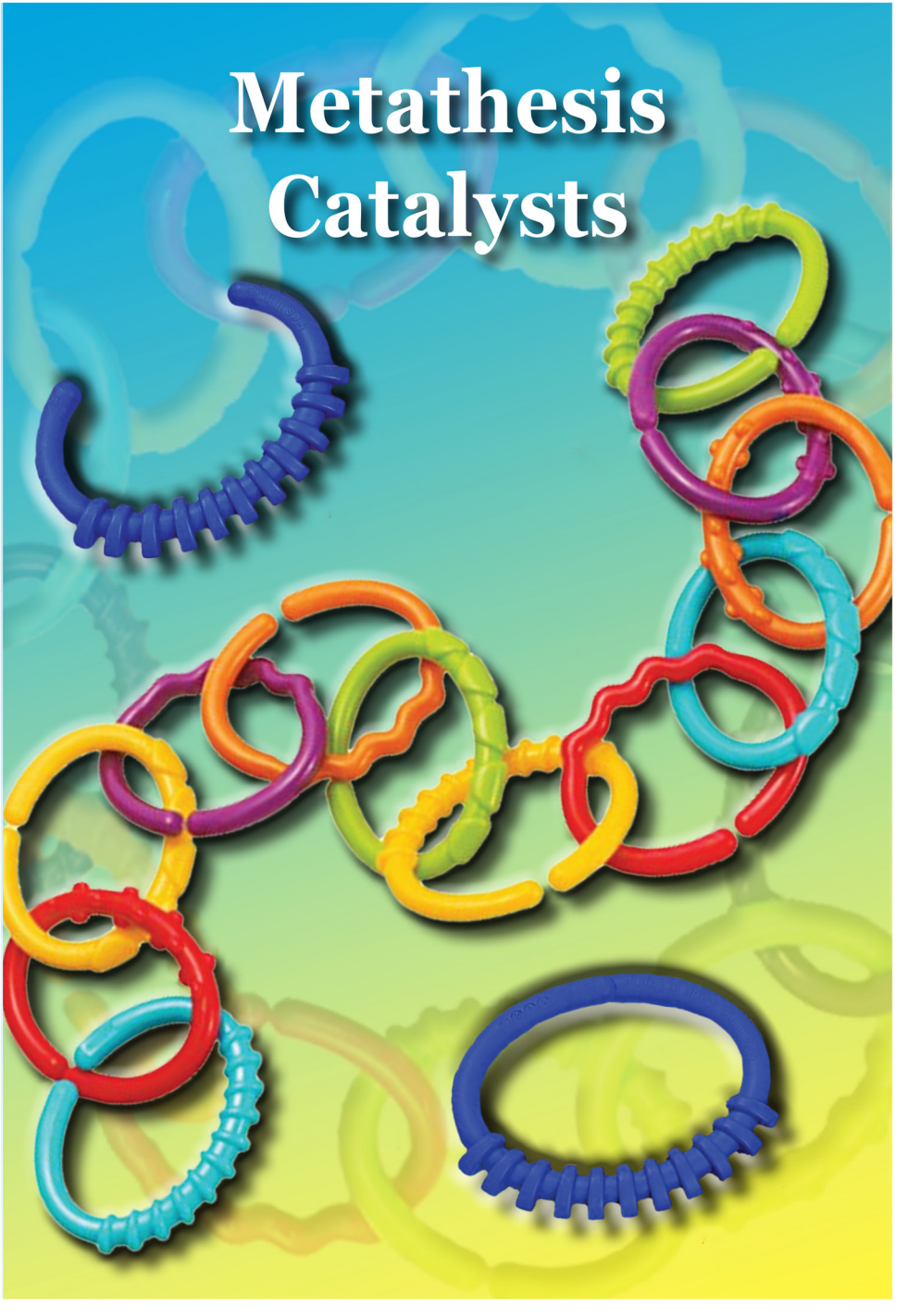
Metathesis Catalysts



STREM

Metathesis Catalysts

Strem Chemicals has been providing fine chemicals for research and commercial production for over fifty years. In this booklet you will find our selection of ruthenium metathesis catalysts as well as related kits for screening purposes. These catalysts can be used in a variety of metathesis applications including olefin metathesis, ring-closing metathesis, ring-opening polymerization and cross-metathesis.

At Strem, we also offer a wide variety of ligands, nanomaterials and CVD/ALD precursors. Most of our products are of high purity, typically at 99%, while some are as high as 99.9999% metals purity. We continually seek to provide new technologies from around the globe and add to our product line. We have licensing agreements with industry and academia, which allow easier access to these patent-protected products for our customers. We look forward to continued growth in order to best serve our customers' needs with the quality and service they can trust from Strem.

As part of our ongoing commitment to quality, we have achieved ISO 9001 certification for the Quality Management System (QMS) at our corporate headquarters in Newburyport, Massachusetts.

In addition, custom synthesis services are provided on a contract basis. For pharmaceutical applications, manufacturing is conducted under current Good Manufacturing Practices (cGMP) in FDA inspected kilo-lab suites. Complete documentation is available, including validation and stability studies. Active Drug Master Files (DMF's) are maintained in North America and Europe.

***

Our other booklets, which focus on applications and product classes, are available in print per request and also on our website. Below is a list of current booklet titles that are available. Please also check our Product Resources section online to find additional literature offerings, such as the Strem Chemiker, our technical publication, and product literature sheets.

- Biocatalysts
- Buchwald Ligands and Precatalysts
- Carbon-Base Nanomaterials & Elemental Forms
- Catalysts & LIgands Sold in Collaboration with Takasago
- Chiral Phosphoric Acids
- Gold Elements & Compounds
- Heterogeneous Catalysts
- High Purity Chiral Reagents
- Kits
- Materials for Energy Applications
- Metal Catalysts for Organic Synthesis
- Metathesis Catalysts
- MOCVD, CVD & ALD Precursors
- MOFs and Ligands for MOF Synthesis
- Nanomaterials
- New Products
- Other Ligands
- Phosphorous Ligands and Compounds
- Photocatalysts
- PURATREM: High Purity Inorganics

Ephraim S. Honig, Ph.D., M.B.A
Chief Executive Officer

ISO 9001 CERTIFIED

Metathesis 10/18

© 2018 Strem Chemicals. Inc.

Glossary of Terms

$[\alpha]_D$	.....	Specific rotation
AAS	.....	Atomic Absorption Standard
ACS	.....	Conforms to American Chemical Society specifications
air sensitive	.....	Product may chemically react with atmospheric oxygen or carbon dioxide at ambient conditions. Handle and store under an inert atmosphere of nitrogen or argon.
amp	.....	Ampouled
b.p.	.....	Boiling point in °C at 760mm, unless otherwise noted
d.	.....	Density
dec.	.....	Decomposes
elec. gr.	.....	Electronic Grade, suitable for electronic applications
f.p.	.....	Flash point in °F
gran.	.....	Granular
heat sensitive	.....	Product may chemically degrade if stored for prolonged periods of time at ambient temperatures or higher. Store at 5°C or lower.
hydrate	.....	Unspecified water content which may vary slightly from lot to lot
hygroscopic	.....	Product may absorb water if exposed to the atmosphere for prolonged periods of time (dependent on humidity and temperature). Handle and store under an inert atmosphere of nitrogen or argon.
light sensitive	.....	Product may chemically degrade if exposed to light
liq.	.....	Liquid
m.p.	.....	Melting point in °C
moisture sensitive	.....	Product may chemically react with water. Handle and store under an inert atmosphere of nitrogen or argon.
NMR grade		Suitable as a Nuclear Magnetic Resonance reference standard
optical grade	.....	For optical applications
pwdr.	.....	Powder
primary standard	.....	Used to prepare reference standards and standardize volumetric solutions
PURATREM	.....	Product has a minimum purity of 99.99% (metals basis)
purified	.....	A grade higher than technical, often used where there are no official standards
P. Vol.	.....	Pore volume
pyrophoric	.....	Product may spontaneously ignite if exposed to air at ambient conditions
reagent	.....	High purity material, generally used in the laboratory for detecting, measuring, examining or analyzing other substances
REO	.....	Rare Earth Oxides. Purity of a specific rare-earth metal expressed as a percentage of total rare-earths oxides.
SA	.....	Surface area
store cold	.....	Product should be stored at -18°C or 4°C, unless otherwise noted (see product details)
subl.	.....	Sublimes
superconductor grade	.....	A high purity, analyzed grade, suitable for preparing superconductors
tech. gr.	.....	Technical grade for general industrial use
TLC	.....	Suitable for Thin Layer Chromotography
v.p.	.....	Vapor pressure mm of Hg
xtl.	.....	Crystalline

About Purity

Chemical purity	.....	is reported after the chemical name, e.g. Ruthenium carbonyl, 99%
Metals purity	.....	is reported in parentheses with the respective element, e.g. Gallium (III) bromide, anhydrous, granular (99.999%-Ga) PURATREM where 100% minus the metal purity is equal to the maximum allowable percentage of trace metal impurity

RUTHENIUM (Compounds)

96-0440 **Apeiron Ammonium Catalysts Kit**
See page 15

96-0420 **Apeiron Bulky Catalysts Kit**
See page 16

96-0410 **Apeiron nitro-Grela Catalysts Kit**
See page 16

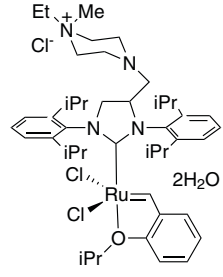
96-0430 **Apeiron Polymerization Catalysts Kit**
See page 17

96-0400 **Apeiron Ruthenium Metathesis Catalyst Kit**
See page 18

44-0759 100mg 500mg

NEW

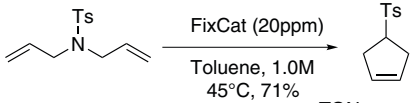
(1,3-Bis(2,6-diisopropylphenyl)-4-((4-ethyl-4-methylpiperzain-1-ium-1-yl)methyl)imidazolidin-2-ylidene)(2-isopropoxybenzylidene)ruthenium(II) dichloride chloride dihydrate FixCat *(1799947-97-9)*
$C_{45}H_{67}Cl_2N_4ORuCl\ 2(H_2O)$; FW: 887.47 (923.50);
green pwdr.
(store cold)
Note: Sold in collaboration with Apeiron Synthesis, Inc.
U.S. Patent 61/603,790; PCT/EP2013/053967



Technical Note:

1. Fixcat is a stable olefin metathesis initiator with very good solubility in neat water. The product efficiently promotes ring-closing, cross, and enyne metathesis reactions of water soluble substrates. Suitable for homogeneous and heterogeneous in batch or flow setup.

