

Preface

Sixty years ago, Otto Roelen discovered the hydroformylation reaction while working on the Fisher–Tropsch synthesis from CO/H₂ and doing a series of experiments for increasing the yields of the FT by recycling ethylene. This discovery, which we celebrate this year the diamond jubilee, began the era of homogeneous catalysis. It led to a German patent application by September 20, 1938 but, due to the second world war events, was only issued on July 17, 1952. This story on the Roelen's scientific approach is detailed in a paper recently published by B. Cornils, W.A. Herrmann and M. Rasch [Angew. Chem. Int. Ed. Engl. 33 (1994) 2144].

Quickly the industrial application followed with an oxo plant built in Ruhr Chemie for a process using cobalt and working at 135°C and 200 bar. Curiously, the generally accepted mechanism for this homogeneous catalysis was reported in 1960, i.e., 22 years later, by Heck and Breslow!

Today the oxo reaction is certainly the second most important catalyzed reaction after the polymerization of light alkenes and accounts for more than 7×10^6 T/year of aldehydes (or oxo products) obtained by the formal addition of H₂ and CO to a carbon–carbon double bond.

If we extend this reaction to all those in which a CO molecule is incorporated into a

substrate, the carbonylation reactions have been in fact extensively studied since the early years. Many industrial and academic teams are pursuing studies on carbonylations either to improve the separation of the catalyst from the reaction products, or to improve the selectivity as well as the rate of the reaction through a fine tuning of the coordination sphere of the transition metal center, or to understand in depth the reactions of the catalyst in each step of the catalytic cycle, or to discover novel systems which lead to new classes of reactions.

I thought that it would be of interest to dedicate a Special Issue of the Journal of Molecular Catalysis to this modern chemistry and by the same way to recognize the essential contribution of a scientist like Otto Roelen. Many colleagues were enthusiastic about such a project so that the present Issue contains 32 contributions.

Such an Issue is not exhaustive, but certainly represents a significative selection of the 'Recent Achievements in Carbonylation Reactions' which have occurred.

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