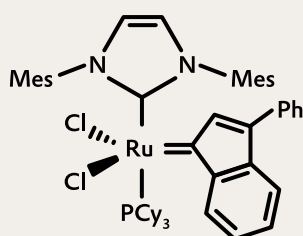


Technical information

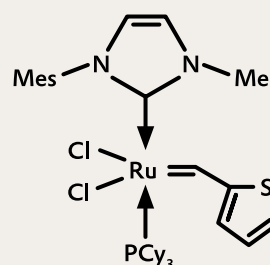
catMETium® RF 1-4

Catalysts for Royalty-free Metathesis

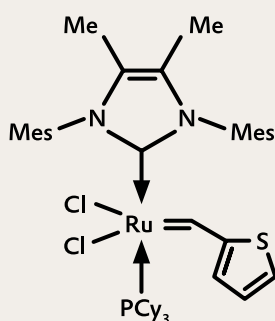
catMETium® RF 1



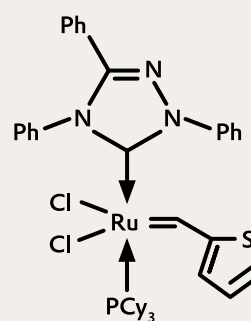
catMETium® RF 2



catMETium® RF 3



catMETium® RF 4



The Business Model in brief

1. RF = Royalty-free metathesis

No licence agreements, no royalty payments!
Evonik technology is priced on a cost per unit (€/kg) basis.

2. Strong and clear IP Portfolio

Evonik's IP portfolio contains the patents for composition of matter and synthetic routes. This is vital for customers who want to be clear on the patent position of their catalyst partner.

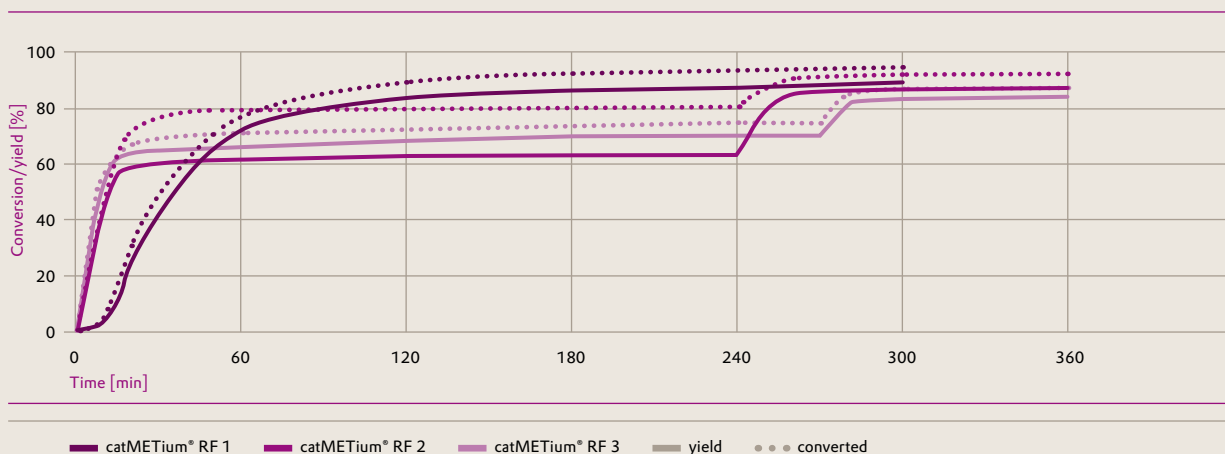
3. No Quantity Restrictions

Evonik has the necessary internal production capabilities on lab, pilot and commercial scales. There are no restrictions on purchase quantities.