   The Fixcat structure was also optimized to serve as a versatile and very stable catalyst, easily immobilized on solid supports. In its SCA-15 supported version, it showed exceptional efficiency in promoting ring-closing and cross-metathesis reactions, in both batch and continuous flow setups. Fix Cat is also applicable as a homogeneous catalyst, where compatible solvents include alcohols and halogenated solvents.



TON 35500
$TOF_{10\ min}$ 1590 min^{-1}

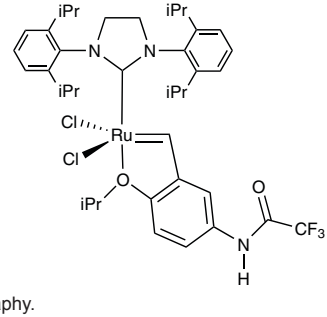
Tech. Note (1)
Ref. (1)

References:

1. *ChemSus Chem*., **2015**, *8*, 4139.

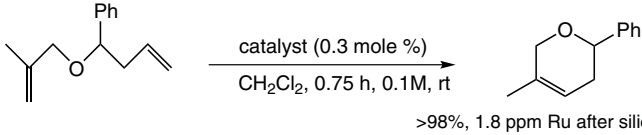
44-0055 100mg 500mg

[1,3-Bis(2,6-di-i-propylphenyl)-4,5-dihydro-imidazol-2-ylidene]-[2-i-propoxy-5-(trifluoro-acetamido)phenyl]methyleneruthenium(II) dichloride M71-S1Pr *(1212008-99-5)*
$C_{39}H_{50}Cl_2F_3N_3O_2Ru$; FW: 821.80;
green pwdr.
Note: Sold under license from Omega Cat System for research purposes only
WO 2008/065187, PCT/EP2008/054901, Fr n°08/05403.



Technical Note:

1. Enhanced activity ruthenium “boomerang” pre-catalyst used in the olefin metathesis, enyne metathesis, and cross metathesis reactions, that can be recycled, and leaves reduced ruthenium in the product after silica gel chromatography.



>98%, 1.8 ppm Ru after silica gel

Tech. Note (1)
Ref. (1,2)

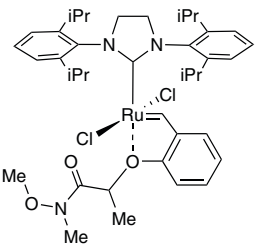
References:

1. *Eur. J. Org. Chem.,* **2009**, 4254.
2. *J. Org. Chem.,* **2008**, *73*, 4225.

RUTHENIUM (Compounds)

44-0750 NEW

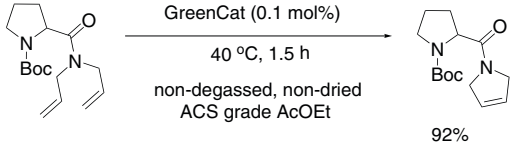
[1,3-Bis(2,6-di-i-propylphenyl)imidazolidin-2-ylidene]{2-[[1-(methoxy(methyl)amino)-1-oxopropan-2-yl]oxy]benzylidene}ruthenium(II) dichloride GreenCat *(1448663-06-6)*
$C_{39}H_{53}Cl_2N_3O_3Ru$; FW: 783.33; green pwdr.
Note: Sold in collaboration with Apeiron Synthesis, Inc. U.S. Patent 61/666,009, PCT/EP2013/062435.
Aperion Ruthenium Metathesis Catalyst Kit component.



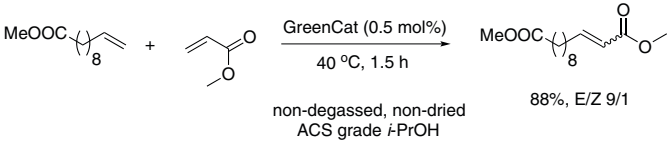
100mg
500mg

Technical Note:

1. Efficient, durable and reuseable olefin metathesis catalyst with a high affinity to silica gel.



Tech. Note (1)
Ref. (1)



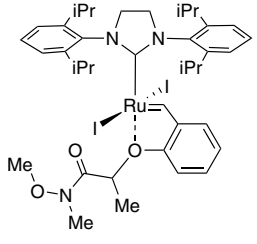
Tech. Note (1)
Ref. (1)

References:

1. *Tetrahedron,* **2013**, *69*, 7408

44-0748 NEW

[1,3-Bis(2,6-di-i-propylphenyl)imidazolidin-2-ylidene][(2-((1-methoxy(methyl)amino)-1-oxopropan-2-yl)oxy]benzylidenediiodoruthenium(II) GreenCat-I2
$C_{39}H_{53}I_2N_3O_3Ru$; FW: 966.74; green solid
air sensitive, (store cold)
Note: Recommended storage 2-8°C.
Sold in collaboration with Apeiron Synthesis, Inc.
U.S. Patent 61/666,009 PCT/EP2013/062435.



100mg
500mg

Technical Note:

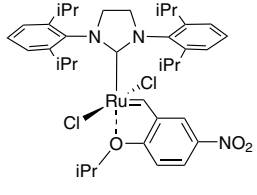
1. Catalyst for metathesis applications.

References:

1. *Angew. Chem.***2017**, *129,* 1001 –1006.

44-0770 NEW

1,3-Bis(2,6-di-i-propylphenyl)imidazolidin-2-ylidene)(2-i-propoxy-5-nitrobenzylidene) ruthenium(II) dichloride Nitro-Grela SiPr *(928795-51-1)*
$C_{37}H_{49}Cl_2N_3O_3Ru$; FW: 755.78; green pwdr.
air sensitive, (store cold)
Note: Recommended storage 2-8°C. Sold in collaboration with Apeiron Synthesis, Inc. U.S. Patent 6/867,303 PCT/EP2003/0112



100mg
500mg

Technical Note:

1. Catalyst for metathesis applications.

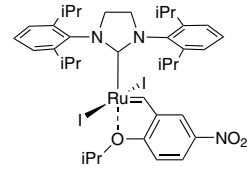
References:

1. *ACS Catalysis*, **2017**, *7(8)*, 5443-5449.
2. *Catalysis Science & Technology* **2017**, *7(6)*, 1284-1296.
3. *Angew. Chem.* **2017**, *129*, 1001 –1006.

RUTHENIUM (Compounds)

44-0782 NEW

[1,3-Bis(2,6-di-i-propylphenyl)imidazolidin-2-ylidene)(2-i-propoxy-5-nitrobenzylidene) ruthenium(II) diiodide nitro-Grela I2 SIPr *(1874265-00-5)*
$C_{37}H_{49}I_2N_3O_3Ru$; FW: 938.68; olive brown pwdr.
air sensitive, (store cold)
Note: Recommended storage 2-8°C.
Sold in collaboration with Apeiron Synthesis, Inc.
U.S. Patent 6/867,303 PCT/EP2003/01122.



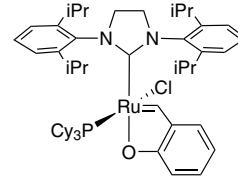
100mg
500mg

Technical Note:
1. Catalyst for metathesis applications.

References:
1. *Beilstein Journal of Organic Chemistry,* **2015**, *11*, 1823-1832.

44-0793 NEW

[1,3-Bis(2,6-di-i-propylphenyl)imidazolidin-2-ylidene)(tricyclohexylphosphine)-(2-oxobenzylidene)ruthenium(II) chloride LatMet SIPr *(1544328-59-7)*
$C_{52}H_{77}ClN_2OPRu$; FW: 913.68; dark green xtl.
air sensitive, (store cold)
Note: Recommended storage 2-8°C.
Sold in collaboration with Apeiron Synthesis, Inc.
U.S. Patent 9,328,132, PCT/EP2013/065839.



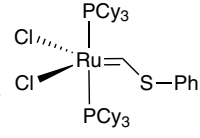
100mg
500mg

Technical Note:
1. Catalyst for metathesis applications.

References:
1. *U.S. Pat. Appl. Publ.* **2015**, US 20150158896 A1 20150611.
2. *PCT Int. Appl.* **2014**, WO 2014016422 A1 20140130.

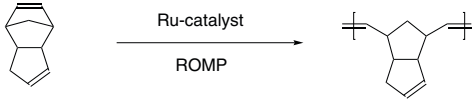
44-0073

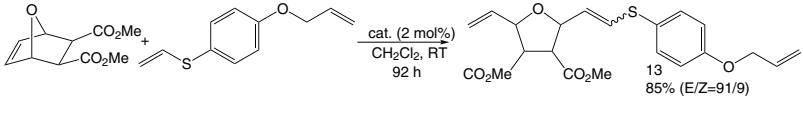
Bis(tricyclohexylphosphine)[(phenylthio)methylene] ruthenium(II) dichloride, min. 97% *(219770-99-7)*
$RuCl_2(CHSC_6H_5)[P(C_6H_{11})_3]_2$; FW: 855.02; purple pwdr.



1g
5g

Technical Notes:
1. Metathesis catalyst, stable in air and can be used in aqueous media.
2. Catalyst of choice for the ring-opening metathesis polymerization of cycloolefins.
3. Catalyst concentration 2-3 times lower than comparable phenyl and vinyl substituted ruthenium carbenes.
4. Excellent initiator for solvent-free polymerization and control of initiation rates and gelation times.
5. Highly selective catalyst for the ring opening/cross-metathesis of norbornene derivatives.

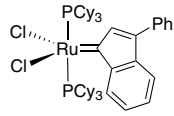




References:
1. *J. Organomet. Chem.,* **2000**, *606*, 16
2. "Ring Opening Metathesis Polymerization of Related Chemistry", NATO Science Series II, **2002**, 23.
3. *Organometallics,* **2003**, *22*, 586

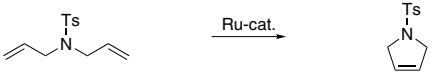
RUTHENIUM (Compounds)

44-0063 **Bis(tricyclohexylphosphine)-3-phenyl-1H-inden-1-ylideneruthenium(II) dichloride** *(250220-36-1)*
$RuCl_2(C_{15}H_{10})[P(C_6H_{11})_3]_2$; FW: 923.07; brown pwdr.
Note: Sold in collaboration with Umicore for research purposes only.

