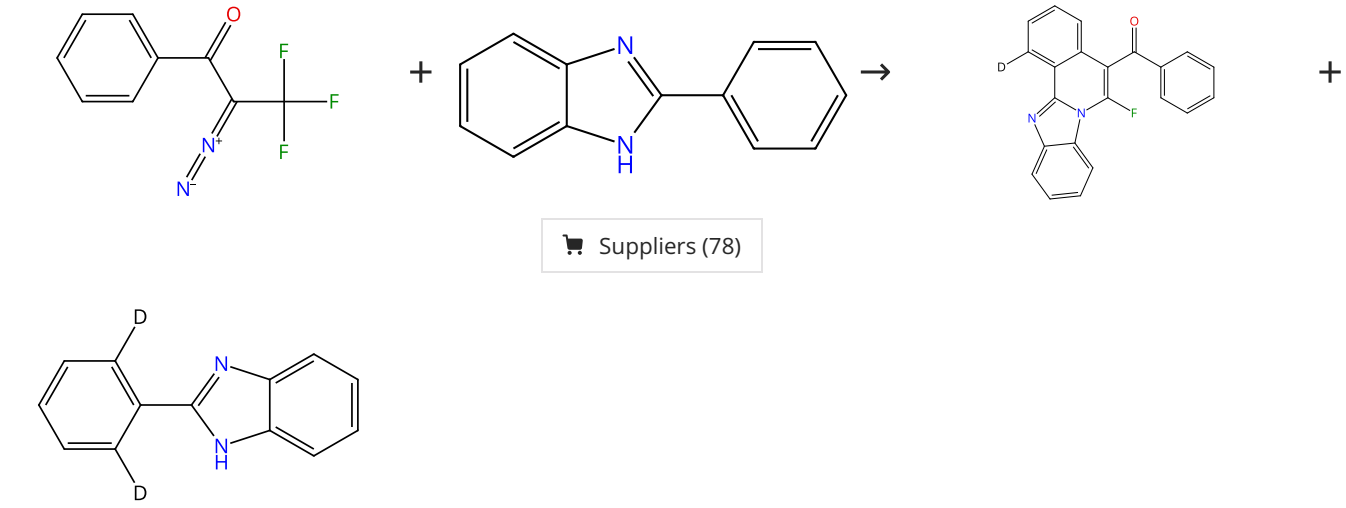
Electrooxidative Ruthenium-Catalyzed C-H/O-H Annulation by Weak O-Coordination

By: Qiu, Youai; et al

Angewandte Chemie, International Edition (2018), 57(20), 5818-5822.

Scheme 180 (1 Reaction)

Steps: **1** Yield: **27%**



Suppliers (78)

31-614-CAS-36993220

Steps: **1** Yield: **27%**

1.1 **Reagents:** Potassium acetate, 2,2,2-Trifluoroethanol-*d*
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium); 3 h, 100 °C

Experimental Protocols

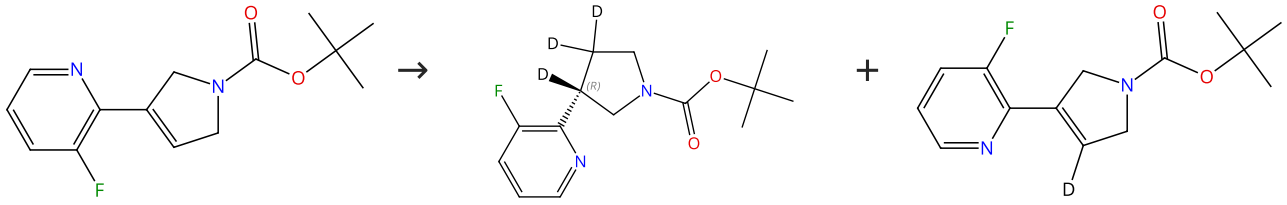
Cascade C-H Activation and Defluorinative Annulation of 2-Arylbenzimidazoles with α-Trifluoromethyl-α-diazoketones: Modular Assembly of 6-Fluorobenzimidazo[2,1-a]isoquinolines

By: Dong, Zhongkang; et al

Organic Letters (2023), 25(26), 4770-4775.

