MULTI-FUNCTIONAL COBALT AND CHROMIUM SCHIFF BASE COMPLEXES AS CATALYSTS FOR CO_2 TRANSFORMATION

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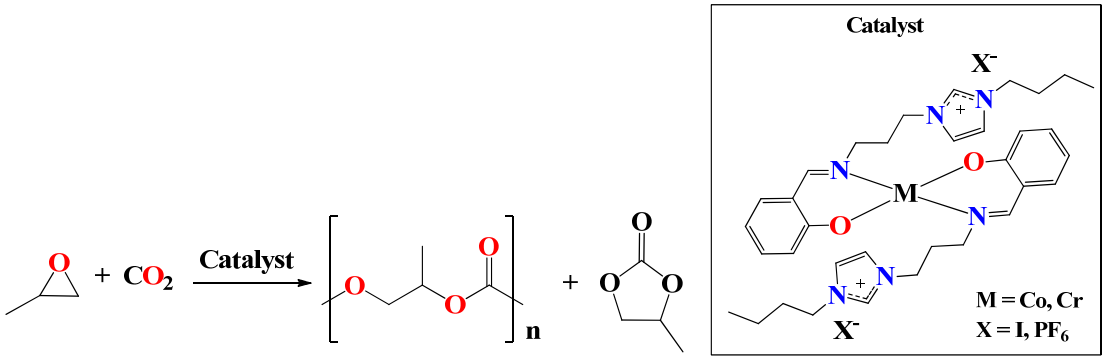
The use of CO_2 as raw material for chemical synthesis has attracted a lot of attention because it is cheap, nontoxic and abundant C1 feedstock [1]. The coupling of CO_2 with epoxides produces aliphatic polycarbonates and/or cyclic carbonates without the formation of any side products (Scheme 1). This coupling reaction typically requires the presence of a suitable catalyst and co-catalyst, however in recent years multifunctional catalysts have been developed where the co-catalyst is incorporated as part of the structure of the catalyst. The coupling reaction is typically a homogeneous catalytic process and therefore it is limited by the fact that catalyst recycling is not feasible. Multi-functional catalysts for this coupling reaction are typically ionic functionalized and thus could potentially be utilized with ionic liquids to produce a biphasic catalytic process that would allow catalyst separation and recycling [2, 3]. A biphasic catalytic process constitutes two immiscible solvents phases where the catalyst is retained in one solvent while products/reactants are retained in a second solvent [4]. This study investigates multifunctional cobalt and chromium Schiff base metal complexes which contain ionic functional groups on the catalyst backbone as suitable catalyst for the coupling of CO_2 with propylene oxide. The presentation will therefore be focused on the preparation of multi-functional cobalt and chromium Schiff base metal complexes, preliminary evaluation of these metal complexes as catalysts for the coupling of CO_2 and propylene oxide in a single-phase catalytic process and in a biphasic catalytic process using ionic liquids as solvent medium.



Scheme 1: Coupling of CO_2 and propylene oxide.

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