

MODULABLE HYDROGEN-BONDING ORGANOCATALYSTS



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Switchable catalysis has gained considerable attention during the last decades due to its ability to modulate catalytic activity by an external stimulus.¹ Such stimuli can be redox, chemical (ion, molecule) or physical (heat, light).

Herein we propose to use singlet oxygen as a new molecular stimulus to modulate catalysis. Indeed, the known [4+2] reaction of ¹O₂ with 9,10-diphenylanthracene (flat architecture) allows the formation of the corresponding endoperoxide (concave structure).² This structural modification within the catalyst will impact the activation of substrates and then modify the reaction kinetics profiles.

As a proof-of-concept, we present a new organocatalyst whose activity is tunable by ¹O₂. Our knowledge on anthracene-based supramolecular systems, to design molecular cages³, and (thio)amide organocatalysis⁴ led us to design a difunctional organocatalyst built from a diphenylanthracene core (Figure A).

The catalytic properties of these systems are investigated in model reactions, i.e. the intramolecular ring-opening of epoxides (Figure B). For this purpose, kinetics studies were designed to compare the new organocatalysts (anthracene-based and endoperoxides) and non switchable catalysts. The results are compared to the previous supramolecular catalysts.^{5,6}

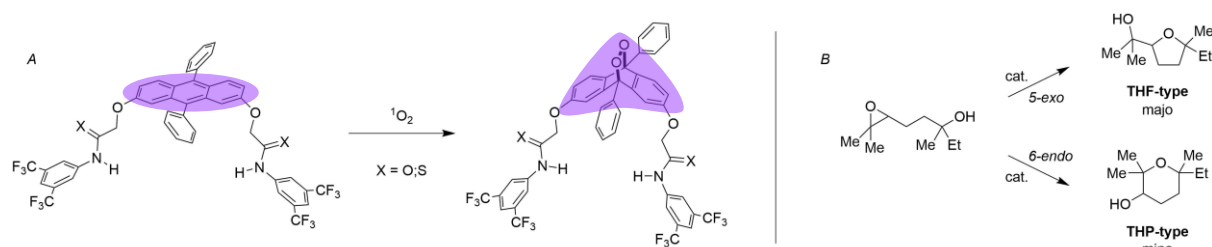


Figure A Design of the modifiable hydrogen-bonding organocatalyst; B Model reaction of the intramolecular ring-opening of epoxides, which can lead to two cyclisation products

References

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