Ruthenium(II)-Catalyzed Asymmetric Transfer Hydrogenation Reaction

**Significance:** In this report, ruthenium-based transfer hydrogenation catalysts are described. The catalysts exhibit impressive turnover numbers with excellent enantioselectivities for the selective reduction of CF₃-substituted 1,3-dicarbonyl compounds. The substrates include benzo-fused cyclic ketones which undergo reduction to furnish one stereoisomer.

**Comment:** Transfer hydrogenation (TH) reactions are milder and safer alternatives to metal-on-carbon-based hydrogenation reactions. Although the scope is usually limited to the reduction of carbonyls, TH avoids the use of highly pressurized systems. These reported ruthenium-based transfer hydrogenation catalysts are notable achievements in this field.

**Selected examples:**

- L2 (S/C = 2000)
  - PhCl, 50 °C, 12 h
  - 99.5% yield
  - 92% yield after one recrystallization
  - >99% ee

- L2 (S/C = 1000)
  - PhCl, 60 °C, 20 h
  - 51% yield
  - 64% ee
  - dr = 99:1 after one recrystallization

- >99% ee

- 96% yield
  - 98% ee
  - dr = 96:3:1:0

- 96% yield
  - dr = 2:86:10:3

- 90% yield
  - dr > 99:1 after one recrystallization

- 96% yield
  - dr = 99:1 after one recrystallization

- 95–99% yield
  - 64–99.9% ee

- 96% yield
  - >99.9% ee
  - dr = 2:86:10:3

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**Key words:** transfer hydrogenation, ruthenium catalysis, asymmetric reduction