ISGC 2019
May 13th - 17th

N°175 / OC
TOPIC(s) : Homogenous, heterogenous and biocatalysis / Biomass conversion

Catalytic CO2 valorization to cyclic carbonates using nitrogen Schiff Base zinc complexes

AUTHORS

Lorraine CHRIST / UCBL & IRCELYON, 2 AVE EINSTEIN, VILLEURBANNE
Walid LAMINE / ISA, 5 RUE DE LA DOUA, VILLEURBANNE
Samira ZAHER / LEBANESE UNIVERSITY, HARIRI CAMPUS, HADATH, BEYROUTH
Iyad KARAMÉ / LEBANESE UNIVERSITY, HARIRI CAMPUS, HADATH, BEYTROUTH
Salima BOUGHDIRI / UNIVERSITY OF TUNIS, EL MANAR UR11ES19, TUNIS
Christophe MORELL / ISA, 5 RUE DE LA DOUA, VILLEURBANNE
Henry CHERMETTE / ISA, 5 RUE DE LA DOUA, VILLEURBANNE

PURPOSE OF THE ABSTRACT

Carbon dioxide can be used as a renewable carbon source to prepare many organic compounds. Among them, useful cyclic carbonates can be obtained by the catalytic CO2 addition to epoxides. Various homogeneous catalysis can be used, including salen derivatives combined to ammonium halides. We developed a salen nitrogen analog and prepared its chromium complexes [1] that catalyzed the CO2 insertion to epoxides, leading to cyclic carbonates or polycarbonates.

In order to get selective catalyst to cyclic carbonates, we focused on nitrogen Schiff base complexes of zinc. In this study, the synthesis of the N4-SB ligands will be presented as well as their zinc complexes and XRay structures [2]. An unexpected self-assembled double-stranded helicate structure was observed for a dimeric zinc species [3]. A theoretical approach (DFT method) will be discussed [4] before the catalytic evaluation of the Zn-N4-SB species with TBAI as co-catalyst, for the cycloaddition of CO2 to styrene oxide (Fig.1). Under optimized conditions, cyclic styrene carbonate was selectively obtained in very high yields without using any organic solvent.

FIGURES

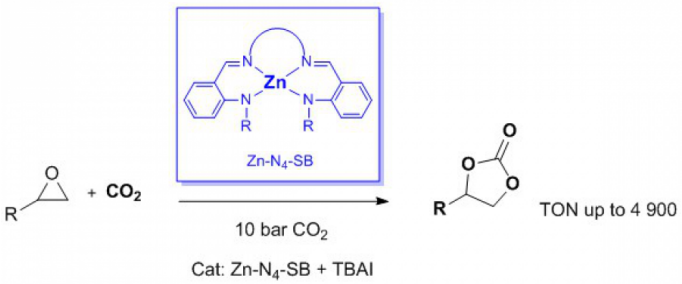

FIGURE 1

Fig.1

CO2 cycloaddition to styrene oxide

FIGURE 2

.

.

KEYWORDS

CO2 transformation | zinc complexes | homogeneous catalysis

BIBLIOGRAPHY

[1] L. Cuesta, M. Djoufak, A. Aghmiz, R. Rivas, L. Christ, A. Masdeu-Bulto, J. Mol. Cat. A: Chemical 2013, 381, 161-170.

[2] I. Karamé, S. Zaher, N. Eid, L. Christ Molecular Catalysis, 2018, 456, 87-95.

[3] W. Lamine, S. Boughdiri, E. Jeanneau, C. Sanglar, C. Morell, L. Christ, H. Chermette Chem Phys Chem, 2018,19 (DOI: 10.1002/cphc.201800514)

[4] W. Lamine, S. Boughdiri, L. Christ, C. Morell, H. Chermette, Molecular Physics, 2016, 114, 1066-1075.