Scheme 181 (1 Reaction)

Steps: **1** Yield: **22%**



Absolute stereochemistry shown

Suppliers (4)

31-614-CAS-29438475

Steps: **1** Yield: **22%**

1.1 **Reagents:** Hydrogen, Methanol-*d*
Catalysts: Ruthenium(1+), [(1*R*)-1,1'-[1,1'-binaphthalene]-2,2'-diylbis[1,1-bis(4-methylphenyl)phosphine-κ*P*]]chloro[(1,2,3,4,5,6-η)-1-methyl-4-(1-methylethyl)benzene]-, chloride; 23 min, 25 psi, 50 °C

1.2 **Reagents:** Water

Experimental Protocols

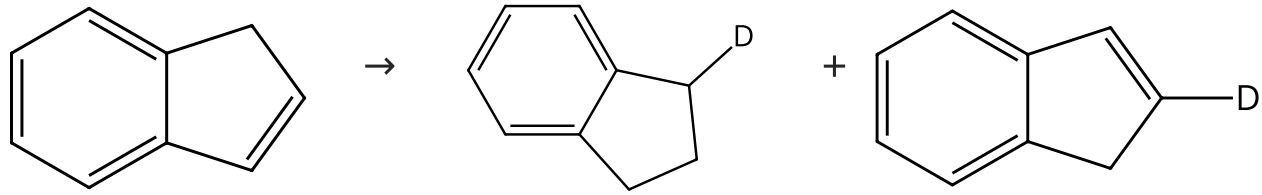
Ru-Catalyzed Enantioselective Hydrogenation of 2-Pyridyl-Substituted Alkenes and Substrate-Mediated H/D Exchange

By: Hao, Wei; et al

ACS Catalysis (2022), 12(2), 1150-1160.

Scheme 182 (1 Reaction)

Steps: **1** Yield: **21%**



Suppliers (109)

Supplier (1)

31-116-CAS-6263828

Steps: **1** Yield: **21%**

1.1 **Reagents:** 2-Propan-*1,1,1,2,3,3,3-d*$_7$-ol-*d*
Catalysts: (η^6-Benzene)carbonylhydro(tricyclohexylphosphine) ruthenium(1+)
Solvents: Toluene-d_8; 1 h, 25 °C

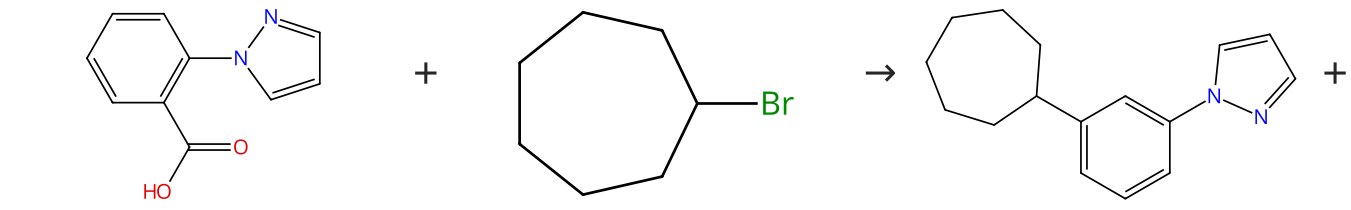
Selective Catalytic C-H Alkylation of Alkenes with Alcohols

By: Lee, Dong-Hwan; et al

Science (Washington, DC, United States) (2011), 333(6049), 1613-1616.

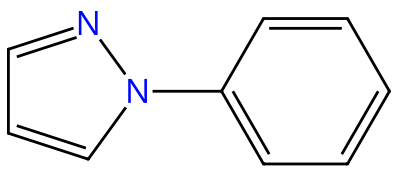
Scheme 183 (1 Reaction)

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



Suppliers (71)

Suppliers (84)



31-614-CAS-25630552 Steps: **1** Yield: **20%**

1.1 **Reagents:** Potassium carbonate, Methanol-d_4
Catalysts: 2,4,6-Trimethylbenzoic acid, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: *o*-Xylene; 16 h, 120 °C