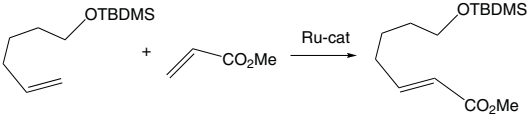


1g
5g

Technical Notes:
1. Highly active, air-stable catalyst used for the ring closing metathesis of dienes.
2. Used in cross-metathesis.



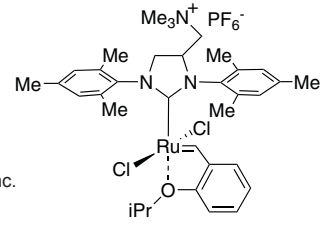
Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

References:
1. *Angew. Chem. Int. Ed*., **2000**, *112*, 3012. (review article)
2. *Adv. Synth. Catal.*, **2008**, *350*, 2959.

44-0755 NEW **1,3-Bis(2,4,6-trimethylphenyl)-4-[(trimethylammonio)methyl]imidazolidin-2-ylidene]-(2-i-propoxybenzylidene) dichlororuthenium(II) hexafluorophosphate StickyCat PF6**
$C_{35}H_{48}Cl_2F_6N_3OPRu$; FW: 843.72; green pwdr.
air sensitive, (store cold)
Note: Recommended storage 2-8°C.
Sold in collaboration with Apeiron Synthesis, Inc.
U.S. Patent 61/603,790, PCT/EP2013/053967.

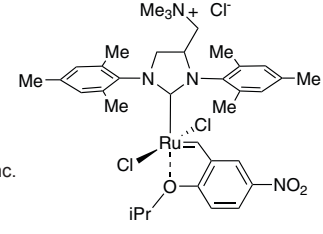


100mg
500mg

Technical Note:
1. Catalyst for metathesis applications.

References:
1. *Angew. Chem.***2017**, *129,* 1001 –1006.

44-0795 NEW **1,3-Bis(2,4,6-trimethylphenyl)-4-[(trimethylammonio)methyl]imidazolidin-2-ylidene]-(2-i-propoxy-5-nitrobenzylidene) dichlororuthenium(II) chloride nitro-StickyCat Cl** *(1415661-45-8)*
$C_{35}H_{47}Cl_3N_4O_3Ru$; FW: 779.20; green pwdr.
air sensitive, (store cold)
Note: Recommended storage 2-8°C.
Sold in collaboration with Apeiron Synthesis, Inc.
U.S. Patent 61/603,790 PCT/EP2013/053967.



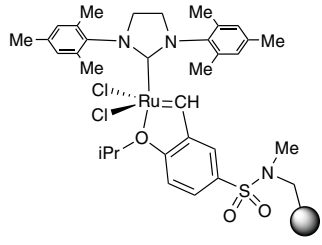
100mg
500mg

Technical Note:
1. Catalyst for olefin metathesis applications.

References:
1. *U.S. Pat. Appl. Publ.* **2013**, US 20130225807 A1 20130829.
2. *Green Chemistry*, **2012**, *14(12),* 3264-3268.

RUTHENIUM (Compounds)

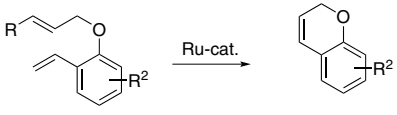
44-0083 **1,3-Bis(2,4,6-trimethylphenyl)-4,5-dihydroimidazol-2-ylidene[2-(i-propoxy)-5-(N,N-dimethyl aminosulfonyl)phenyl] methyleneruthenium(II) dichloride (resin supported) Zhan Catalyst II**



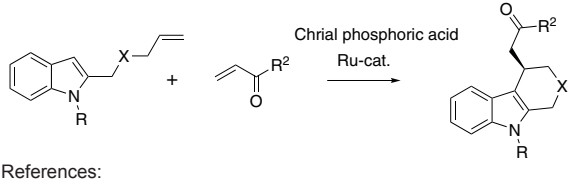
100mg
500mg
2g

FW: >1000; black solid;
Loading: 0.5 mmol/g
Note: Sold under license from Zannan for research purposes only.
Patents CN1907992A, US 2007/0043180 A1, PCT WO 2007/003135 A1.

Technical Notes:
1. Efficient, air-stable metathesis catalyst.
2. Used in cross-metathesis/Friedel-Crafts Cascade reaction.



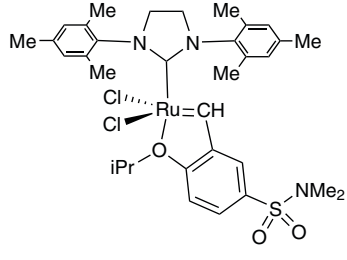
Tech. Note (1)



Tech. Note (2)
Ref. (1)

References:
1. *Angew. Chem. Int. Ed.,* **2009**, *48*, 7428.

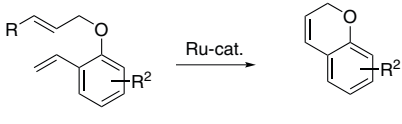
44-0082 **1,3-Bis(2,4,6-trimethylphenyl)-4,5-dihydroimidazol-2-ylidene[2-(i-propoxy)-5-(N,N-dimethylaminosulfonyl)phenyl] methyleneruthenium (II) dichloride, Zhan Catalyst-1B, min 96%**
(918870-76-5)



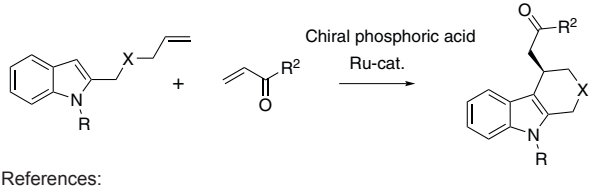
100mg
500mg
2g

$RuCl_2[C_{21}H_{26}N_2][C_{12}H_{17}NO_3S]$; FW: 733.75; green solid
Note: Sold under license from Zannan for research purposes only.
Patents CN1907992A, US 2007/0043180 A1, PCT WO 2007/003135 A1.

Technical Notes:
1. Efficient, air-stable metathesis catalyst.
2. Used in cross-metathesis/Friedel-Crafts Cascade reaction.



Tech. Note (1)



Tech. Note (2)
Ref. (2)

References:
1. PCT Int. Appl. (2007), WO 2007003135 A1
2. *Angew. Chem. Int. Ed.,* **2009**, *48*, 7428

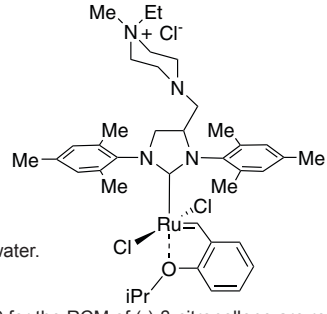
RUTHENIUM (Compounds)

44-0768 NEW

[1,3-Bis(2,4,6-trimethylphenyl)-4-[(4-ethyl-4-methylpiperazin-1-ium-1-yl) methyl]imidazolidin-2-ylidene]-(2-i-propoxybenzylidene)dichlororuthenium(II) chloride AquaMet *(1414707-08-6)*

$C_{39}H_{55}Cl_3N_4ORu$; FW: 803.31; green pwdr.

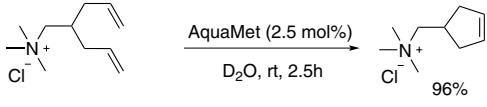
Note: Sold in collaboration with Apeiron Synthesis, Inc. U.S. Patent 61/603,790, PCT/EP2013/053967. Aperion Ruthenium Metathesis Catalyst Kit component.



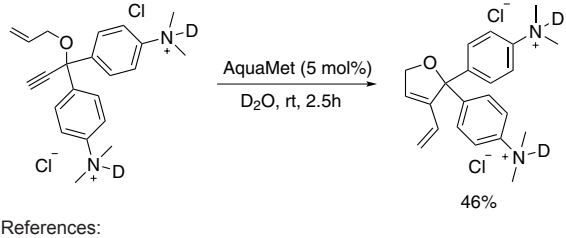
100mg
500mg

Technical Notes:

1. This is an highly active catalyst for olefin metathesis in water.
2. This catalyst is used as linker free heterogeneous metathesis catalysts after immobilization on silica or siliceous mesoporous molecular sieves. TON of ~16000 for the RCM of (-)-β-citronellene are reported.



Tech. Note (1)
Ref. (1)



Tech. Note (1)
Ref. (1)

References:

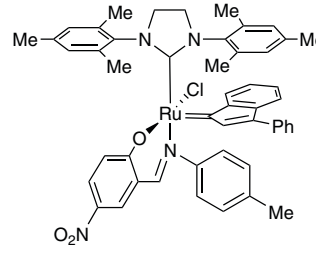
1. *Catal. Sci. Technol.,* **2012**, *22*, 2424
2. *ACS Catal.,* **2014**, *4*, 3227

44-0047

[1,3-Bis(2,4,6-trimethylphenyl)-2-imidazolidinylidene]-[2-[[(4-methylphenyl)imino] methyl]-4-nitrophenolyl]-[3-phenyl-1H-inden-1-ylidene]ruthenium(II) chloride *(934538-04-2)*

$C_{50}H_{47}ClN_4O_3Ru$; FW: 888.46;
orange-brown solid

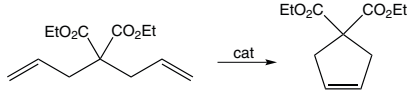
Note: Sold in collaboration with Umicore for research purposes only.
EP 1 468 004 B1, US 2002/0349956.



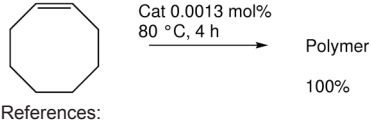
100mg
500mg

Technical Note:

1. Highly active catalyst for ring opening polymerization and ring closing metathesis reactions.



Ref. (1-3)



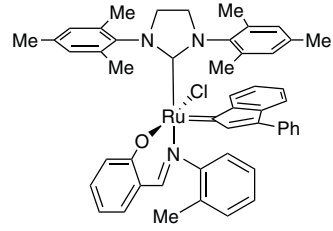
Ref. (1-3)

References:

1. *WO 2003062253.*
2. *Eur. J. Org. Chem.,* **2009**, 655.
3. *Curr. Org. Synth.,* **2008**, *5*, 291

RUTHENIUM (Compounds)

44-0049 **[1,3-Bis(2,4,6-trimethylphenyl)-2-imidazolidinylidene]-[2-[[(2-methylphenyl) imino] methyl]phenolyl]-[3-phenyl-1H-inden-1-ylidene]ruthenium(II) chloride** *(934538-12-2)*

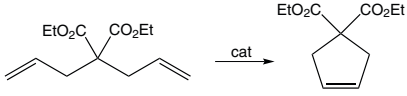


100mg
500mg

$C_{50}H_{48}ClN_3ORu$; FW: 843.46;
red-brown solid
Note: Sold in collaboration with Umicore for research purposes only.
EP 1 468 004 B1, US 2002/0349956.