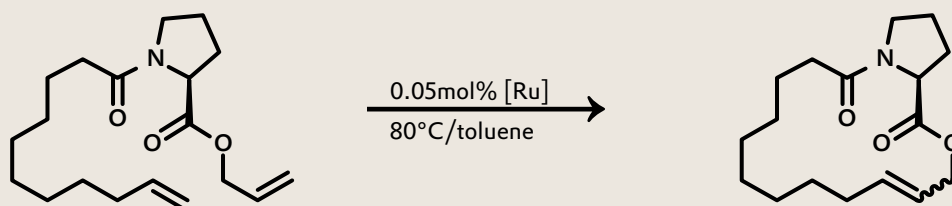
Product Characteristics

Product	catMETium® RF 1	catMETium® RF 2	catMETium® RF 3	catMETium® RF 4
Synonyms	Tricyclohexylphosphine [1,3-bis(2,4,6-trimethylphenyl)imidazol-2-ylidene][3-phenyl-1H-inden-1-ylidene] ruthenium(II) dichloride	Tricyclohexylphosphine [1,3-bis(2,4,6-trimethylphenyl)imidazol-2-ylidene][2-thienylmethylene] ruthenium(II) dichloride	Tricyclohexylphosphine [4,5-dimethyl-1,3-bis(2,4,6-trimethylphenyl)imidazol-2-ylidene][2-thienylmethylene] ruthenium(II) dichloride	Tricyclohexylphosphine [2,4-dihydro-2,4,5-triphenyl-3H-1,2,4-triazol-3-ylidene][2-thienylmethylene] ruthenium(II) dichloride
Formula	C ₅₄ H ₆₇ Cl ₂ N ₂ PRu	C ₄₄ H ₆₁ Cl ₂ N ₂ PRuS	C ₄₆ H ₆₅ Cl ₂ N ₂ PRuS	C ₄₃ H ₅₂ Cl ₂ N ₃ PRuS
Color and Form	brown powder	violet brown powder	violet brown powder	brown powder
Other	For use in pharmaceutical applications only. Uses other than pharmaceutical applications are not authorized!	No limitations in application fields	No limitations in application fields	No limitations in application fields

Performance example



Using only 0.05 mol% RF accomplishes Macrocyclization



This information and all further technical advice is based on our present knowledge and experience. However, it implies no liability or other legal responsibility on our part, including with regard to existing third party intellectual property rights, especially patent rights. In particular, no warranty, whether express or implied, or guarantee of product properties in the legal sense is intended or implied. We reserve the right to make any changes according to technological progress or further developments. The customer is not released from the obligation to conduct careful inspection and testing of incoming goods. Performance of the product described herein should be verified by testing, which should be carried out only by qualified experts in the sole responsibility of a customer. Reference to trade names used by other companies is neither a recommendation, nor does it imply that similar products could not be used.

February 2012

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www.evonik.com/catalysts

1 Product Business



In homogeneous catalysis Evonik has specialised in metathesis catalysts. To identify or develop the most cost-effective, productive and robust homogeneous catalyst, you need a large, skilled and experienced partner in industrial catalysis: Evonik Industries.

The catMETium® catalyst family
for royalty-free metathesis

One Cost to the Customer

- Access to Evonik technology is priced on a cost per unit (€/kg) basis.
- No additional licence agreements are required.

Confidence in IP Portfolio

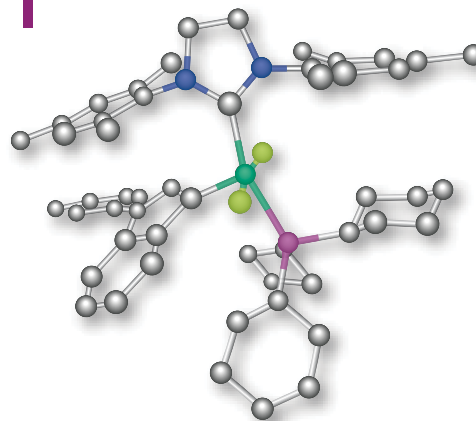
- Evonik's IP portfolio contains the patents for composition of matter and synthetic routes that are necessary to sell the ligands and catalysts on the market.

No Black Listed Applications

- Because it holds exclusive licences, Evonik does not impose any restrictions on applications. Therefore no application is „black listed“.

No Quantity Restrictions

- Evonik has the necessary internal production capabilities on the lab, pilot and commercial scales. There are no restrictions on purchase quantities.



Reactions possible with the catMETium® ligand family

1. cross metathesis
2. ring-closing metathesis
3. carbon-carbon double bond formation

Your benefits:

- You get easy access to metathesis catalyst technology. There are no licence fees; you just buy the catalyst as you do any other raw material, on a €/kg basis.
- You are on the safe side with respect to IP. Evonik owns the composition of matter parent for the catalyst and has a secure IP position. A clear and unambiguous IP position of the catalyst vendor cannot be overestimated if you want to use the metathesis technology in your process.

Product features:

- 1 derivative
- 2nd generation catalyst
- most suitable for cross metathesis, ring-closing metathesis and carbon-carbon double bond formation
- Used for pharma applications only

Catalyst Guide

Our website carries an interactive search engine, the **Catalyst Guide**. This web-based tool can give you a preliminary idea of the Evonik catalysts suitable for a particular reaction. And the Catalyst Guide offers you much more, providing information on reaction conditions, reaction mechanisms, patents and the scientific literature. Evonik's Catalyst Guide is an indispensable tool for anyone working with catalytic processes.

➔ www.evonik.com/catalysts