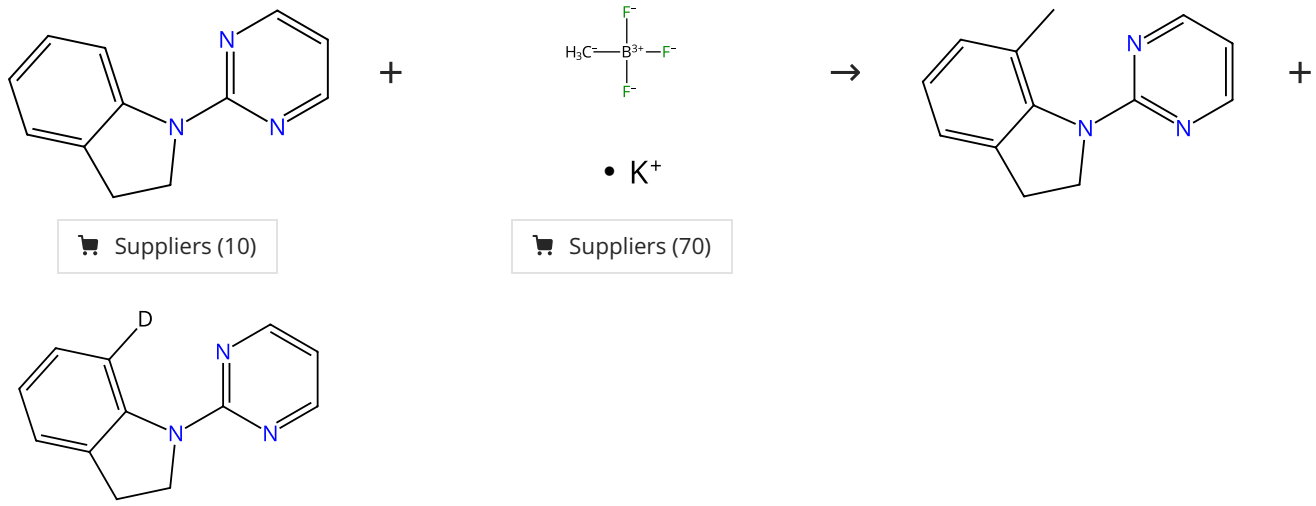
Experimental Protocols

Regiodivergent C-H and Decarboxylative C-C Alkylation by Ruthenium Catalysis: ortho versus meta Position-Selectivity

By: Korvorapun, Korkit; et al

Angewandte Chemie, International Edition (2020), 59(42), 18795-18803.

Scheme 184 (1 Reaction) Steps: **1** Yield: **15%**



Suppliers (10) Suppliers (70)

31-614-CAS-41582355 Steps: **1** Yield: **15%**

1.1 **Reagents:** Silver acetate, Methanol-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: Ethanol; 5 h, 100 °C

