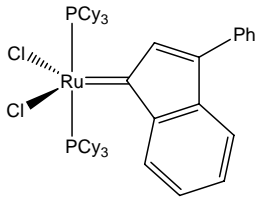
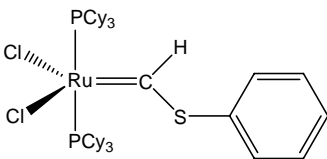
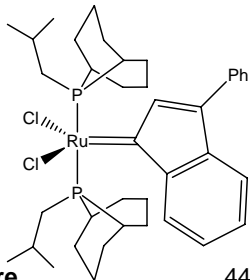
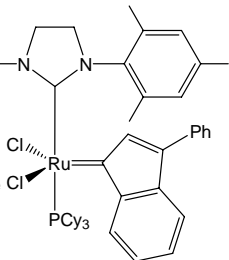
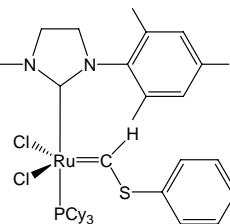
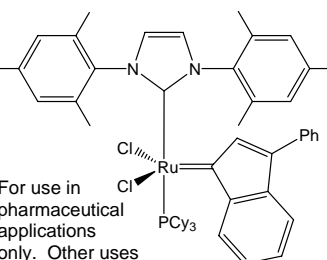
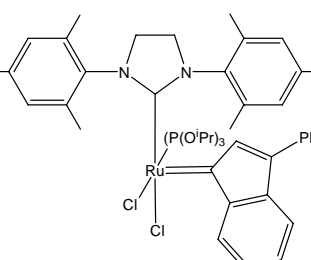
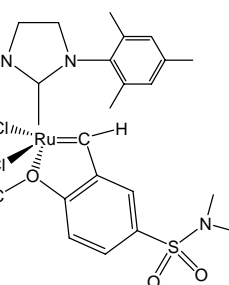
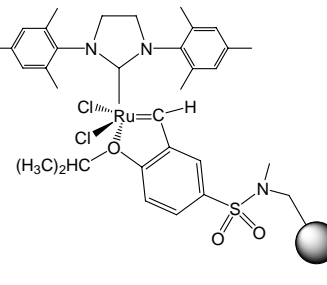
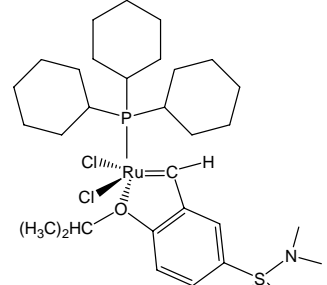
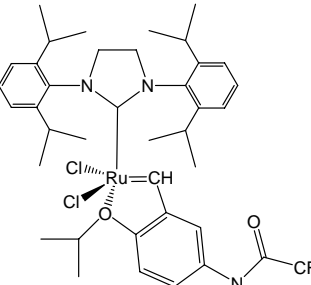
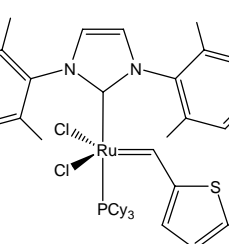
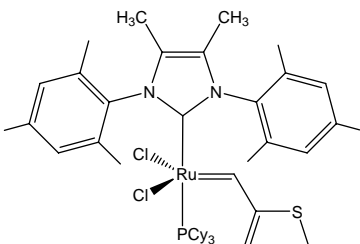
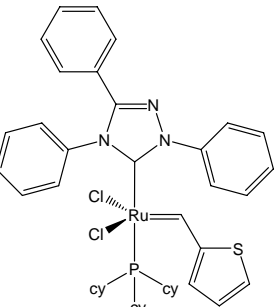


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 <p>For use in lifecycle Cl applications and for research purposes only.</p> <p>with Umicore 44-7777</p>	 <p>with BASF 44-7780 Patents US 6,407,190, EP 993,465</p>	 <p>For use in pharmaceutical applications only. Other uses are unauthorized.</p> <p>with Evonik 44-7775 Patent US 6635768</p>	 <p>with Cazin 44-7783</p>
 <p>with Zannan 44-0082 Patents CN1907992A, US 2007/0043180 A1, PCT WO 2007/003135 A1.</p>	 <p>with Zannan 44-0083 Patents CN1907992A, US 2007/0043180 A1, PCT WO 2007/003135 A1.</p>	 <p>with Zannan 44-0078 Patents CN1907992A, US 2007/0043180 A1, PCT WO 2007/003135 A1.</p>	 <p>with Omega Cat System 44-0055 Patents WO 2008/065187, PCT/EP2008/054901, Fr n°08/05403.</p>
 <p>with Evonik 44-7785 Patent US 6635768</p>	 <p>with Evonik 44-7790 Patent US 6635768</p>	 <p>with Evonik 44-7795 Patent US 6635768</p>	

