



The Synthesis of Oxetan-2-yl Enolsilanes and Their (4+3) Cycloaddition Reactions

Zihao Chen, Yueyao Chen, Pauline Chiu*

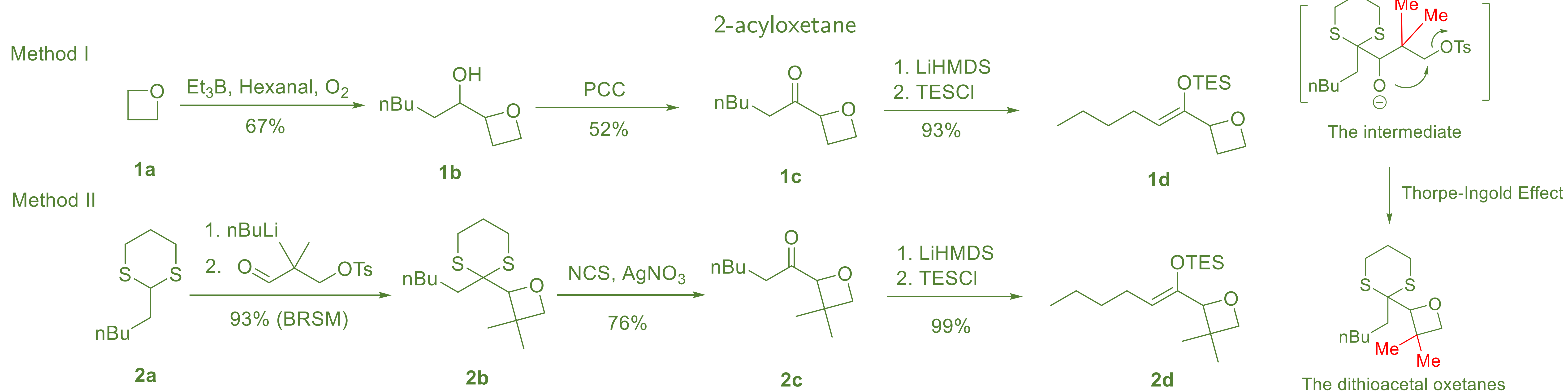
Department of Chemistry and the State Key Laboratory of Synthetic Chemistry
The University of Hong Kong, Pokfulam Rd. Hong Kong, P. R. China