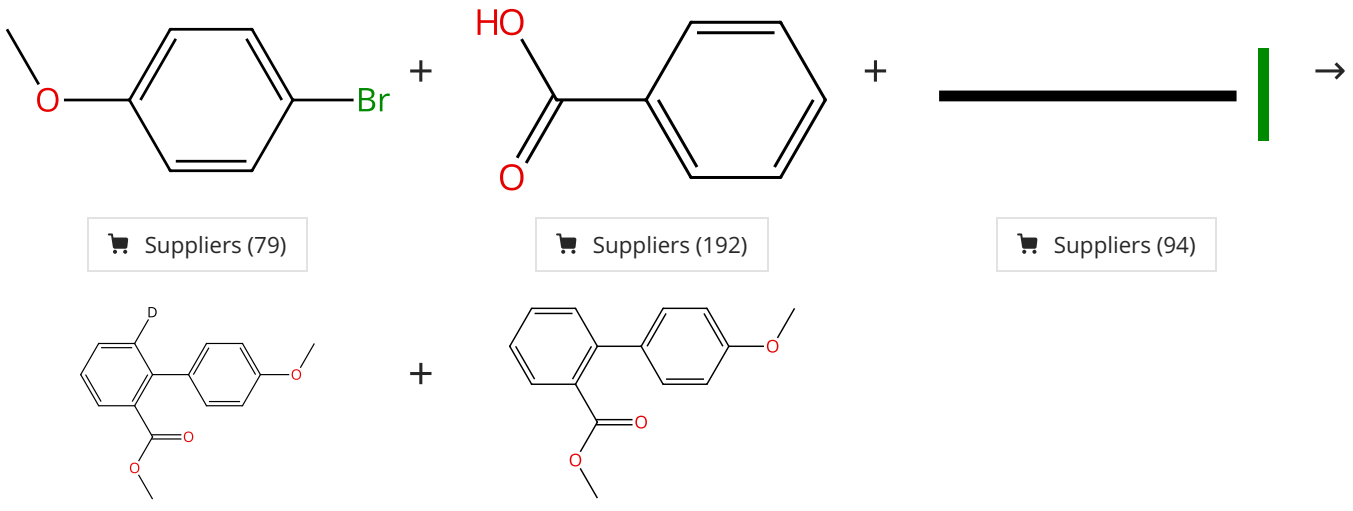
Experimental Protocols

Ru(II)-catalyzed sustainable C-H methylation of indolines with organoboranes in ethanol

By: Sumit; et al

Journal of Organic Chemistry (2024), 89(20), 14880-14886.

Scheme 185 (1 Reaction) Steps: **1** Yield: **10%**



Suppliers (79) Suppliers (192) Suppliers (94)

Suppliers (18)

31-017-CAS-16254652 Steps: **1** Yield: **10%**

1.1 **Reagents:** Potassium carbonate, Methanol-d_4
Catalysts: Tricyclohexylphosphine, [(1,2,3,4,5,6-η)-1-Methyl-4-(1-methylethyl)benzene](2,4,6-trimethylbenzoato-κ*O*)(2,4,6-trimethylbenzoato-κ*O*,κ*O*')ruthenium
Solvents: *N*-Methyl-2-pyrrolidone; 16 h, 120 °C

1.2 **Reagents:** Potassium carbonate
Solvents: Acetonitrile; 2 h, 50 °C

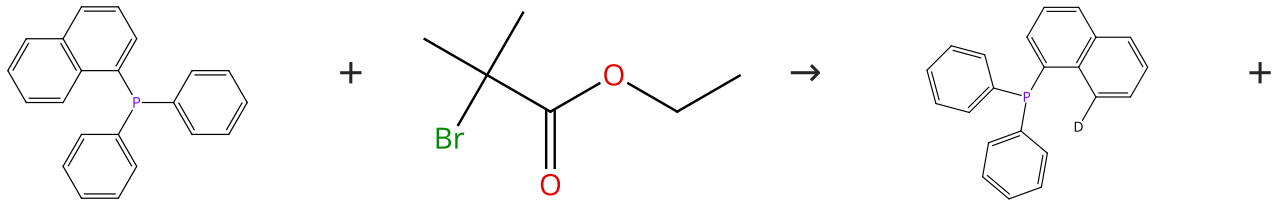
Experimental Protocols

Ruthenium(II)-catalyzed C-H functionalizations of benzoic acids with aryl, alkenyl and alkynyl halides by weak O-coordination

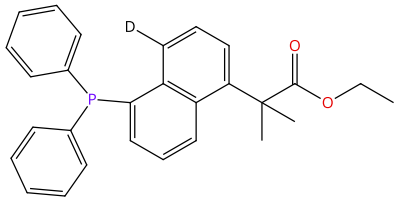
By: Mei, Ruhuai; et al

Chemical Communications (Cambridge, United Kingdom) (2016), 52(89), 13171-13174.

Scheme 186 (1 Reaction) Steps: **1**



Suppliers (8) Suppliers (60)



31-614-CAS-31847182 Steps: **1**

1.1 **Reagents:** Sodium acetate, Methanol-d_4
Catalysts: 1-Adamantanecarboxylic acid, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: (Trifluoromethyl)benzene; 12 h, 50 °C

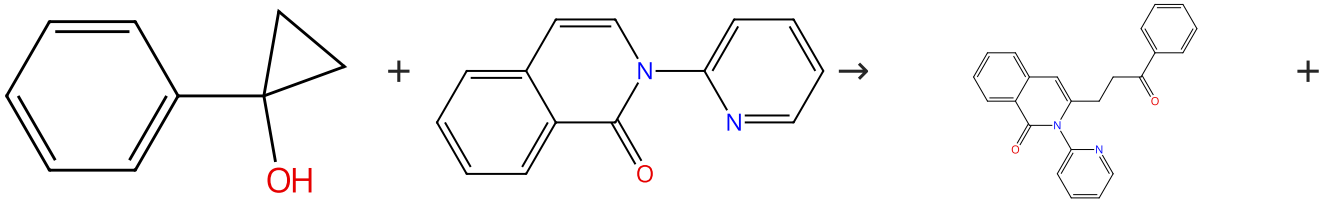
Experimental Protocols

Remote C5-Selective Functionalization of Naphthalene Enabled by P-Ru-C Bond-Directed δ-Activation