Technical Note:

1. Highly active catalyst for ring opening and ring closing metathesis reactions.



100% (20° C, 60 mins)

Ref. (1-3)

Cat 0.0013 mol%
80 °C, 4 h

Polymer

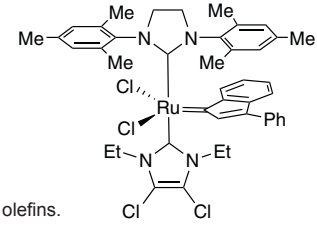
100%

Ref. (1-3)

References:

1. *WO 2003062253.*
2. *Eur. J. Org. Chem.,* **2009**, 655.
3. *Curr. Org. Synth.,* **2008**, *5*, 291

44-0026 **1,3-Bis(2,4,6-trimethylphenyl)-2-imidazolidinylidene)(3-phenyl-1H-inden-1-ylidene)(4,5-dichloro-1,3-diethyl-1,3-dihydro-2H-imidazol-2-ylidene) ruthenium(II) dichloride** *(1228169-92-3)*

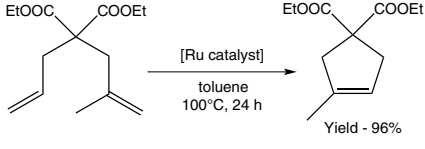


50mg
250mg
1g

$C_{43}H_{46}Cl_4N_4Ru$; FW: 861.73;
orange-brown solid
Note: Sold in collaboration with Umicore for research purpose only. Patent US 10,873,026.

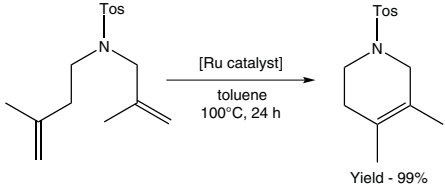
Technical Note:

1. Catalyst used for RCM reactions leading to trisubstituted olefins.



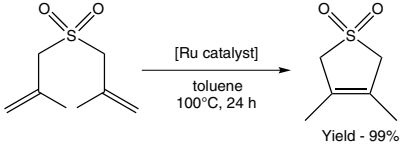
Yield - 96%

Tech. Note (1)
Ref. (1)



Yield - 99%

Tech. Note (1)
Ref. (1)



Yield - 99%

Tech. Note (1)
Ref. (1)

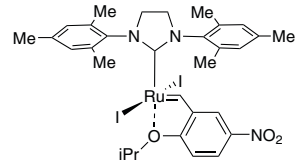
References:

1. *Organometallics,* **2010**, *29*, 2761

RUTHENIUM (Compounds)

44-0767 NEW

[1,3-Bis(2,4,6-trimethylphenyl)imidazolidin-2-ylidene)-(2-i-propoxy-5-nitrobenzylidene) ruthenium(II) diiodide nitro-Grela I2 *(1874264-99-9)*
$C_{31}H_{37}I_2N_3O_3Ru$; FW: 854.52; olive brown pwdr.
air sensitive, (store cold)
Note: Recommended storage 2-8°C.
Sold in collaboration with Apeiron Synthesis, Inc.
U.S. Patent 6/867,303 PCT/EP2003/01122.



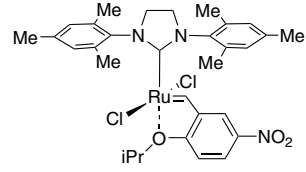
100mg
500mg

Technical Note:
1. Catalyst for metathesis applications.

References:
1. *Beilstein Journal of Organic Chemistry* **2015**, *11,* 1823-1832.

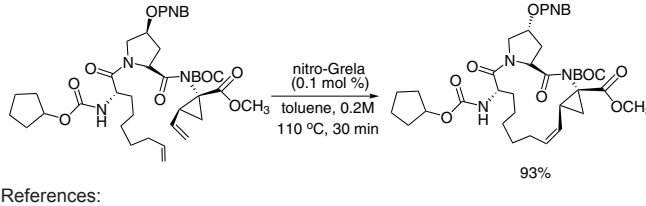
44-0758 NEW

[1,3-Bis(2,4,6-trimethylphenylimidazolidin-2-ylidene)]-(2-i-propoxy-5-nitrobenzylidene)ruthenium(II) dichloride nitro-Grela *(502964-52-5)*
$C_{31}H_{37}Cl_2N_3O_3Ru$; FW: 671.62; green pwdr.
Note: Sold in collaboration with Apeiron Synthesis, Inc. U.S. Patent 6,867,303, PCT/EP2003/01122. Aperion Ruthenium Metathesis Catalyst Kit component.



100mg
500mg

Technical Notes:
1. This catalyst is used for an efficient synthesis of HCV Protease Inhibitor, BILN 2061.
2. The nitro-Grela catalyst is a stable olefin metathesis initiator active in various ring-closing, cross, and enyne metathesis reactions. Its efficiency has been proven in numerous total syntheses of natural and biologically active compounds, and in material science (see Ref. 1-9)

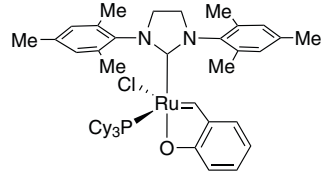


Tech. Note (1)
Ref. (1,2)

References:
1. *Org. Lett.,* **2008**, *1*, 1303
2. *Org. Process Res. Dev.,* **2009**, *13*, 250
3. *Org. Lett.,* **2013**, *15*, 1016
4. *Chem. Eur. J.,* **2013**, *19*, 11847
5. *Org. Lett.,* **2010**, *12*, 248
6. *Angew. Chem. Int. Ed.,* **2008**, *47*, 6483
7. *Tetrahedron Lett.,* **2006**, *47*, 6351
8. *J. Am. Chem. Soc.,* **2004**, *126*, 9318
9. *Angew. Chem. Int. Ed.,* **2002**, *41*, 4038

44-0753 NEW

[1,3-Bis(2,4,6-trimethylphenylimidazolidin-2-ylidene)](tricyclohexylphosphine)-(2-oxobenzylidene)ruthenium(II) chloride LatMet *(1407229-58-6)*
$C_{46}H_{65}ClN_2OPRu$; FW: 829.52; green pwdr.
Note: Sold in collaboration with Apeiron Synthesis, Inc. U.S. Patent 9,328,132, PCT/EP2013/065839. Aperion Ruthenium Metathesis Catalyst Kit component.



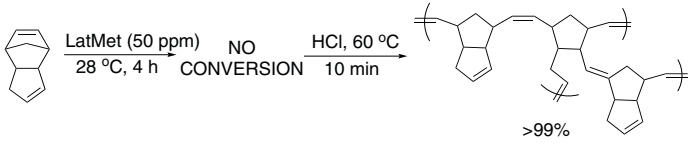
100mg
500mg

Technical Note:
1. This catalyst is used for olefin metathesis polymerization.

RUTHENIUM (Compounds)

44-0753 ***(continued)***

[1,3-Bis(2,4,6-trimethylphenylimidazolidin-2-ylidene)](tricyclohexylphosphine)-(2-oxobenzylidene)ruthenium(II) chloride LatMet *(1407229-58-6)*



Tech. Note (1)
Ref. (1,2)

References:

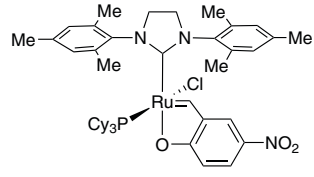
1. *Chem. Eur. J.,* **2014**, *20*, 14120
2. *Eur. J. Inorg. Chem.,* **2014**, *1131*

44-0787

NEW

[1,3-Bis(2,4,6-trimethylphenylimidazolidin-2-ylidene)(tricyclohexylphosphine)-(2-oxo-5-nitrobenzylidene)ruthenium(II) chloride Nitro-LatMet *(1544328-53-1)*

$C_{46}H_{64}ClN_3O_3PRu$; FW: 874.52; brown xtl.
air sensitive, (store cold)
Note: Recommended storage 2-8°C.
Sold in collaboration with Apeiron Synthesis, Inc.
U.S. Patent 9,328,132, PCT/EP2013/065839.



100mg
500mg

Technical Note:

1. Catalyst for metathesis applications.

References:

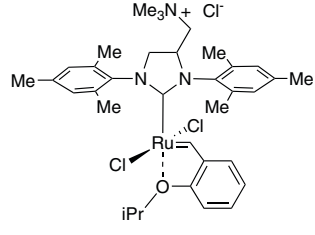
1. *Angew. Chem.***2017**, *129,* 1001 –1006.
2. *U.S. Pat. Appl. Publ.* **2015**, US 20150158896 A1 20150611.
3. *Chemistry - A European Journal,* **2014**, *20(43)*, 14120-14125.
4. *PCT Int. Appl.* **2014**, WO 2014016422 A1 20140130.
5. *European Journal of Inorganic Chemistry,* **2014**, *2014(7),* 1131-1136.

44-0765

NEW

[1,3-Bis(2,4,6-trimethylphenyl)-4-[(trimethylammonio)methyl]imidazolidin-2-ylidene]-(2-i-propoxybenzylidene) dichlororuthenium(II) chloride StickyCat Cl *(1452227-72-3)*

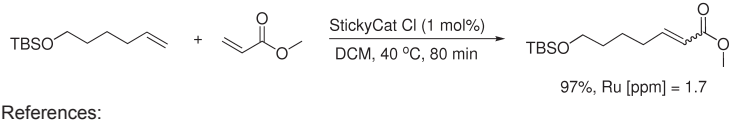
$C_{35}H_{48}Cl_3N_3ORu$; FW: 734.20; green pwdr.
Note: Sold in collaboration with Apeiron Synthesis, Inc. U.S. Patent 61/603,790, PCT/EP2013/053967. Aperion Ruthenium Metathesis Catalyst Kit component.



