Enantio- and Chemoselective Hydrogenation of Azaindole Pyridine Rings through Iridium Catalyst

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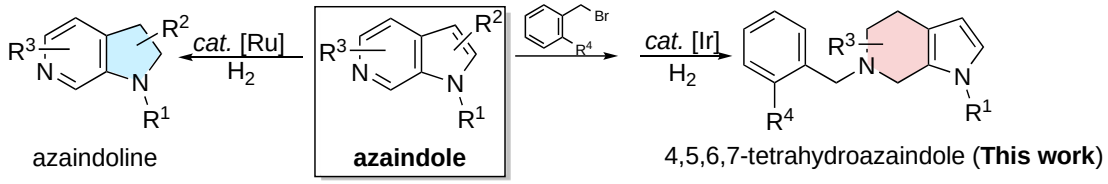
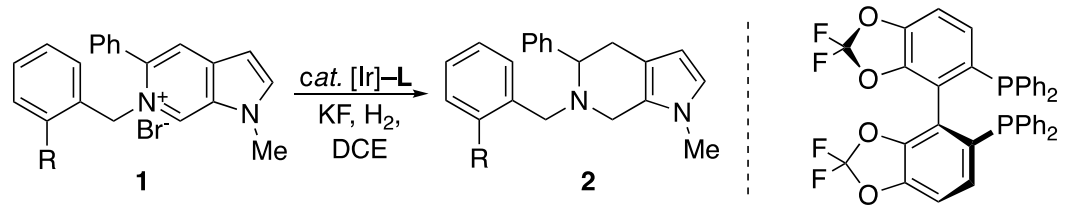
We had reported the enantioselective hydrogenation of azaindoles with a chiral ruthenium catalyst.[1] In this reaction, the 5-membered rings were selectively reduced to give the chiral azaindolines with up to 95% ee. Furthermore, we found that DIFLUOROPHOS (**L**)–iridium catalyst allows the highly enantioselective hydrogenation of pyridine rings of azaindoles, when an alkyl group was installed on their nitrogen atoms.[2] In this study, we found that the stereoselectivity could be improved by modification of the *N*-alkyl group.



Use of the azaindolium **1c** bearing isopropoxycarbonyl group on its *N*-benzyl group led to slight enhancement of the enantioselectivity to 96% ee, while **1a** and **1b** was hydrogenated with 92% and 94% ees in the previous report.[2] The optimized reaction condition was applicable to the highly enantioselective reduction of the pyridine rings in other 5-aryl-6-azaindoles. Furthermore, a range of 6-aryl-5-azaindoles also could be converted into the corresponding 4,5,6,7-tetrahaydroazaindoles with high enantioselectivities by the **L**–iridium catalyst and the installation of 2-(isopropoxycarbonyl)benzyl group on the nitrogen atom.



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2) Y. Nakayama, Y. Makida, R. Kuwano, *Abstract of the 99th CSJ Annual Meeting*, **2019**, 1H4-54