ABSTRACT

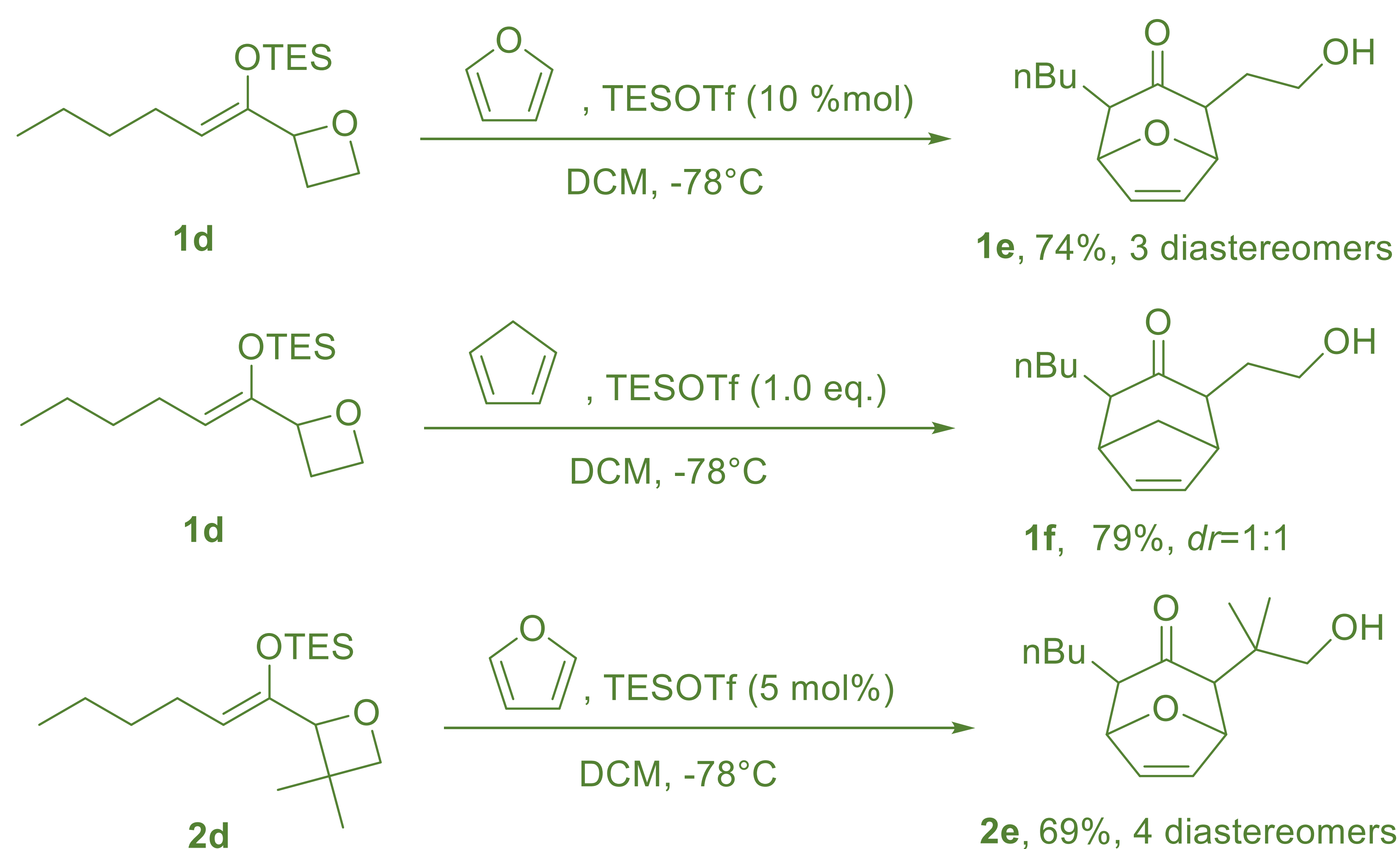
Oxetanes play the important role in medicinal and synthetic chemistry, and they are isosteres of some functional groups. However, in comparison to epoxides, methods to synthesize oxetanes are quite limited, especially 2-substituted oxetanes because this introduces a stereocenter. Thus both the synthesis of oxetanes and the exploration of their applications in synthetic chemistry needs further exploration and study.

To synthesize 2-acyloxetanes, we explored three methods I and II. These were then converted to the corresponding enolsilanes. These were induced to undergo (4+3) cycloadditions to generate seven-membered carbocycles. Both types of enolsilanes reacted with good yields in intermolecular (4+3) cycloadditions, which underscored that oxetanes were reactive enough to participate in these ring-opening cycloadditions.

The synthesis of 2-acyloxetanes



(4+3) Cycloadditions of oxetan-2-yl enolsilanes



Conclusion

- We present two efficient and condition-mild methods on synthesizing 2-acyloxetanes, which are difficult to obtain because of their chemical and metabolic stability. Thorpe-Ingold Effect was applied as a strategy on building the oxetane ring in **one step**.
- Both two types of oxetan-2-yl enolsilanes (**1d** and **2d**) afforded cycloadducts in good yields, given that the oxetanes are reactive enough in ring-opening cycloadditions.

References

- Burkhard, J. A., Wuitschik, G., Rogers-Evans, M., Müller, K., Carreira, E. M. *Angew. Chem. Int. Ed.* **2010**, *49*, 9052-9067.
- Bull, J. A., Croft, R. A., Davis, O. A., Doran, R., Morgan, K. F. *Chem. Rev.* **2016**, *116*, 12150-12233.
- Yoshimitsu, T., Arano, Y., Nagaoka, H. *J. Org. Chem.*, **2005**, *70*, 2342-2345.
- Yin, Z., He, Y., Chiu, P. *Chem. Soc. Rev.* **2018**, *47*, 8881-8924.