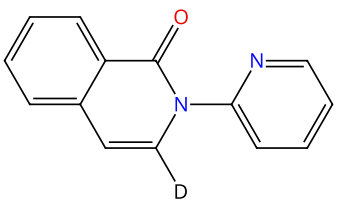
By: Fu, Yueliuting; et al

ACS Catalysis (2022), 12(9), 5036-5047.

Scheme 187 (1 Reaction) Steps: **1**



Suppliers (53) Supplier (1)



31-614-CAS-37732071 Steps: **1**

1.1 **Reagents:** Cupric acetate, Methanol-d_4
Catalysts: 1-Adamantanecarboxylic acid, Bis(dichloro(η^6-*p*-cymene)ruthenium); 2 h, 80 °C

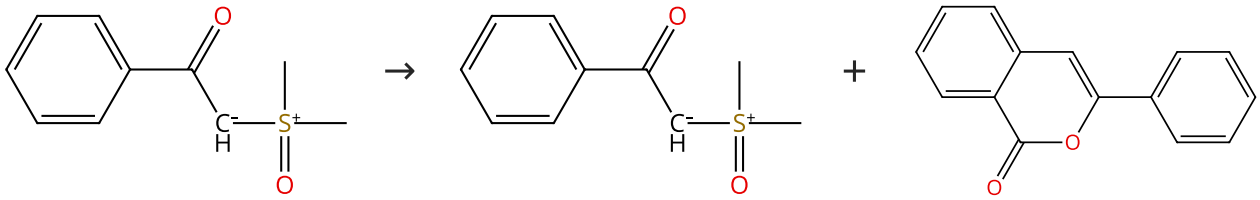
Experimental Protocols

Regiocontrol via Electronics: Insights into a Ru- Catalyzed, Cu-Mediated Site-Selective Alkylation of Isoquinolones via a C-C Bond Activation of Cyclopropanols

By: Jha, Neha; et al

Chemistry - A European Journal (2023), 29(55), e202301551.

Scheme 188 (1 Reaction) Steps: **1**



Suppliers (38)

31-614-CAS-28603506 Steps: **1**

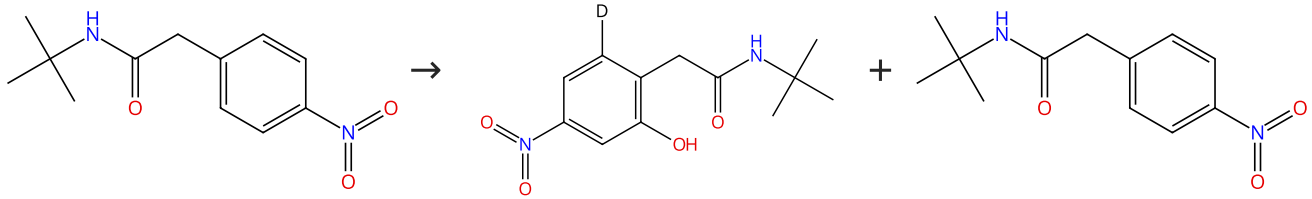
1.1 **Reagents:** Acetic acid, Methanol-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 2,2,2-Trifluoroethanol; 5 min, 100 °C

Ruthenium(II)-Catalyzed Homocoupling of Weakly Coordinating Sulfoxonium Ylides via C-H Activation/Annulations: Synthesis of Functionalized Isocoumarins

By: Zhou, Ming-Dong; et al

Advanced Synthesis & Catalysis (2019), 361(22), 5191-5197.

