Journal of Organometallic Chemistry, 363 (1989) C46
Elsevier Sequoia S.A., Lausanne – Printed in The Netherlands
JOM 9781BR

Book review

Carbon dioxide activation by metal complexes, Arno Behr, VCH, 1988, viii + 161 pages, DM 160, ISBN 3-527-26903-7

The idea of using carbon dioxide as a carbon feedstock has become increasingly attractive in recent years. It is not highly toxic, and is inexpensive and plentiful. However, from a chemical point of view it is relatively inert, and requires activation to participate in chemical processes.

This book reviews the activation of carbon dioxide by metal complexes, covering many aspects of both stoicheiometric and catalytic reactions. The first chapter is introductory, and considers carbon dioxide as a raw material, outlining the main methods for its production, and its main industrial uses. Chapter 2 includes a brief account of the thermochemistry of CO_2 reactions, and its utilisation by metalloenzymes such as carbonic anhydrase. Next is described the fundamental coordination chemistry of CO_2, followed by a detailed account of insertion into metal–carbon, metal–nitrogen and metal–hydrogen bonds. These reactions are critical in almost all processes involving the fixation of CO_2. The final part of this chapter deals with "oxidative coupling" in which a metal centre, an unsaturated compound, X=Y, and CO_2 react to form a metalloheterocycle. Many such species have been proposed as intermediates in catalytic reactions.

The remainder of this volume considers catalytic reactions for the fixation of CO_2. Industrial conversions to low molecular weight alcohols have been known for some years. Strained heterocycles insert CO_2, and the reaction with epoxides has been used in polymer synthesis. Reactions with strained hydrocarbons have proved interesting, but applications have been few. The reaction with butadiene has been studied in very great detail, and selectivities may be high, but again few practical uses have been found.

This book has been well produced, and has appeared with commendable speed, since it includes references through 1987. The index is clear and useful. This is a timely review of an important subject, and should be available in all chemistry libraries. At DM 160 for 160 pages it can hardly be considered to be a bargain, however, and I could have wished that it had been produced at a price which would make it accessible to the wider audience which it undoubtedly deserves.

School of Chemistry and Molecular Sciences,
University of Sussex, Brighton (Great Britain)

Penny A. Chaloner