100mg
500mg

Technical Note:

1. This is an easily removable olefin metathesis catalyst. It shows high activity at 40-110°C. Residual ruthenium metal is usually below 5 ppm.



Tech. Note (1)
Ref. (1)

References:

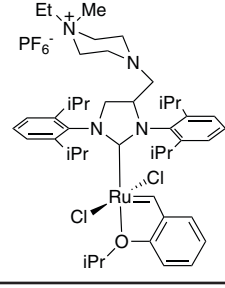
1. *Green Chem.,* **2012**, *14*, 3264

44-0797

NEW

Dichloro(1,3-Bis(2,6-di-i-propylphenyl)-4-((4-ethyl-4-methylpiperzain-1-ium-1-yl)methyl)imidazolidin-2-ylidene)(2-isopropoxybenzylidene)ruthenium(II) hexafluorophosphate FixCat PF6

$C_{45}H_{67}Cl_2F_6N_4OPRu$; FW: 996.98; green pwdr.
air sensitive, (store cold)
Note: Recommended storage 2-8°C.
Sold in collaboration with Apeiron Synthesis, Inc.
U.S. Patent 61/603,790 PCT/EP2013/053967.



100mg
500mg

Technical Note:

1. Catalyst for metathesis applications.

References:

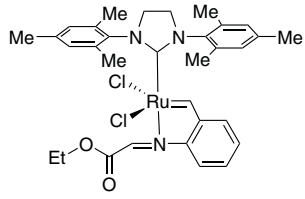
1. *Angew. Chem.***2017**, *129,* 1001 –1006.

RUTHENIUM (Compounds)

44-0760 NEW

Dichloro(1,3-bis(2,4,6-trimethylphenyl) imidazolidin-2-ylidene){2-[(ethoxy-2-oxoethylidene)amino]benzylidene} ruthenium(II) HeatMet

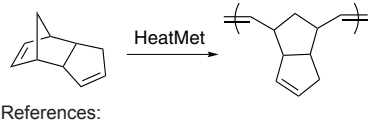
$C_{32}H_{37}Cl_2N_3O_2Ru$; FW: 667.63; dark purple xtls.
(store cold)
Note: Sold in collaboration with Apeiron Synthesis, Inc. U.S. Patent 14/443,034; PCT/IN2013/002543.



100mg
500mg

Technical Note:

1. HeatMet catalyst is a highly efficient latent catalyst, requiring thermal activation to initiate catalytic activity. Its characteristics are especially suitable to mold polymerization of reactive monomers such as dicyclopentadiene (DCPD). The catalyst is soluble in toluene and dichloromethane.



Tech. Note (1)
Ref. (1)

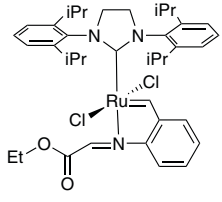
References:

1. *ChemSus Chem.*, **2015**, *8*, 4139.

44-0792 NEW

Dichloro(1,3-di-i-propylphenylimidazolidin-2-ylidene){2-[(ethoxy-2-oxoethylidene)amino] benzylidene} ruthenium(II) HeatMet SIPr *(2097273-88-4)*

$C_{38}H_{49}Cl_2N_3O_2Ru$; FW: 751.79; dark violet pwdr.
air sensitive, (store cold)
Note: Recommended storage 2-8°C.
Sold in collaboration with Apeiron Synthesis, Inc. U.S. Patent 14/443,034.



100mg
500mg

Technical Note:

1. Catalyst for metathesis applications.

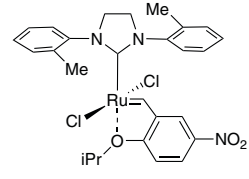
References:

1. *ACS Catalysis*, **2017**, *7(6),* 4115-4121.

44-0740 NEW

(1,3-Di-o-tolylimidazolidin-2-ylidene) (2-i-propoxy-5-nitrobenzylidene) dichlororuthenium(II) Nitro-Grela SI-o-Tolyl

$C_{27}H_{29}Cl_2N_3O_3Ru$; FW: 615.51; green pwdr.
air sensitive, (store cold)
Note: Recommended storage 2-8°C. Sold in collaboration with Apeiron Synthesis, Inc. U.S. Patent 6/867,303 PCT/EP2003/01122.



100mg
500mg

Technical Note:

1. Catalyst for metathesis applications.

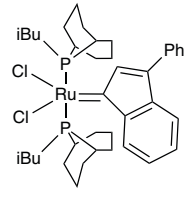
References:

1. *Angew. Chem.***2017**, *129,* 1001 –1006.

44-7778

3-Phenyl-1H-inden-1-ylidene[bis(i-butylphobane)] ruthenium(II) dichloride *(894423-99-5)*

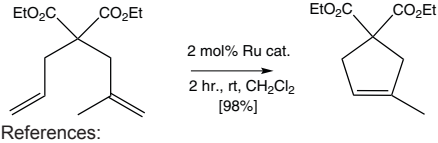
$C_{39}H_{56}Cl_2P_2Ru$; FW: 758.78; red pwdr.
Note: Sold in collaboration with Umicore for research purposes only. Patent US 10,518,716.



250mg
1g

Technical Note:

1. This catalyst exhibits high selectivity as a general purpose metathesis catalyst for applications other than polymerization. It has improved air, moisture and heat resistance.

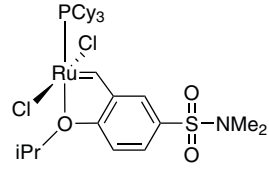


References:

1. *J. Org. Chem.,* **2008**, *73*, 259

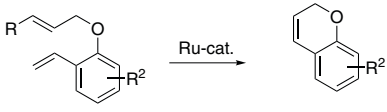
RUTHENIUM (Compounds)

44-0078 **{[2-(i-Propoxy)-5-(N,N-dimethylaminosulfonyl) phenyl]methylene}(tricyclohexylphosphine) ruthenium(II) dichloride Zhan Catalyst -1C** *(918871-44-0)*
$C_{30}H_{50}Cl_2NO_3PRuS$; FW: 707.74; brown solid
Note: Sold under license from Zannan for research purposes only. Patents CN1907992A, US 2007/0043180 A1, PCT WO 2007/003135 A1.

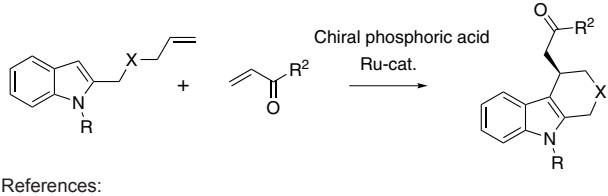


500mg
2g

Technical Notes:
1. Efficient, air-stable metathesis catalyst.
2. Used in cross-metathesis/Friedel-Crafts Cascade reaction.



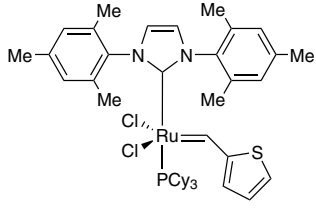
Tech. Note (1)



Tech. Note (2)
Ref. (2)

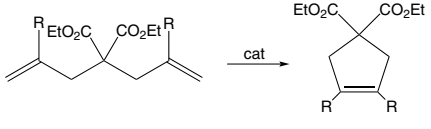
References:
1. PCT Int. Appl. (2007), WO 2007003135 A1
2. *Angew. Chem. Int. Ed.,* **2009**, *48*, 7428

44-7785 **Tricyclohexylphosphine[1,3-bis(2,4,6-trimethylphenyl) imidazol-2-ylidene][2-thienylmethylene] ruthenium(II) dichloride, min. 95% [catMETium® RF 2]** *(1190427-49-6)*
$C_{44}H_{61}Cl_2N_2PRuS$; FW: 852.98; brown pwdr.
Note: Sold in collaboration with Evonik for research purposes only.
Patent US 6635768.



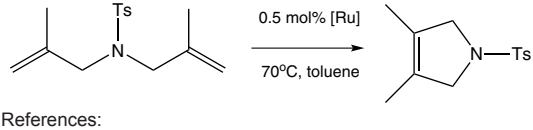
100mg
500mg
2g

Technical Note:
1. Efficient catalyst for ring-closing metathesis.



R = H 88% (25° C, 25 mins)
R = CH_3 20% (80° C, 120 mins)

Ref. (1)

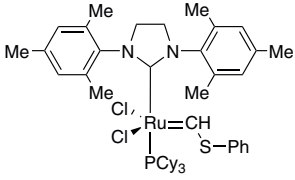


Ref. (2)

References:
1. *Organometallics,* **1999**, *18*, 5416
2. *ChemistryToday,* **2009**, *27*, 24

RUTHENIUM (Compounds)

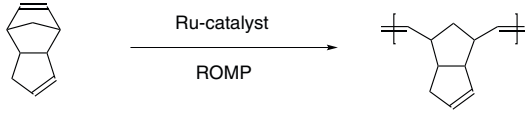
44-7780 **Tricyclohexylphosphine[1,3-bis(2,4,6-trimethylphenyl)-4,5-dihydroimidazol-2-ylidene][(phenylthio)methylene] ruthenium(II) dichloride** *(1155422-69-7)*
$RuCl_2[C_{21}H_{26}N_2][C_7H_6S][P(C_6H_{11})_3]$; FW: 881.04; purple-brown solid



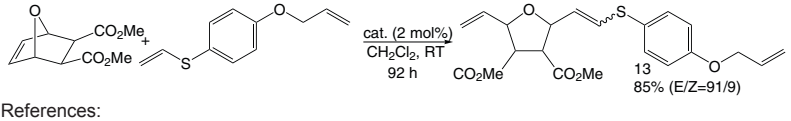
100mg
500mg

Technical Notes:

1. Metathesis catalyst, stable in air and can be used in aqueous media.
2. Catalyst of choice for the ring-opening metathesis polymerization of cycloolefins.
3. Catalyst concentration 2-3 times lower than comparable phenyl and vinyl substituted ruthenium carbenes.
4. Excellent initiator for solvent-free polymerization and control of initiation rates and gelation times.
5. Highly selective catalyst for the ring opening/cross-metathesis of norbornene derivatives.



