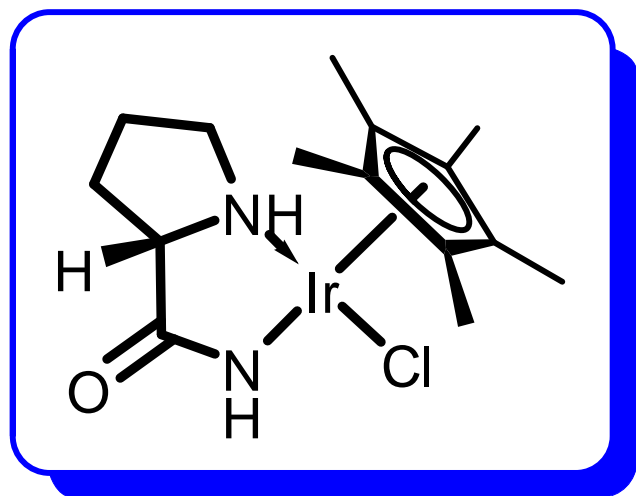
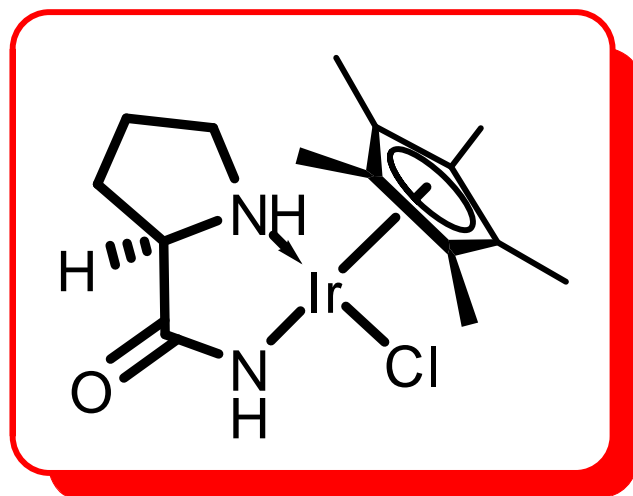


# HAMOC

## Practical Asymmetric Transfer Hydrogenation Catalyst



**HAMOC-1S**



**HAMOC-1R**

HAMOC is a trademark of Hamari Chemicals, Ltd.



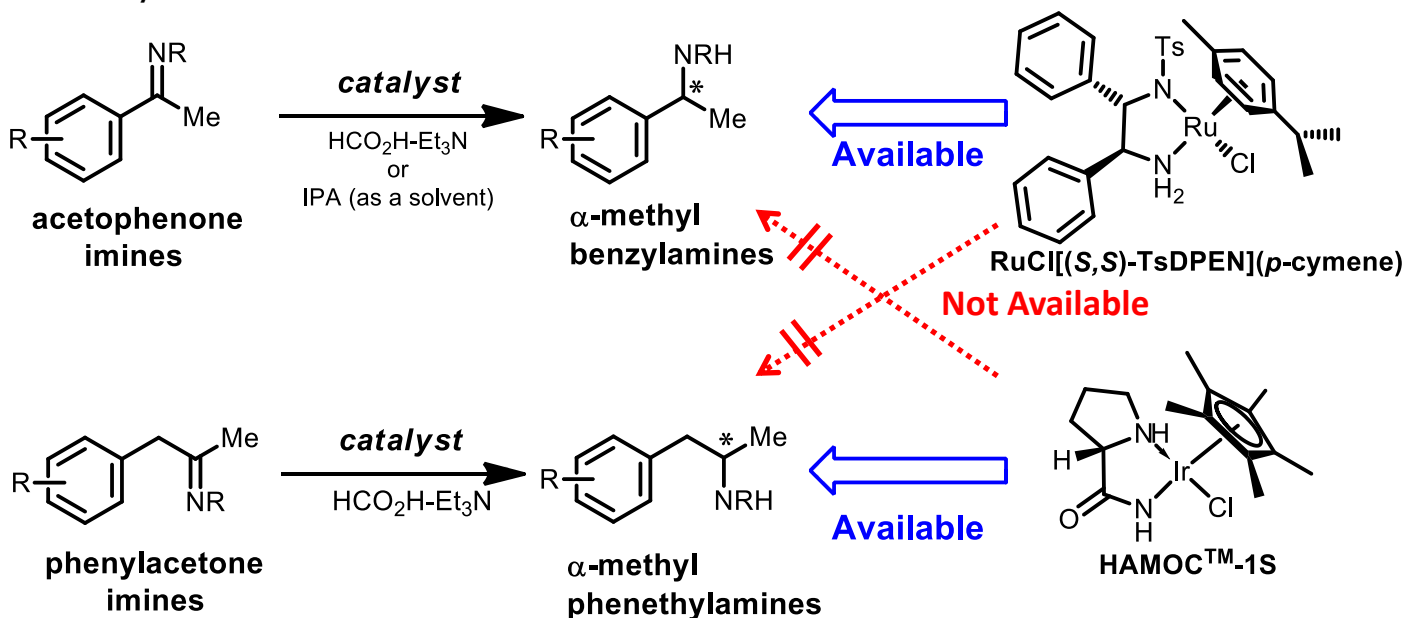
Hamari Chemicals, Ltd.

