Synthesis of (S)-Rivastigmine

Significance: Rivastigmine (Exelon®) is an acetylcholinesterase inhibitor that is prescribed for the treatment of mild to moderate dementia in patients with Alzheimer’s disease and Parkinson’s disease. The key step in the synthesis depicted is a dynamic kinetic resolution of the benzylic secondary alcohol B involving a lipase (Novozyme 435) coupled with a polymer-bound racemization catalyst (C).

Comment: The polymer-bound racemization catalyst C was prepared by heating a polymer-bound benzoyl chloride with [Ph₄][η⁵-C₄CO]Ru(CO)₃ in toluene for one day. The catalyst can be recycled several times. The enzymatic resolution was performed on a 1 mmol scale. For an alternative chemoenzymatic synthesis of rivastigmine, see: J. Mangas-Sánchez et al. J. Org. Chem. 2009, 74, 5304.