Chemoselective Reduction of \(\alpha,\beta\)-Unsaturated Aldehydes with AuNPore

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\begin{align*}
    \text{R}_1 & \quad \text{R}_2 \\
    \begin{array}{c}
    - \text{OH} \\
    \text{MeO} \\
    \text{X} = \text{Br} \\
    \text{X} = \text{F} \\
    \text{X} = \text{F}_3\text{C} \\
    \end{array} \\
    \begin{array}{c}
    \text{OH} \\
    \text{OH} \\
    \text{OH} \\
    \text{OH} \\
    \text{OH} \\
    \end{array}
\end{align*}
\]

Results:

- 73% yield, 2/3 > 99:1
- 70% yield, 2/3 = 100:0
- 71% yield, 2/3 = 89:11
- 78% yield, 2/3 = 91:9
- 70% yield, 2/3 = 91:9
- 70% yield, 2/3 = 82:18
- 75% yield, 2/3 = 100:0
- 70% yield, 2/3 > 99:1
- 46% yield, 2/3 > 99:1
- 69% yield, 2/3 > 99:1
- 62% yield, 2/3 = 97:3

Significance: Nanoporous gold (AuNPore) catalyzed the 1,2-reduction of \(\alpha,\beta\)-unsaturated aldehydes 1 with triethylsilane. The reduction was carried out in the presence of water and triethylamine to give the corresponding allyl alcohols 2 in 42–78% yield with 82:18 to 100:0 (2/3) chemoselectivity.

Comment: Previously, the authors reported the AuNPore-catalyzed chemoselective reduction of imines with dimethylphenylsilane (Org. Lett. 2014, 16, 2558). In the reduction of cinnamyl aldehyde, the catalytic activity of AuNPore was superior to that of Au\(_{30}\)Ag\(_{70}\) alloy, homogeneous AuCl(Ph\(_3\)P)/Bu\(_3\)P, and AuCl/IPr·HCl. ICP-MS analysis showed that no gold content was leached from the catalyst during the reaction.