# Introducing HAMOC

HAMOC is a series of asymmetric hydrogenation catalysts developed independently and invented by Hamari Chemicals, Ltd.

(PCT Int. Appl., WO2013011930, PCT Int. Appl., WO2013061999)

HAMOC-1S and HAMOC-1R catalysts are superior to the conventional  $\text{RuCl}[(S,S)\text{-TsDPEN}](p\text{-cymene})$  catalyst, in that HAMOC catalysts afford higher yields in asymmetric transfer hydrogenation of phenylacetone imines with high optical selectivity.



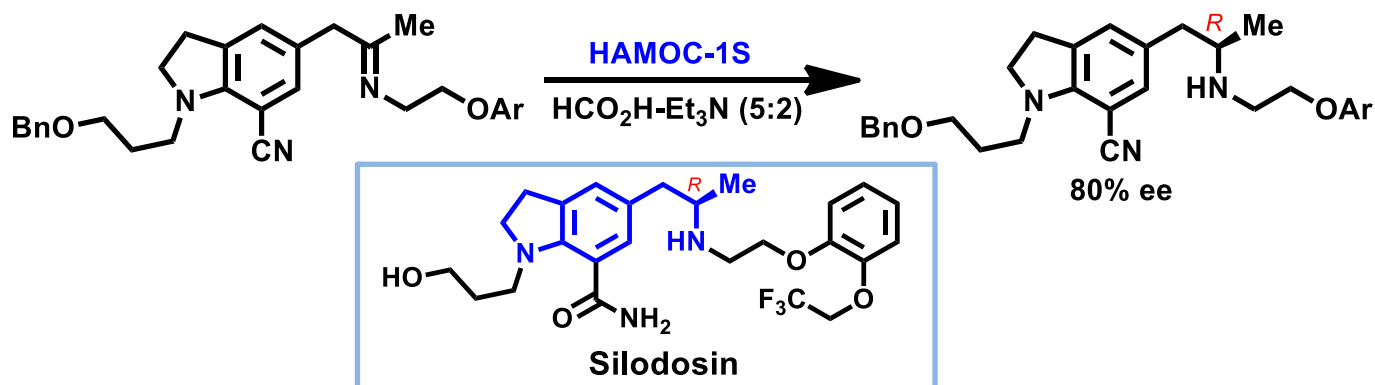
## Reaction Comparisons with HAMOC

R	Catalyst	Conversion (%)	ee (%)
H	HAMOC-1S	87.6	66.8
	$\text{Ru-(R,R)\text{-TsDPEN}}$	18.8	14.3
OMe	HAMOC-1S	92.2	47.0
	$\text{Ru-(R,R)\text{-TsDPEN}}$	11.7	13.0
F	HAMOC-1S	89.6	71.7
	$\text{Ru-(R,R)\text{-TsDPEN}}$	22.8	33.7
$\text{NO}_2$	HAMOC-1S	97.3	71.3
	$\text{Ru-(R,R)\text{-TsDPEN}}$	22.0	33.5

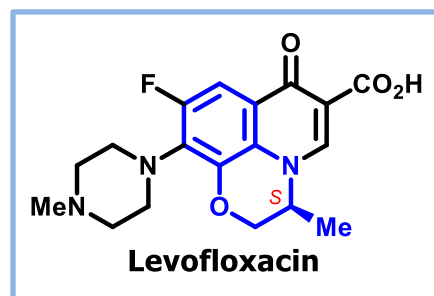
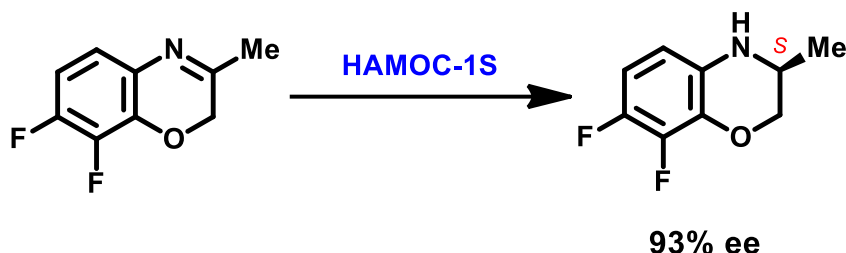
# Synthesis Examples with HAMOC

HAMOC catalysts afford the required optically active product at high optical yield when used during asymmetric hydrogenation of common iminyl or ketonyl substrates. Reactions performed by this HAMOC method provide key intermediates of various active pharmaceutical ingredients.

