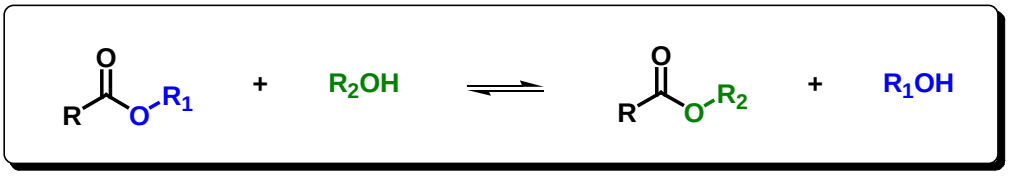
Novel catalytic systems for selective transesterification reactions

Dr. Koen Van Aken
EcoSynth, Stationstraat 123, 8400 Oostende, Belgium

Catalysis, in particular in large scale applications, is the cornerstone of sustainable chemistry. As transesterification is a crucial step in several industrial processes (such as the production of higher acrylates, polyethylene terephthalate, biodiesel, polylactic acid, fragrances and active pharmaceutical ingredients.[1]), development of more efficient catalysts in this field remains important. Typical industrially used catalysts are alkoxides/hydroxides from alkali metals and titanium or tin-based alkoxides. Despite their general use, the interference of side reactions such as olefin formation, ether formation and hydrolysis is observed and selectivity is often hampered by the presence of functional groups such as unsaturated bonds or amines in the reactant ester or alcohol. Also, due to sustainability issues, the use of toxic tin-based catalysts will be phased out in industrial production.



In response to above-mentioned shortcomings, highly selective transesterification catalysts for the production of esters were developed. These catalysts are prepared from readily available starting materials (a zinc or iron 1,3-dicarbonyl complex and an inorganic salt) within the reaction medium without the need for prior isolation (in-situ preparation)[2]. Their ease of use, combined with their high selectivity, makes these compounds highly favourable as catalysts for industrial transesterification processes, as will presented in some case studies.

1. For reviews of the transesterification reaction, see J. Otera, Chem. Rev. 93 (1993) 1449;
U. Schuchardt, R. Serchelia and R.M. Vargas, J. Braz. Chem. Soc. 9 (1998) 199;
H.E. Hoydonckx, D.E. De Vos, S.A. Chavan and P.A. Jacobs, Top. Catal. 27 (2004) 83;
G.A. Grasa, R. Singh, S.P. Nolan, Synthesis (2004) 971.

2. WO/2011/157645 "Transesterification process using mixed salt acetylacetonates catalysts"