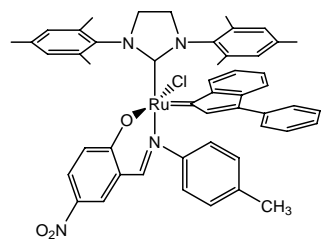
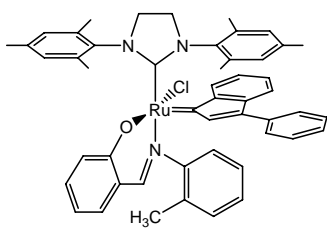
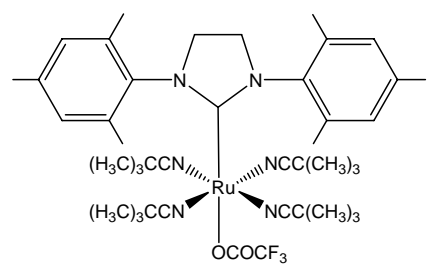
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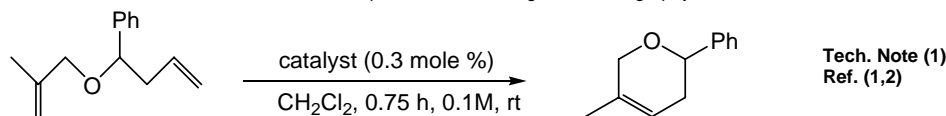
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 <p>with Umicore 44-0047 Patent EP 1 468 004 B1, US 2002/0349956</p>	 <p>with Umicore 44-0049 Patent EP 1 468 004 B1, US 2002/0349956</p>	 <p>with ITCF 44-7712 DE 102008008299, US 12/866.806</p>
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44-0055 NEW →	[1,3-Bis(2,6-di- <i>i</i> -propylphenyl)-4,5-dihydroimidazol-2-ylidene]-[2- <i>i</i> -propoxy-5-(trifluoroacetamido)phenyl]methyleneruthenium(II) dichloride (omega CS1) C ₃₉ H ₅₀ Cl ₂ F ₃ N ₃ O ₂ Ru; FW: 821.80; brown powdr. Note: Sold under license from Omega Cat System for research purposes only WO 2008/065187, PCT/EP2008/054901, Fr n°08/05403.	100mg 500mg
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Technical Note:

- 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.



References:

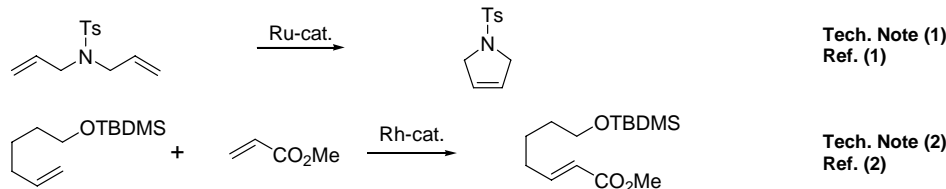
- Eur. J. Org. Chem.*, **2009**, ASAP.
- J. Org. Chem.*, **2008**, 73, 4225.

>98%, 1.8 ppm Ru after silica gel

44-0063	Bis(tricyclohexylphosphine)-3-phenyl-1H-inden-1-ylideneruthenium(II) dichloride [250220-36-1] RuCl ₂ (C ₁₅ H ₁₀)[P(C ₆ H ₁₁) ₃] ₂ ; FW: 923.07; brown powdr. Note: Sold in collaboration with Umicore for research purposes only.	1g 5g
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Technical Notes:

- Highly active, air-stable catalyst used for the ring closing metathesis of dienes.
- Used in cross-metathesis.



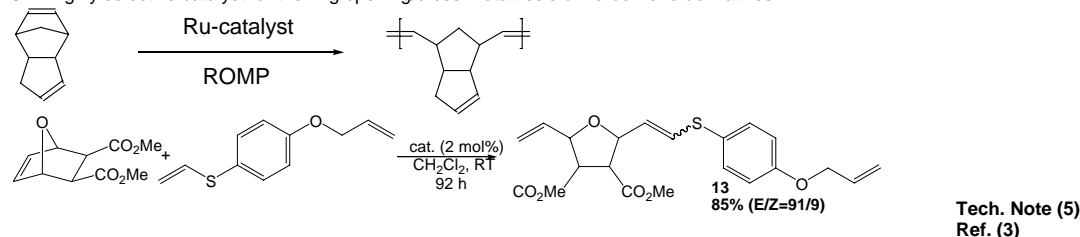
References:

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

44-0073	Bis(tricyclohexylphosphine)[(phenylthio)methylene]ruthenium(II) dichloride, min. 97% [219770-99-7] RuCl ₂ (CHSC ₆ H ₅)[P(C ₆ H ₁₁) ₃] ₂ ; FW: 855.02; purple powdr. Note: Sold in collaboration with BASF for research purposes only. Patents: US 6,407,190 and EP 993,465.	1g 5g
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Technical Notes:

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



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44-0073 Bis(tricyclohexylphosphine)[(phenylthio)methylene]ruthenium(II) dichloride, min. 97% [219770-99-7]
(cont.)

