Asymmetric Synthesis of Ipatasertib

Significance: Ipatasertib (GDC-0068) is an Akt kinase inhibitor that is of interest for the treatment of cancer. The stereogenic centers in fragment \( \text{F} \) were installed using a nitrilase-catalyzed resolution of nitrile \((\text{rac})-A\) and a ketoreductase-catalyzed reduction of ketone \( \text{D} \). For a related large-scale synthesis of Ipatasertib, see: T. Remarchuk et al. Org. Process Res. Dev. 2014, 18, 1652.

Comment: The stereogenic center in fragment \( \text{L} \) was installed by asymmetric hydrogenation. Using \([\text{Ru}(\text{TFA})_2((S)\text{-BINAP})]\) with catalyst activation by NaBr as an additive, allowed for S/C = 10,000. The optimal ratio to ensure reaction robustness was Ru/NaBr = 1:20 and thus afforded >99% conversion and 98.8:1.2 er.