Scheme 189 (1 Reaction) Steps: **1**



Suppliers (8)

31-614-CAS-26052525 Steps: **1**

1.1 **Reagents:** Bis(trifluoroacetoxy)iodobenzene
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane, Methanol-d_4; 16 h, 100 °C

1.2 **Solvents:** Water

Experimental Protocols

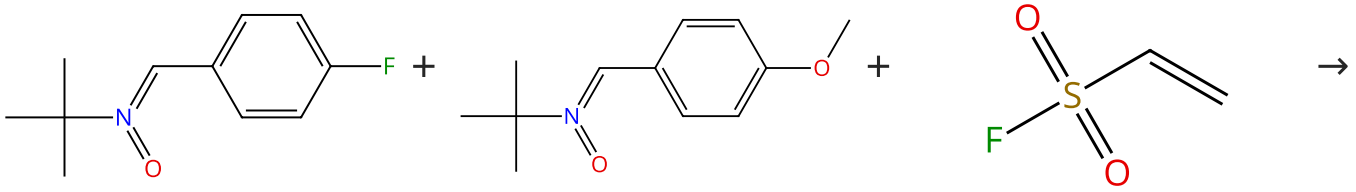
Insights into Ruthenium(II/IV)-Catalyzed Distal C-H Oxygenation by Weak Coordination

By: Bu, Qingqing; et al

Chemistry - A European Journal (2020), 26(69), 16450-16454.

Scheme 190 (1 Reaction)

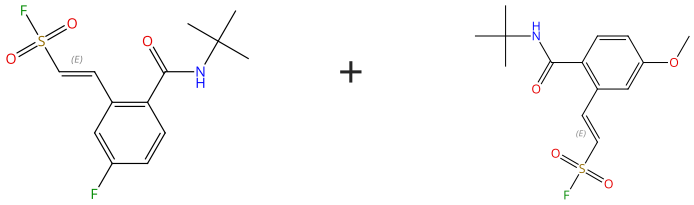
Steps: **1**



Supplier (1)

Suppliers (2)

Suppliers (51)



Double bond geometry shown

Double bond geometry shown

31-614-CAS-34216391

Steps: **1**

1.1 **Reagents:** Quinone, Cupric acetate, Methanol-d_4, Silver hexafluoroantimonate
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 1 h, 100 °C

Experimental Protocols

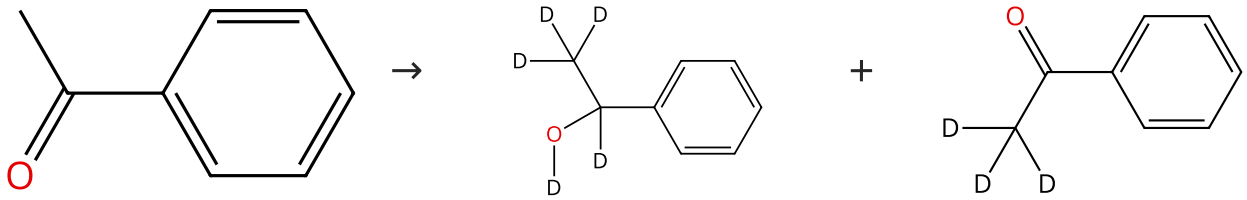
Synthesis of 2-arylethenesulfonyl fluorides and isoindol inones: Ru-catalyzed C-H activation of nitrones with ethenes ulfonyl fluoride

By: Wang, Tong-Tong; et al

Chemical Communications (Cambridge, United Kingdom) (2022), 58(79), 11099-11102.

Scheme 191 (1 Reaction)

Steps: **1**



Suppliers (109)

Supplier (1)

Suppliers (41)

31-614-CAS-39583517

Steps: **1**

1.1 **Reagents:** Ethanol-*d*
Catalysts: Potassium carbonate, Ruthenium, (benzo[*h*]quinolin-10-yl-C^{10},N^1)carbonylchlorobis(triphenylphosphine)-, (*OC*-6-52)-; 5 h, 120 °C

Experimental Protocols

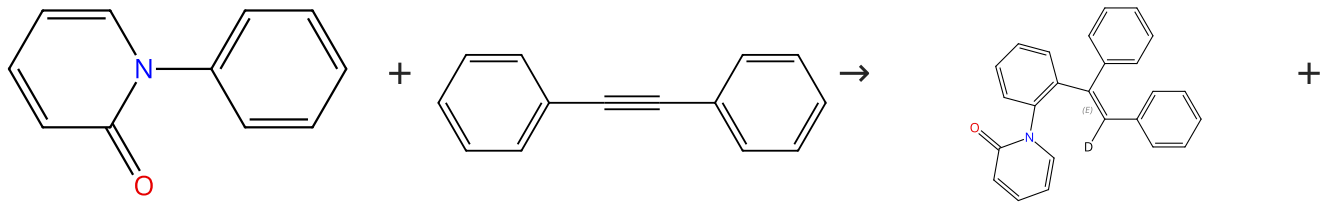
Bidentate Ru(II)-NC Complexes as Catalysts for Transfer Hydrogenation of Ketones with Ethanol

By: Li, Yufei; et al

Asian Journal of Organic Chemistry (2024), 13(3), e202300496.