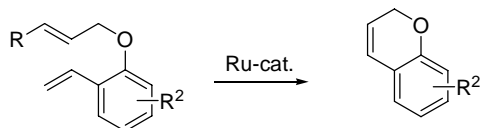
References:

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.

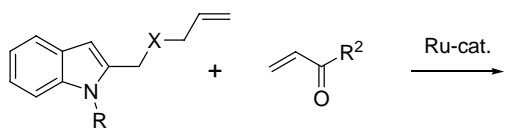
44-0082 1,3-Bis(2,4,6-trimethylphenyl)-4,5-dihydroimidazol-2-ylidene[2-(i-propoxy)-5-(N,N-dimethylaminosulfonyl)phenyl]methylene ruthenium(II) dichloride Zhan Catalyst-1B [918870-76-5] 100mg
 $\text{RuCl}_2[\text{C}_{21}\text{H}_{26}\text{N}_2][\text{C}_{12}\text{H}_{17}\text{NO}_3\text{S}]$; FW: 733.75; green solid 500mg
 Note: Sold under license from Zannan for research purposes only. Patents CN1907992A, US 2007/0043180 A1, PCT WO 2007/003135 A1. 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. (1)

Reference:

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

44-0083 1,3-Bis(2,4,6-trimethylphenyl)-4,5-dihydroimidazol-2-ylidene[2-(i-propoxy)-5-(N,N-dimethylaminosulfonyl)phenyl]methylene ruthenium(II) dichloride (resin supported) Zhan Catalyst II 100mg
 FW: >1000; black solid 500mg
 Note: Sold under license from Zannan for research purposes only. Patents CN1907992A, US 2007/0043180 A1, PCT WO 2007/003135 A1. 2g

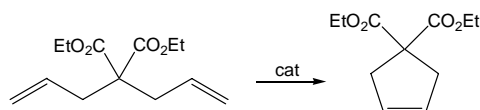
Technical Note:

1. See 44-0082.

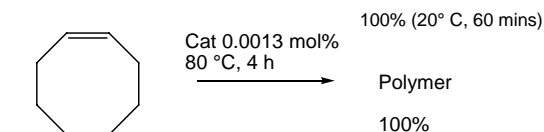
44-0047 [1,3-Bis(2,4,6-trimethylphenyl)-2-imidazolidinylidene]-[2-[(4-methylphenyl)imino]methyl]-4-nitrophenolyl]-[3-phenyl-1H-inden-1-ylidene]ruthenium(II) chloride [934538-04-2] 100mg
 $\text{C}_{50}\text{H}_{47}\text{ClN}_4\text{O}_3\text{Ru}$; FW: 888.46; orange-brown solid 500mg
 Note: Sold in collaboration 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.



Ref. (1-3)



Ref. (1-3)

References:

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

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
 $\text{C}_{50}\text{H}_{48}\text{ClN}_3\text{ORu}$; FW: 843.46; orange-brown solid 500mg
 Note: Sold in collaboration with Umicore for research purposes only. EP 1 468 004 B1, US 2002/0349956.

Technical Note:

1. See 44-0047.

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44-7778	3-Phenyl-1H-inden-1-ylidene[bis(i-butylphoban)]ruthenium(II) dichloride C ₃₉ H ₅₆ Cl ₂ P ₂ Ru; FW: 758.78; red powdr. 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.		
Reference: 1. <i>J. Org. Chem.</i> , 2008 , 73, 259.		
44-0078 NEW →	{[2-(i-propoxy)-5-(N,N-dimethylaminosulfonyl)phenyl]methylene}(tricyclohexylphosphine) ruthenium(II) dichloride Zhan Catalyst -1C [918871-44-0] C ₃₀ H ₅₀ Cl ₂ NO ₃ PRuS; 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 Note: 1. See 44-0082.		
44-7780	Tricyclohexylphosphine[1,3-bis(2,4,6-trimethylphenyl)-4,5-dihydroimidazol-2-ylidene][(phenylthio)methylene]ruthenium(II) dichloride RuCl ₂ [C ₂₁ H ₂₆ N ₂][C ₇ H ₆ S][P(C ₆ H ₁₁) ₃]; FW: 881.04; purple-brown solid Note: Sold in collaboration with BASF for research purposes only. Patents US 6,407,190 and EP 993,465.	100mg 500mg
Technical Note: 1. See 44-0073.		
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® RF 1] [254972-49-1] RuCl ₂ [C ₂₁ H ₂₄ N ₂][C ₁₅ H ₁₀][P(C ₆ H ₁₁) ₃]; FW: 947.07; brown powdr. 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.		
References: 1. <i>Organometallics</i> , 1999 , 18, 5416. 2. <i>Chemistry Today</i> , 2009 , 27, 24.		
44-7785 NEW →	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 ₂ N ₂ PRuS; FW: 852.98; brown powdr. Note: Sold in collaboration with Evonik for research purposes only. Patent US 6635768.	100mg 500mg 2g
Technical Note: 1. See 44-7775.		
44-7795 NEW →	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 ₂ N ₃ PRuS; FW: 845.91; violet to brown powdr. Note: Sold in collaboration with Evonik for research purposes only. Patent US 6635768.	100mg 500mg 2g
Technical Note: 1. See 44-7775.		
44-7790 NEW →	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 ₂ N ₂ PRuS; FW: 881.04; violet to brown powdr. Note: Sold in collaboration with Evonik for research purposes only. Patent US 6635768.	100mg 500mg 2g
Technical Note: 1. See 44-7775.		

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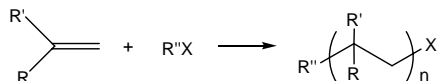
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44-7777	Tricyclohexylphosphine[3-phenyl-1H-inden-1-ylidene][1,3-bis(2,4,6-trimethylphenyl)-4,5-dihydroimidazol-2-ylidene]ruthenium(II) dichloride, min. 95% [536724-67-1] C ₅₄ H ₆₉ Cl ₂ N ₂ PRu; FW: 949.09; dark red pwdr. Note: Sold in collaboration with Umicore for research purposes only. For use in life science applications and for research purposes only.	100mg 500mg
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Technical Note:

- Catalyst used for the Atom Transfer Radical Polymerization (ATRP) of vinyl monomers.



Reference:

- New J. Chem.*, **2003**, *27*, 257.

44-7712 NEW →	Trifluoroacetato[4,5-dihydro-1,3-bis(2,4,6-trimethylphenyl)imidazol-2-ylidene]tetra(2,2-dimethylpropanenitrile)ruthenium(II) trifluoroacetate [1034198-65-6] C ₄₅ H ₆₂ F ₈ N ₆ O ₄ Ru; FW: 966.08; yellow xtl. Note: Sold under license from ITCF for research purposes only. DE 102008008299, US 12/866.806.	100mg 500mg
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Technical Note:

- Cationic ruthenium(II) complex useful for UV-induced, ring-opening metathesis polymerization.

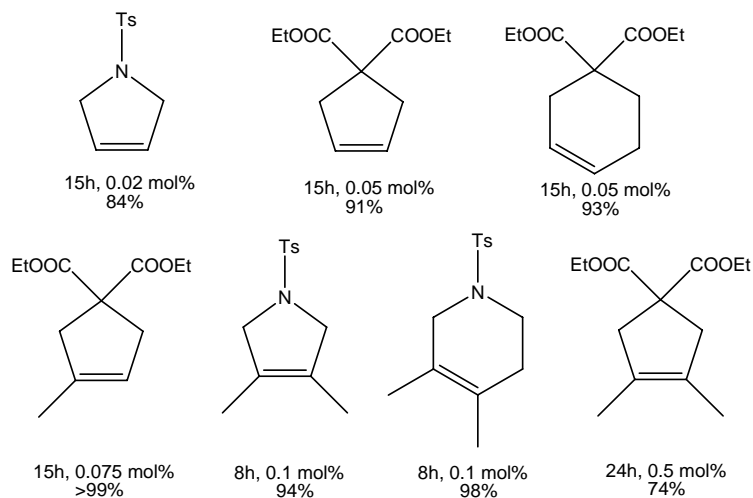
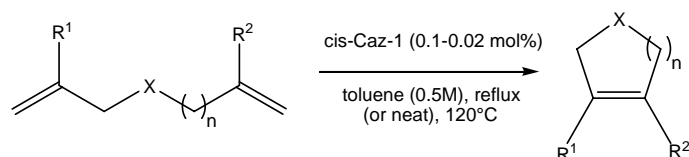
Reference:

- Angew. Chem. Int. Ed.*, **2008**, *47*, 3267.

44-7783 NEW →	Tri(<i>i</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% Caz-1 C ₄₅ H ₅₇ Cl ₂ N ₂ O ₃ Ru; FW: 876.89; brown pwdr.	50mg 250mg
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Technical Note:

- Efficient catalyst for ring-closing metathesis.



Reference:

- Chem. Commun.*, **2010**, 7115.

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