

Asymmetric Dihalogenation from Sulfoxonium Ylides

Lucas G. Furniel¹, Marcio Hayashi^{1*}, Radell Echemendía¹, Viktor S. Câmara¹, Kauê C. Capellaro¹ and Antonio C. B. Burtoloso¹

1) São Carlos Institute of Chemistry, IQSC-USP, 13563-120

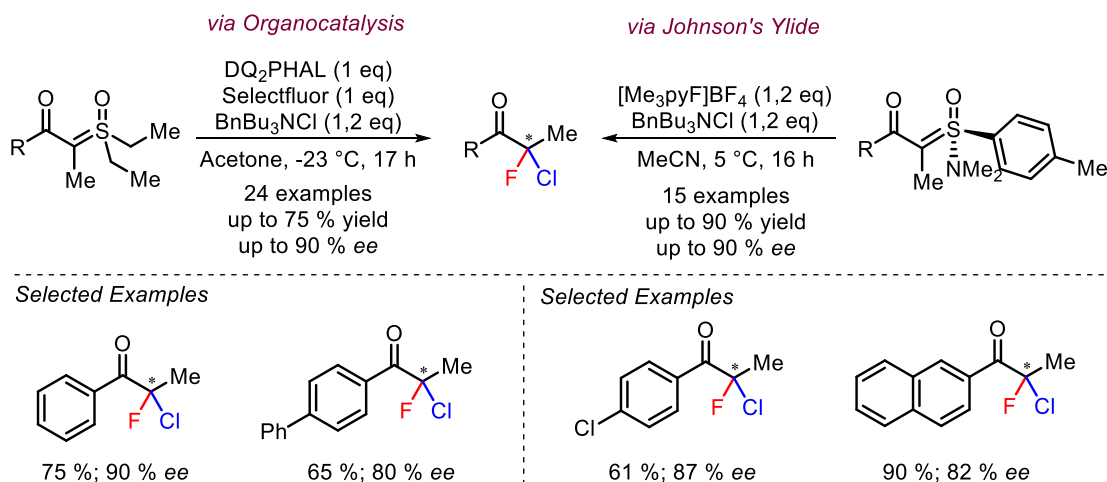
*e-mail: marcio.hayashi@alumni.usp.br

Keywords: Sulfur Ylides, Dihalogenation, Enantioselective

ABSTRACT

Optically activated fluorinated compounds are vital in medicinal and agricultural chemistry, with chiral *gem*-chlorofluorinated carbon centers being key building blocks for biologically active compounds.¹ Existing synthesis methods for these chiral centers often involve multiple steps or require starting materials containing halogens.² In this context, sulfoxonium ylides offer a promising alternative, capable of generating *gem*-disubstituted compounds in a single step.³

We developed two strategies to synthesize *gem*-chlorofluorinated compounds from sulfoxonium ylides under mild conditions. The first strategy, utilizing organocatalysis (Scheme 1, left), achieved the dihalogenated products with good yields and high enantioselectivity. The second strategy, employing Johnson's Ylide (Scheme 1, right), also produced the target compounds efficiently, with good yields and enantioselectivity. These methods streamline the synthesis process, offering a more efficient route to these important chiral building blocks.



Scheme 1. Asymmetric Dihalogenation from Sulfoxonium Ylides via: Left-Organocatalysis; right-Johnson's Ylide.

ACKNOWLEDGEMENTS



REFERENCES

- Inoue, M.; Sumii, Y.; Shibata, N. Contribution of Organofluorine Compounds to Pharmaceuticals. *ACS Omega* **2020**, 5 (19), 10633–10640. <https://doi.org/10.1021/acsomega.0c00830>.
- Shibatomi, K.; Yamamoto, H. Stereoselective Synthesis of α,α -Chlorofluoro Carbonyl Compounds Leading to the Construction of Fluorinated Chiral Quaternary Carbon Centers. *Angew Chem Int Ed* **2008**, 47 (31), 5796–5798. <https://doi.org/10.1002/anie.200801682>.
- Day, D. P.; Vargas, J. A. M.; Burtoloso, A. C. B. Synthetic Routes Towards the Synthesis of Geminal α -Difunctionalized Ketones. *The Chemical Record* **2021**, 21 (10), 2837–2854. <https://doi.org/10.1002/tcr.202000176>.