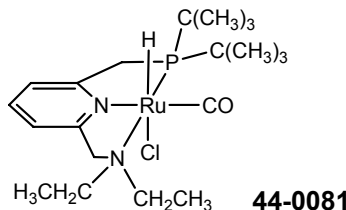


# STREM MILSTEIN CATALYSTS

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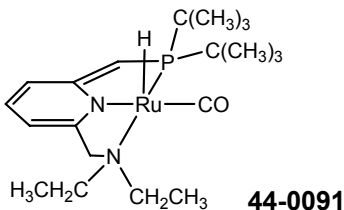


**44-0081**  
**NEW**

**Carbonylchlorohydrido[6-(di-t-butylphosphinomethyl)-2-(N,N-diethylaminomethyl)pyridine]ruthenium(II), min. 98% (Milstein Catalyst Precursor) [863971-62-4]**  
C<sub>20</sub>H<sub>36</sub>ClN<sub>2</sub>OPRu; FW: 488.01; pale yellow solid  
*air sensitive*

Note: Air-stable in the solid state for several days, but best stored under an inert atmosphere.

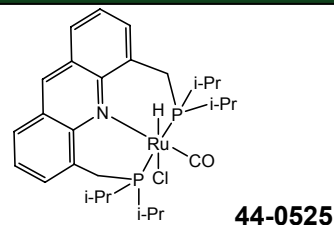
100mg  
500mg



**44-0091**

**Carbonylhydrido[6-(di-t-butylphosphinomethylene)-2-(N,N-diethylaminomethyl)-1,6-dihydropyridine] ruthenium(II), min. 98% Milstein Catalyst [863971-63-5]**  
C<sub>20</sub>H<sub>35</sub>N<sub>2</sub>OPRu; FW: 451.55; red-black solid  
*air sensitive, (store cold)*

100mg  
500mg

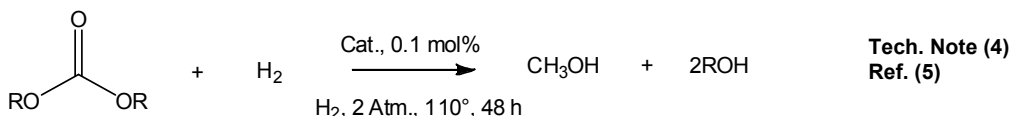
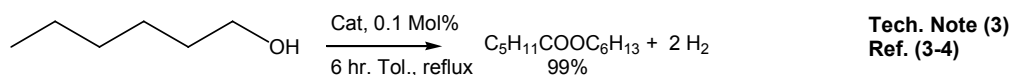
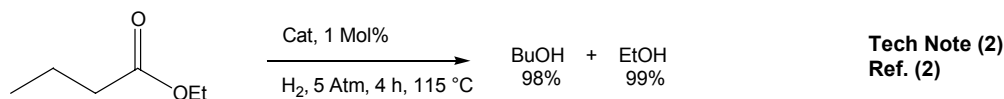
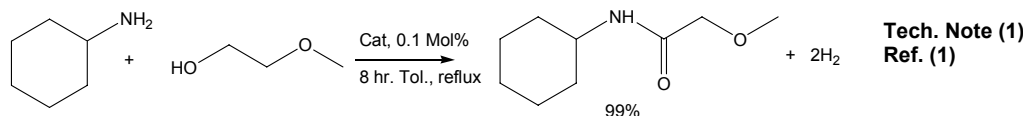


Technical Note:

1. See 44-0091.

Technical Notes:

1. Ruthenium catalyst for the direct synthesis of amides from alcohols and primary amines.
2. Ruthenium catalyst for the hydrogenation of esters in high yields under mild pressure and neutral conditions.
3. Ruthenium catalyst for the dehydrogenative coupling of alcohols to form esters in high yields under neutral conditions.
4. Catalytic hydrogenation of CO<sub>2</sub> derived carbonate, carbamate, and formate, a route to methanol from carbon dioxide.



References:

1. *Science*, **2007**, 317, 790.
2. *Angew. Chem. Int. Ed.*, **2006**, 45, 1113.
3. *J. Am. Chem. Soc.*, **2005**, 127, 12429.
4. *J. Am. Chem. Soc.*, **2005**, 127, 10840.
5. *Nature, Chem.*, **2011**, 3, 609.

**44-0525**  
**NEW**

**Chlorocarbonylhydrido[4,5-bis-(di-i-propylphosphinomethyl)acridine]ruthenium(II), min.98% Milstein Acridine Catalyst [1101230-25-4]**  
C<sub>28</sub>H<sub>40</sub>ClN<sub>2</sub>OP<sub>2</sub>Ru; FW: 605.09; orange solid  
*air sensitive*

Note: Patents: US provisional 61/087,708, PCT/IL2009/000778.

25mg  
100mg

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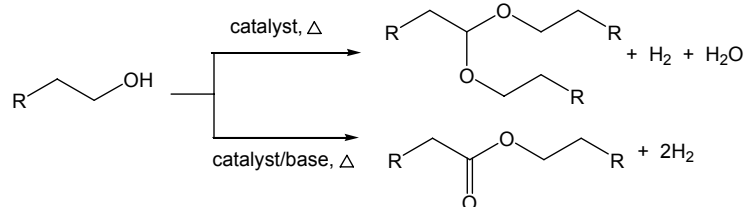
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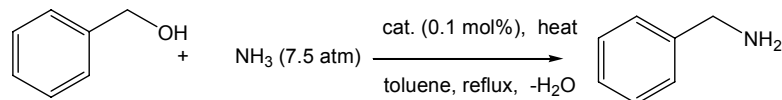
## Technical Notes:

- Useful ruthenium catalyst for the direct conversion of alcohols to acetals and esters.



**Tech. Note (1)**  
**Ref. (1)**

- Useful ruthenium catalyst for the selective synthesis of amines directly from alcohols and ammonia.



**Tech. Note (2)**  
**Ref. (2)**

## References:

- J. Am. Chem. Soc.*, **2009**, *131*, 3146.
- Angew. Chem. Int. Ed.*, **2008**, *47*, 8661.

**Also available P-N-P ligand 15-0415 used to make Acridine catalyst 44-0525.**

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