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Catalytic Reductive Carbonylation of Organic Nitro Compounds

S. Cenini and F. Ragaini

Kluwer Academic Publishers, Dordrecht, 1996

339 + xi pages. £115

ISBN 0-7923-4307-7, Hardback

Research workers in the area of metal-catalysed reactions of organic nitro compounds will be familiar with the work of the Milan group and the article by Professor Cenini and Colleagues.¹ This has now been updated and expanded to produce the current monograph. Experts in this area will be keen to make a comparison with the article by two researchers from Hoechst² which appeared only months after the literature deadline for this book, given as March 1996.

The book is divided into six chapters with a useful index. Chapter 1 is introductory: it sets out the most important objectives of the research in the field, and also describes how a nitro group can interact with a metal ion. Chapter 2 is concerned with the carbonylation of nitro compounds to give isocyanates, which are needed for the manufacture of polyurethanes. It is this reaction which has involved so much effort over the years, because a direct synthesis of an isocyanate from a nitro compound and carbon monoxide would eliminate the need for the use of the highly toxic phosgene. Chapter 3 describes the synthesis of carbamates and ureas. Carbamates can provide another route to isocyanates, as they may be thermally decomposed into the isocyanate and alcohol. Unfortunately the catalysts so far developed are not sufficiently active to be commercially attractive. Chapter 4 is devoted to the synthesis of non-cyclic compounds (oximes, amines, nitriles, azo compounds, Schiff bases and other miscellaneous derivatives), whereas Chapter 5 concentrates on heterocyclic compounds. The final chapter is a critical discussion of the mechanisms of the reductive carbonylation of nitro compounds; it is divided according to the catalytic metal, with over 20 pages devoted to palladium. The authors say in the

introduction to this chapter that whereas the first five chapters are essentially a literature survey, in the final chapter they give their interpretation of observations and it should be regarded as an original contribution rather than a review article. In other words, this is reductive carbonylation of organic nitro compounds '*alla Milanese*', and certainly none the worse for that. Some of the suggestions are controversial; for example, on p. 264 the authors suggest an alternative structure for an intermediate which had been deduced from spectroscopic evidence.

This is an extremely specialized book of over 300 pages on a topic which only receives about five pages of coverage in Parshall and Ittel's *Homogeneous Catalysis*.³ Those working in the field will be extremely grateful to the authors for giving such a comprehensive account together with their specialist insight.

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Chemistry of Tin, 2nd edn

P. J. Smith (ed)

Blackie Academic & Professional, London, 1997

578 pages. £149 (hardback)

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Tin is one of the world's most valuable metals. Although its annual consumption of around 200 000 tonnes is small

compared with that of many industrial metals, its importance lies in the fact that it is a vital component