Tech. Note (2)
Ref. (2)

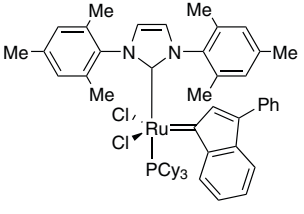


Tech. Note (5)
Ref. (3)

References:

1. *J. Org. Chem.,* **2000**, *606*, 65.
2. "Ring Opening Metathesis Polymerization of Related Chemistry", NATO Science Series II, **2002**, 23.
3. *Organometallics,* **2003**, *22*, 586.

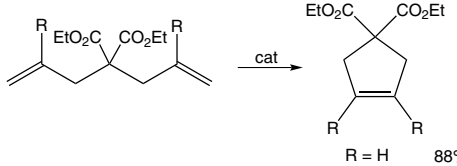
44-7775 **Tricyclohexylphosphine[1,3-bis(2,4,6-trimethylphenyl)imidazol-2-ylidene][3-phenyl-1H-inden-1-ylidene]ruthenium(II) dichloride, min. 95% [catMETium® RF1]** *(254972-49-1)*
$RuCl_2[C_{21}H_{24}N_2][C_{15}H_{10}][P(C_6H_{11})_3]$; FW: 947.07; orange to brown pwdr.
Note: Sold in collaboration with Evonik for research purposes only. Patent US 6635768. For use in pharmaceutical applications only. Other uses are unauthorized.



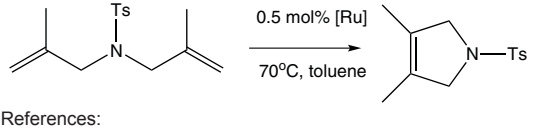
100mg
500mg
2g

Technical Note:

1. Efficient catalyst for ring-closing metathesis.



Ref. (1)



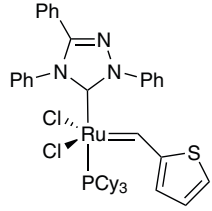
Ref. (2)

References:

1. *Organometallics,* **1999**, *18*, 5416
2. *ChemistryToday,* **2009**, *27*, 24

RUTHENIUM (Compounds)

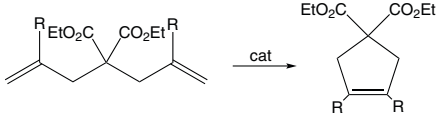
44-7795 **Tricyclohexylphosphine[2,4-dihydro-2,4,5-triphenyl-3H-1,2,4-triazol-3-ylidene][2-thienylmethylene] ruthenium(II) dichloride, min. 95% [catMETium® RF 4]** *(1190427-51-0)*
$C_{43}H_{52}Cl_2N_3PRuS$; FW: 845.91; violet to brown pwdr.
Note: Sold in collaboration with Evonik for research purposes only. Patent US 6635768.



100mg
500mg
2g

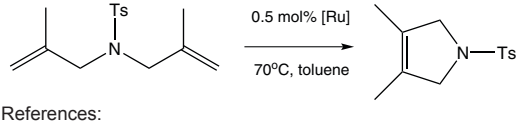
Technical Note:

1. Efficient catalyst for ring-closing metathesis.



R = H 88% (25° C, 25 mins)
R = CH_3 20% (80° C, 120 mins)

Ref. (1)

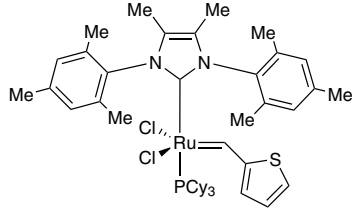


Ref. (2)

References:

1. *Organometallics,* **1999**, *18*, 5416
2. *ChemistryToday,* **2009**, *27*, 24

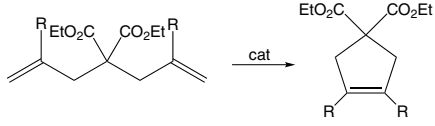
44-7790 **Tricyclohexylphosphine[4,5-dimethyl-1,3-bis(2,4,6-trimethylphenyl)imidazol-2-ylidene][2-thienylmethylene] ruthenium(II) dichloride, min. 95% [catMETium® RF 3]** *(1190427-50-9)*
$C_{46}H_{65}Cl_2N_2PRuS$; FW: 881.04; violet to brown pwdr.
Note: Sold in collaboration with Evonik for research purposes only. Patent US 6635768.



100mg
500mg
2g

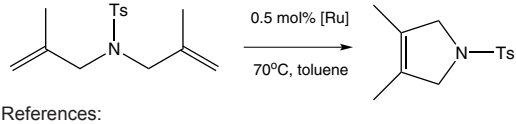
Technical Note:

1. Efficient catalyst for ring-closing metathesis.



R = H 88% (25° C, 25 mins)
R = CH_3 20% (80° C, 120 mins)

Ref. (1)



Ref. (2)

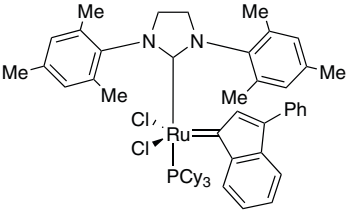
References:

1. *Organometallics,* **1999**, *18*, 5416
2. *ChemistryToday,* **2009**, *27*, 24

RUTHENIUM (Compounds)

44-7777 — 100mg, 500mg

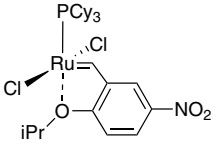
Tricyclohexylphosphine[3-phenyl-1H-inden-1-ylidene][1,3-bis(2,4,6-trimethylphenyl)-4,5-dihydroimidazol-2-ylidene]ruthenium(II) dichloride, min. 95% *(536724-67-1)*
$C_{54}H_{69}Cl_2N_2PRu$; FW: 949.09;
dark red pwdr.
Note: Sold in collaboration with Umicore for research purposes only. For use in lifescience applications and research purposes only.



44-0763 — 100mg, 500mg

NEW

Tricyclohexylphosphine(2-i-propoxy-5-nitrobenzylidene)dichlororuthenium(II) Nitro-Grela 1 gen. *(625082-83-9)*
$C_{28}H_{44}Cl_2NO_3PRu$; FW: 645.60; brown pwdr.
air sensitive, (store cold)
Note: Recommended storage 2-8°C. Sold in collaboration with Apeiron Synthesis, Inc.
U.S. Patent 6/867,303 PCT/EP2003/01122.



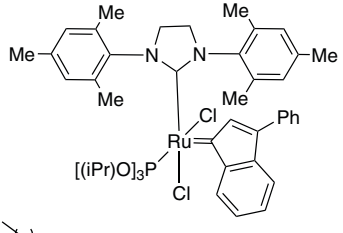
Technical Note:
1. Catalyst for metathesis applications.

References:

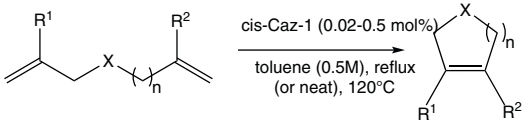
1. *ACS Catalysis,* **2017**, *7(8),* 5443-5449.
2. *Angew. Chem.***2017**, *129,* 1001 –1006.
3. *Chemistry - A European Journal*, **2014**, *20(42)*, 13716-13721.
4. *Advanced Synthesis & Catalysis*, **2013**, *355(10),* 1997-2006.

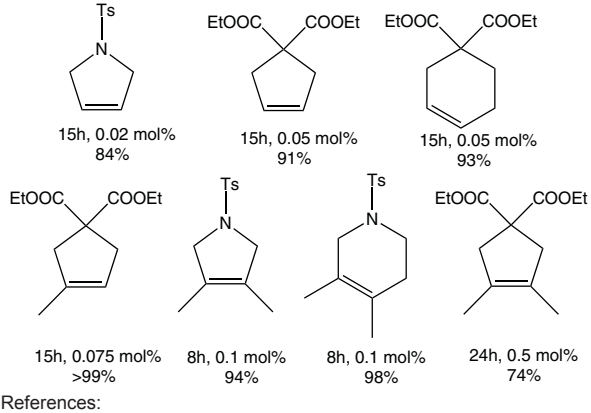
44-7783 — 50mg, 250mg

Tri(i-propoxy)phosphine(3-phenyl-1H-inden-1-ylidene)[1,3-bis(2,4,6-trimethylphenyl)-4,5-dihydroimidazol-2-ylidene] ruthenium (II) dichloride, min. 95% cis-Caz-1
$C_{45}H_{57}Cl_2N_2O_3PRu$; FW: 876.89;
brown pwdr.



Technical Note:
1. Efficient catalyst for ring-closing metathesis.





References:

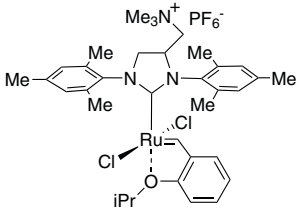
1. *Chem. Commun,* **2010**, 7115

METATHESIS KITS - Apeiron Ammonium Catalysts Kit

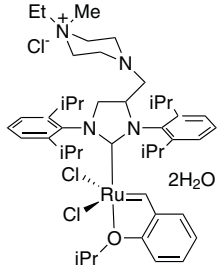
96-0440 **Apeiron Ammonium Catalysts Kit**

NEW

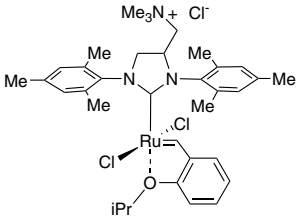
Sold in collaboration with Apeiron Synthesis, Inc.
Components also available for individual sale. Contains the following:



