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Book Review

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Catalytic synthesis of alkene–carbon monoxide copolymers and cooligomers

Kluwer Academic Publishers, May 2003, 325 pp; price €148, US$ 145, £93
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This book presents a wide-ranging survey of the synthesis of copolymers and cooligomers of carbon monoxide and alkenes. The basic process, that of preparing perfectly alternating carbon monoxide–ethene-based polymers, was discovered at Badische in 1951 and improved by the discovery of a new palladium-based catalyst series at Shell in 1982 (Mul *et al.*, Chapter 4). This latter class of catalyst made it possible to produce perfectly alternating co- and terpolymers with low levels of catalyst residue. As the editor points out in his introduction, one great advantage of this polymerization methodology is that the monomers are less expensive than those involved in the preparation of other functional group polymers, such as nylons. The existence of the functional CO group in the polymer, of course, allows for the introduction of further functionality. The Introduction (Chapter 1) also points out the utility of this methodology in terms of the ability to use functionalized ethenes. A further advantage of the polymerization is its tolerance of a wide range of solvents, including water.

The various chapters include summaries of the syntheses of low-molecular-weight esters, ketones and aldehydes (Chapters 2 and 3), high-molecular-weight copolymers (Chapter 4), the role of chain initiation and termination processes (Chapter 5), the achievement of copolymers with high regio-, stereo- and enantio-selectivities (Chapters 6 and 7) and mechanistic aspects (Chapters 8 and 9).

Future directions discussed include an expanding role for catalysts other than those based on palladium, variation of the normal 1 : 1 CO/ethene ratio in the polymer, problem ethene monomers (functionality directly adjacent to the double bond).

This is a reasonably compact work that is useful and digestible at the research, graduate coursework and specialist final-year-undergraduate levels. It is to be recommended to research groups in the catalytic field generally, to university and departmental libraries, and to individual specialists in the field.

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