Scheme 192 (1 Reaction)

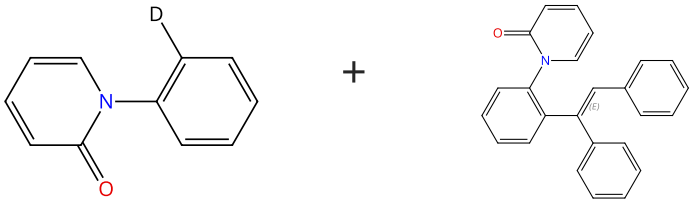
Steps: **1** Yield: **17%**



Suppliers (34)

Suppliers (88)

Double bond geometry shown



Double bond geometry shown

31-614-CAS-31487792

Steps: **1** Yield: **17%**

1.1 **Reagents:** Methanol-d_4
Catalysts: Bis(dichloro(η^6-*p*-cymene)ruthenium), Antimonate (3-), hexafluoro-, silver(1+) hydrogen (1:1:2), (*OC*-6-11)-
Solvents: 1,2-Dichloroethane; 12 h, 110 °C

1.2 **Reagents:** Sodium bicarbonate
Solvents: Water

Experimental Protocols

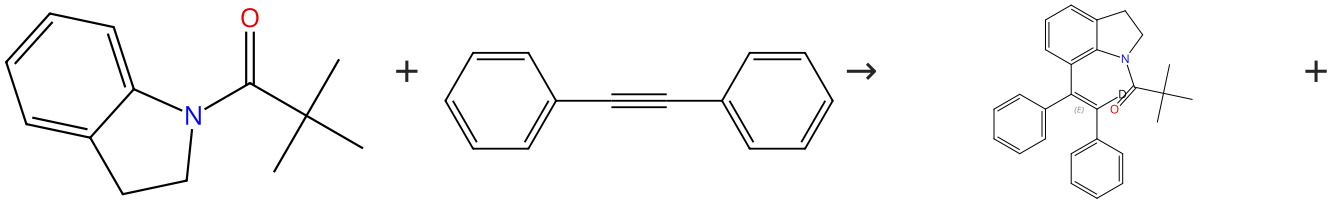
Ru-Catalyzed C-H alkenylation on the arene ring of pirfenidone using pyridone as a directing group

By: Raziullah; et al

Chemical Communications (Cambridge, United Kingdom) (2022), 58(21), 3481-3484.

Scheme 193 (1 Reaction)

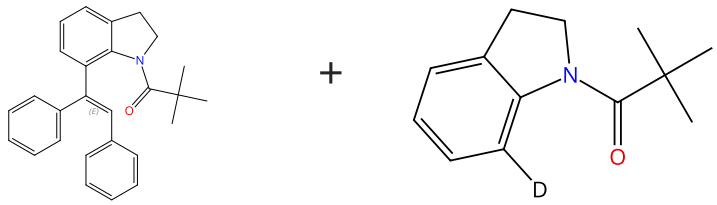
Steps: **1** Yield: **15%**



Suppliers (10)

Suppliers (88)

Double bond geometry shown



Double bond geometry shown

31-116-CAS-23618305

Steps: **1** Yield: **15%**

1.1 **Reagents:** Pivalic acid, Methanol-d_4
Catalysts: Silver hexafluoroantimonate, Bis(dichloro(η^6-*p*-cymene)ruthenium)
Solvents: 1,2-Dichloroethane; 6 h, 100 °C

1.2 **Reagents:** Sodium bicarbonate
Solvents: Water

Ru(II)-Catalyzed Regioselective Hydroarylative Coupling of Indolines with Internal Alkynes by C-H Activation

By: Raziullah; et al

European Journal of Organic Chemistry (2021), 2021(14), 2107-2113.