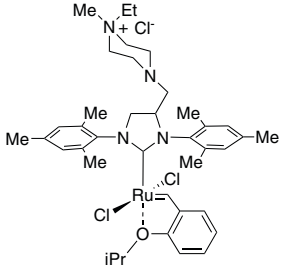
44-0755 100mg



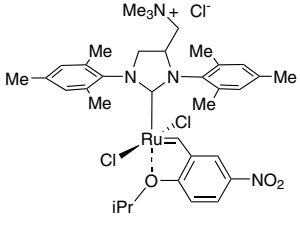
44-0759 100mg



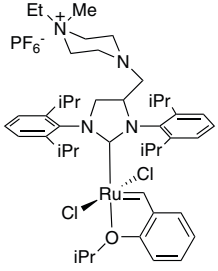
44-0765 100mg



44-0768 100mg



44-0795 100mg



44-0797 100mg

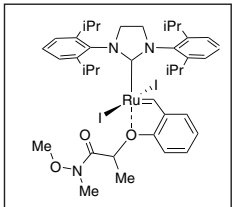
44-0755	1,3-Bis(2,4,6-trimethylphenyl)-4-[(trimethylammonio) methyl]imidazolidin-2-ylidene]-(2-i-propoxybenzylidene) dichlororuthenium(II) hexafluorophosphate StickyCat PF6	100mg	See page 4
44-0759	(1,3-Bis(2,6-diisopropylphenyl)-4-((4-ethyl-4-methylpiperzain-1-ium-1-yl)methyl)imidazolidin-2-ylidene) (2-isopropoxybenzylidene)ruthenium(II)dichloride chloride dihydrate FixCat *(1799947-97-9)*	100mg	See page 1
44-0765	[1,3-Bis(2,4,6-trimethylphenyl)-4-[(trimethylammonio) methyl]imidazolidin-2-ylidene]-(2-i-propoxybenzylidene) dichlororuthenium(II) chloride StickyCat Cl *(1452227-72-3)*	100mg	See page 9
44-0768	[1,3-Bis(2,4,6-trimethylphenyl)-4-[(4-ethyl-4-methylpiperazin-1-ium-1-yl)methyl]imidazolidin-2-ylidene]-(2-i-propoxybenzylidene)dichlororuthenium(II) chloride AquaMet *(1414707-08-6)*	100mg	See page 6
44-0795	1,3-Bis(2,4,6-trimethylphenyl)-4-[(trimethylammonio) methyl]imidazolidin-2-ylidene]-(2-i-propoxy-5-nitrobenzylidene)dichlororuthenium(II) chloride nitro-StickyCat Cl *(1415661-45-8)*	100mg	See page 4
44-0797	Dichloro(1,3-Bis(2,6-di-i-propylphenyl)-4-((4-ethyl-4-methylpiperzain-1-ium-1-yl)methyl)imidazolidin-2-ylidene)(2-isopropoxybenzylidene)ruthenium(II) hexafluorophosphate FixCat PF6	100mg	See page 9

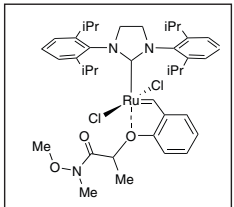
METATHESIS KITS - Apeiron Bulky Catalysts Kit

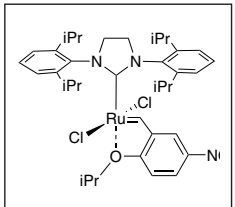
96-0420 **Apeiron Bulky Catalysts Kit**

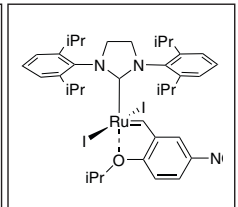
NEW

Sold in collaboration with Apeiron Synthesis, Inc.
Components also available for individual sale. Contains the following:


44-0748 100mg


44-0750 100mg


44-0770 100mg


44-0782 100mg

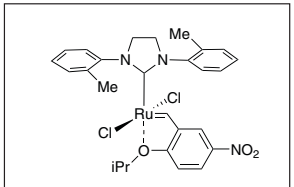
44-0748	[1,3-Bis(2,6-di-i-propylphenyl)imidazolidin-2-ylidene] [(2-((1-methoxy(methyl)amino)-1-oxopropan-2-yl)oxy] benzylidenediiodoruthenium(II) GreenCat-I2	100mg	See page 2
44-0750	[1,3-Bis(2,6-di-i-propylphenyl)imidazolidin-2-ylidene] {2-[[1-(methoxy(methyl)amino)-1-oxopropan-2-yl]oxy]benzylidene} ruthenium(II) dichloride GreenCat *(1448663-06-6)*	100mg	See page 2
44-0770	1,3-Bis(2,6-di-i-propylphenyl)imidazolidin-2-ylidene)(2-i-propoxy-5-nitrobenzylidene) ruthenium(II) dichloride nitro-Grela SiPr *(928795-51-1)*	100mg	See page 2
44-0782	[1,3-Bis(2,6-di-i-propylphenyl)imidazolidin-2-ylidene)(2-i-propoxy-5-nitrobenzylidene) ruthenium(II) diiodide nitro-Grela I2 SIPr *(1874265-00-5)*	100mg	See page 3

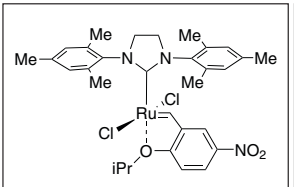
METATHESIS KITS - Apeiron nitro-Grela Catalysts Kit

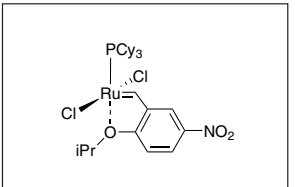
96-0410 **Apeiron nitro-Grela Catalysts Kit**

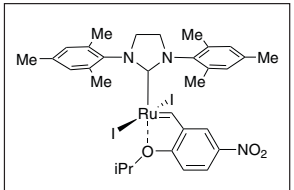
NEW

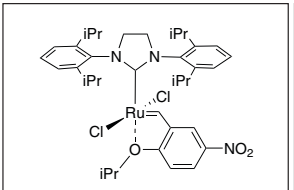
Sold in collaboration with Apeiron Synthesis, Inc.
Components also available for individual sale. Contains the following:

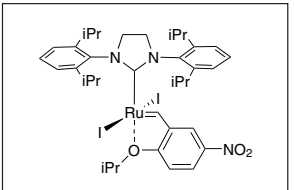

44-0740 100mg


44-0758 100mg


44-0763 100mg


44-0767 100mg


44-0770 100mg


44-0782 100mg

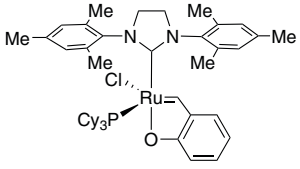
44-0740	(1,3-Di-o-tolylimidazolidin-2-ylidene)(2-i-propoxy-5-nitrobenzylidene)dichlororuthenium(II) nitro-Grela SI-o-Tolyl	100mg	See page 10
44-0758	[1,3-Bis(2,4,6-trimethylphenylimidazolidin-2-ylidene)]-(2-i-propoxy-5-nitrobenzylidene)ruthenium(II) dichloride nitro-Grela *(502964-52-5)*	100mg	See page 8
44-0763	Tricyclohexylphosphine(2-i-propoxy-5-nitrobenzylidene) dichlororuthenium(II) nitro-Grela 1 gen. *(625082-83-9)*	100mg	See page 14
44-0767	[1,3-Bis(2,4,6-trimethylphenyl)imidazolidin-2-ylidene)-(2-i-propoxy-5-nitrobenzylidene) ruthenium(II) diiodide nitro-Grela I2 *(1874264-99-9)*	100mg	See page 8
44-0770	1,3-Bis(2,6-di-i-propylphenyl)imidazolidin-2-ylidene)(2-i-propoxy-5-nitrobenzylidene) ruthenium(II) dichloride nitro-Grela SiPr *(928795-51-1)*	100mg	See page 2
44-0782	[1,3-Bis(2,6-di-i-propylphenyl)imidazolidin-2-ylidene)(2-i-propoxy-5-nitrobenzylidene) ruthenium(II) diiodide nitro-Grela I2 SIPr *(1874265-00-5)*	100mg	See page 3

METATHESIS KITS - Apeiron Polymerization Catalysts Kit

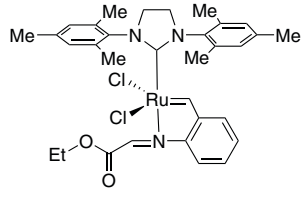
96-0430 **Apeiron Polymerization Catalysts Kit**

NEW

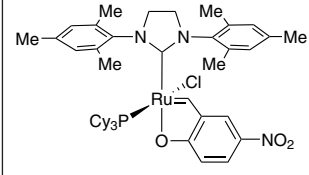
Sold in collaboration with Apeiron Synthesis, Inc.
Components also available for individual sale. Contains the following:



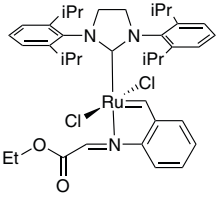
44-0753 100mg



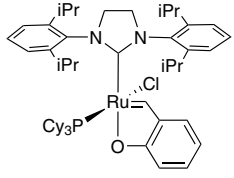
44-0760 100mg



44-0787 100mg



44-0792 100mg



44-0793 100mg

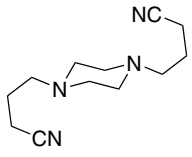
44-0753	[1,3-Bis(2,4,6-trimethylphenylimidazolidin-2-ylidene)] (tricyclohexylphosphine)-(2-oxobenzylidene)ruthenium(II) chloride LatMet *(1407229-58-6)*	100mg	See page 8
44-0760	Dichloro(1,3-bis(2,4,6-trimethylphenyl)imidazolidin-2-ylidene){2-[(ethoxy-2-oxoethylidene)amino]benzylidene} ruthenium(II) HeatMet	100mg	See page 10
44-0787	[1,3-Bis(2,4,6-trimethylphenylimidazolidin-2-ylidene) (tricyclohexylphosphine)-(2-oxo-5-nitrobenzylidene) ruthenium(II) chloride Nitro-LatMet *(1544328-53-1)*	100mg	See page 9
44-0792	Dichloro(1,3-di-i-propylphenylimidazolidin-2-ylidene) {2-[(ethoxy-2-oxoethylidene)amino]benzylidene} ruthenium(II) HeatMet SIPr *(2097273-88-4)*	100mg	See page 10
44-0793	[1,3-Bis(2,6-di-i-propylphenyl)imidazolidin-2-ylidene) (tricyclohexylphosphine)-(2-oxobenzylidene)ruthenium(II) chloride LatMet SIPr *(1544328-59-7)*	100mg	See page 3

METATHESIS KITS - Apeiron Ruthenium Metathesis Catalyst Kit

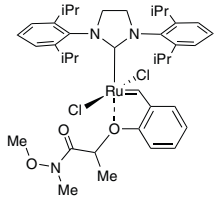
96-0400 **Apeiron Ruthenium Metathesis Catalyst Kit**

NEW

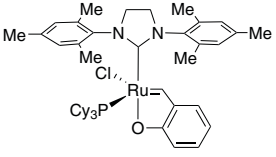
Sold in collaboration with Apeiron Synthesis, Inc.
This kit also includes a metal scavenger (07-2203).
Components also available for individual sale. Contains the following:



