

Book review

Advances in Polymer Science. 56; Springer-Verlag, Berlin, etc., 1984, 141 pages, DM 98.

The second review in this volume, Anionic Copolymerization of Cyclic Ethers with Cyclic Anhydrides by J. Lustoň and F. Vašš, only touches on organometallic chemistry to the extent that one section is concerned with mechanisms initiated by salts, but the first review, Anionic Polymerizations of Non-polar Monomers involving Lithium by R.N. Young, R.P. Quirk and L.J. Fetters, has considerable relevance to the organometallic field, as will be indicated below.

Anionically propagated polymerizations of certain monomers (notably styrene and dienes) initiated by lithium can sometimes be conducted in conditions in which there is no termination; as is well-known, such "living" systems are extremely interesting for studies of kinetics, and for the preparation of monodisperse homopolymers and of block copolymers. Moreover, the chain ends can be functionalized or they can be brought into reaction with reagents selected so as to produce well-defined star polymers or graft polymers. The basic chemistry of processes of this kind is clearly of great academic and industrial interest.

The review first considers the nature of structure and bonding in organolithium compounds, including the uniqueness of the Li—C bond, the controversy over the degree of covalency implied, and the oligomerization of simple organolithium compounds. This leads naturally on to the thermodynamics of aggregation and the effect of solvents upon stability, which is discussed at length.

The mechanism of initiation reactions is followed by a description of propagation involving Li—C centres, and the influence of small quantities of added ethers (THF) is appended. (Polymerization in solvating media forms the subject of a later section.) The mechanistic part concludes with a review of the effects of tertiary amines.

After a discussion of spectroscopic studies, the stereochemistry of the polydienes produced by organolithium initiation follows, and the review ends with commentary on copolymerization, chain transfer, active centre stability, and on the functionalization of terminal anionic groups.

This comprehensive and up-to-date review is strongly recommended.