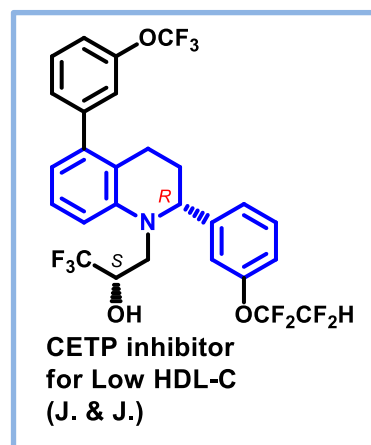
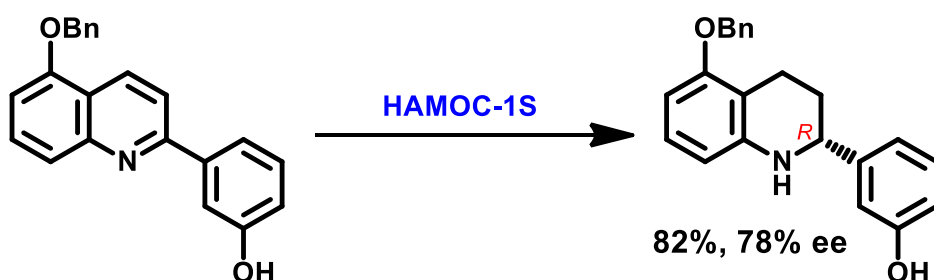
## (1) Phenylacetone imines



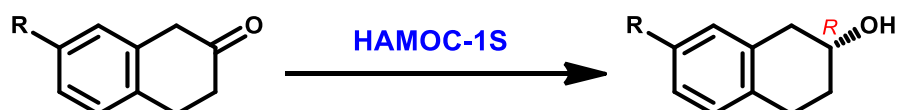
## (2) Benzoxazines



## (3) Substituted quinolines



## (4) Tetralones



R = H: 91%, 90% ee  
R = OMe: 90%, 92% ee

# HAMOC Advantages

## ① Remarkably high enantioselectivity

- a. Asymmetric transfer hydrogenation of phenylacetone imines
- b. Asymmetric transfer hydrogenation of substituted quinoline analogues
- c. Asymmetric transfer hydrogenation of tetralones

## ② Simple structure

HAMOC is manufactured from a readily available amino acid with a simple chemical structure, and HAMOC itself is an extremely simple structure.

## ③ Easy handling

Asymmetric transfer hydrogenation proceeds by simply mixing the substrate and a hydrogen source (formic acid or ammonium formate).

## ④ No special equipment required

Special equipment such as pressurized hydrogen autoclaves are not required. In laboratory reactions, a glass vessel and a stirrer is all that is required for the reaction to quickly proceed.

# HAMOC Price List

Available for purchase from Wako Pure Chemical Industries, Ltd. (Japan)  
and Hamari Chemicals, Ltd. (International Sales)

Compound Name	Class	Quantity	Retail Price
HAMOC-1R *	Chemical Catalyst	250 mg	JPY 22,000
HAMOC-1R *	Chemical Catalyst	1 g	JPY 72,000
HAMOC-1S * *	Chemical Catalyst	250 mg	JPY 22,000
HAMOC-1S * *	Chemical Catalyst	1 g	JPY 72,000

\* : (R)-Chloro[(1,2,3,4,5-η)-1,2,3,4,5-pentamethyl-2,4-cyclopentadien-1-yl](2-pyrrolidinecarboxamidato-κN1,κN2)iridium(III), Ir-R-PA

\* \* : (S)-Chloro[(1,2,3,4,5-η)-1,2,3,4,5-pentamethyl-2,4-cyclopentadien-1-yl](2-pyrrolidinecarboxamidato-κN1,κN2)iridium(III), Ir-S-PA

contact information



**Hamari Chemicals, Ltd.**

International Department  
6F, 2-1-26 Kitahama, Chuou-ku, Osaka 541-0041, Japan  
TEL +81-6-6205-7755 FAX +81-6-6205-7222  
E-Mail: ask@hamari.co.jp

[www.hamarichemicals.com](http://www.hamarichemicals.com)