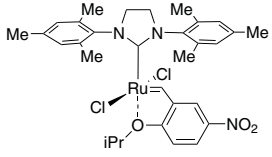
07-2203 1g



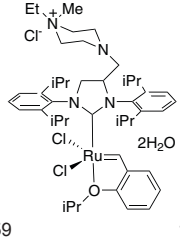
44-0750 100mg



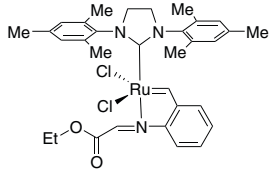
44-0753 100mg



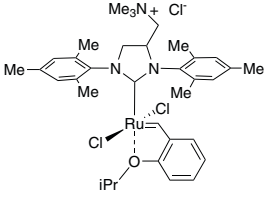
44-0758 100mg



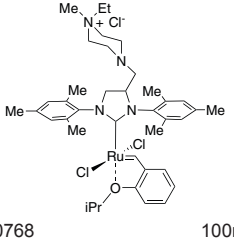
44-0759 100mg



44-0760 100mg



44-0765 100mg



44-0768 100mg

07-2203	1,4-Bis(2-isocyanopropyl)piperazine (SnatchCat Metal Scavenger) *(51641-96-4)*	1g	Visit strem.com
44-0750	[1,3-Bis(2,6-di-i-propylphenyl)imidazolidin-2-ylidene] {2-[[1-(methoxy(methyl)amino)-1-oxopropan-2-yl]oxy] benzylidene}ruthenium(II) dichloride GreenCat *(1448663-06-6)*	100mg	See page 2
44-0753	[1,3-Bis(2,4,6-trimethylphenylimidazolidin-2-ylidene)] (tricyclohexylphosphine)-(2-oxobenzylidene)ruthenium(II) chloride LatMet *(1407229-58-6)*	100mg	See page 8
44-0758	[1,3-Bis(2,4,6-trimethylphenylimidazolidin-2-ylidene)]-(2-i-propoxy-5-nitrobenzylidene)ruthenium(II) dichloride nitro-Grela *(502964-52-5)*	100mg	See page 8
44-0759	(1,3-Bis(2,6-diisopropylphenyl)-4-((4-ethyl-4-methylpiperzain-1-ium-1-yl)methyl)imidazolidin-2-ylidene) (2-isopropoxybenzylidene)ruthenium(II)dichloride chloride dihydrate FixCat *(1799947-97-9)*	100mg	See page 1
44-0760	Dichloro(1,3-bis(2,4,6-trimethylphenyl)imidazolidin-2-ylidene) {2-[(ethoxy-2-oxoethylidene)amino]benzylidene}ruthenium(II) HeatMet	100mg	See page 10
44-0765	[1,3-Bis(2,4,6-trimethylphenyl)-4-[(trimethylammonio) methyl]imidazolidin-2-ylidene]-(2-i-propoxybenzylidene) dichlororuthenium(II) chloride StickyCat Cl *(1452227-72-3)*	100mg	See page 9
44-0768	[1,3-Bis(2,4,6-trimethylphenyl)-4-[(4-ethyl-4-methylpiperazin-1-ium-1-yl)methyl]imidazolidin-2-ylidene]-(2-i-propoxybenzylidene) dichlororuthenium(II) chloride AquaMet *(1414707-08-6)*	100mg	See page 6

RECENTLY ADDED - RUTHENIUM (Compounds)

44-0775 NEW

Bis(1-(2,6-diethylphenyl)-3,5,5-trimethyl-3-phenylpyrrolidin-2-ylidene)(3-phenyl-1H-inden-1-ylidene)ruthenium(II) dichloride UltraCat *(2055540-61-7)*

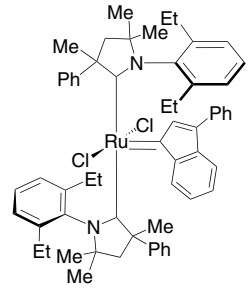
$C_{61}H_{68}Cl_2N_2Ru$; FW: 1001.18; burgundy pwdr.

air sensitive, (store cold)

Note: Sold in collaboration with Apeiron Synthesis, Inc.

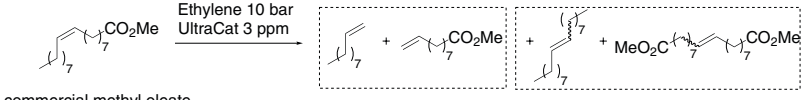
Patent: PCT/IB2016/054486.

100mg
500mg



Technical Note:

1. Highly selective versatile cross metathesis catalyst fleading to terminal olefins and internal olefins, such as ethenolysis via ring closing metathesis (including challenging macrocyclization), cross metathesis (involving electron deficient partners like acrylates), or ene-yne metathesis. These transformations are highly selective and take place at exceptionally low catalyst loadings.



commercial methyl oleate
92% purity

Products

Side-products

Tech. Note (1)
Ref. (1)

selectivity = 95%; TON = 88000

References:

1. *Angew. Chem. Int. Ed. Engl.*, **2017**, *56*, 981-986.

44-0778 NEW

(1-(2,6-Diethylphenyl)-3,5,5-trimethyl-3-phenylpyrrolidin-2-ylidene)(2-isopropoxy-5-nitrobenzylidene)ruthenium(II) dichloride UltraNitroCat *(2106819-64-9)*

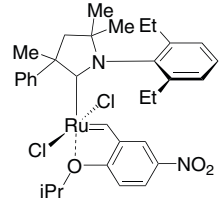
$C_{33}H_{40}Cl_2N_2O_3Ru$; FW: 684.66; green pwdr.

air sensitive, (store cold)

Note: Sold in collaboration with Apeiron Synthesis, Inc.

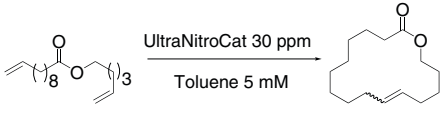
Patent: PCT/IB2016/054486.

100mg
500mg



Technical Note:

1. High turnover selective catalyst for cross metathesis in macrocyclization reactions.



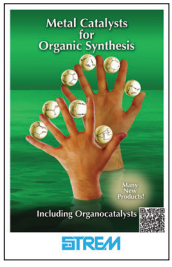
Tech. Note (1)
Ref. (1)

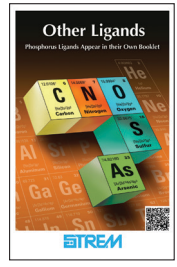
GC yield = 90%; TON = 30000

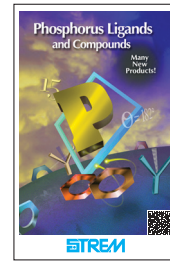
References:

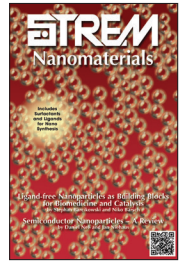
1. *ACS Catal.,* **2017**, *7*, 5443-5449

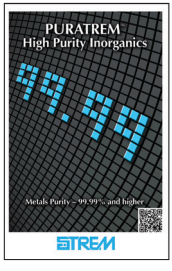
Available Booklets

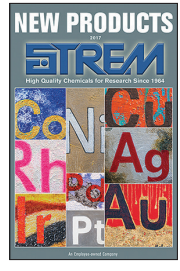


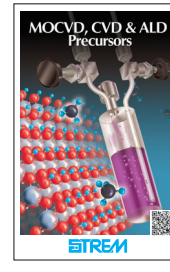


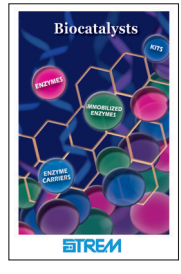


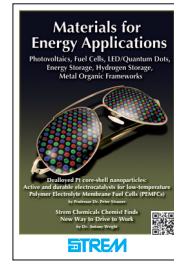


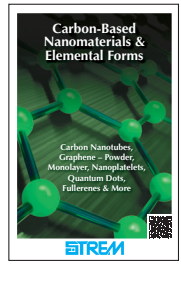


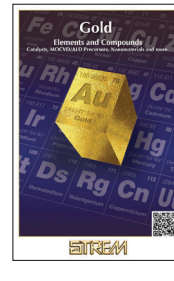












Visit strem.com for new product announcements.

The Strem Product Line

OUR LINE OF RESEARCH CHEMICALS
Biocatalysts & Organocatalysts
Electronic Grade Chemicals
Fullerenes
High Purity Inorganics & Alkali Metals
Ionic liquids
Ligands & Chiral Ligands
Metal Acetates & Carbonates
Metal Alkoxides & beta-Diketonates
Metal Alkyls & Alkylamides
Metal Carbonyls & Derivatives
Metal Catalysts & Chiral Catalysts
Metal Foils, Wires, Powders & Elements
Metal Halides, Hydrides & Deuterides
Metal Oxides, Nitrates & Chalcogenides
Metal Scavengers
Metallocenes
Nanomaterials
Organofluorines
Organometallics
Organophosphines & Arsines
Porphines & Phthalocyanines
Precious Metal & Rare Earth Chemicals
Volatile Precursors for MOCVD, CVD & ALD

Custom Synthesis

cGMP Facilities

FDA Inspected

Drug Master Files

Complete Documentation

Strem Chemicals, Inc.

7 Mulliken Way
Dexter Industrial park
Newburyport, MA 01950-4098
U.S.A

Office Tel: (978) 499-1600
Office Fax: (978) 465-3104

Toll-free (U.S. & Canada)
Tel: (800) 647-8736
Fax: (800) 517-8736

Email: info@strem.com
www.strem.com

Strem Chemicals, Inc.

15, rue de l'Atome
Zone Industrielle
F-67800 BISCHHEIM (France)
Tel.: +33 (0) 3 88 62 52 60
Fax: +33 (0) 3 88 62 26 81
Email: info.europe@strem.com

Strem Chemicals, Inc.

Postfach 1215
D-77672 KEHL, Germany
Tel.: +49 (0) 7851 75879
Fax: +33 (0) 3 88 62 26 81
Email: info.europe@strem.com

Strem Chemicals UK, Ltd.

An Independent Distributor
of Strem Chemicals Products
Newton Hall, Town Street
Newton, Cambridge, CB22 7ZE, UK
Tel: +44 (0)1223 873 028
Fax: +44 (0)1223 870207
Email: enquiries@strem.co.uk

METATHESIS

© 2018 Strem Chemicals, Inc.