

Book reviews

Synthesis of Organometallic Compounds: A Practical Guide

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This text is proposed to bridge the gap between traditional texts in organometallic chemistry and the raw jargon of a typical experimental section of a research paper. It is aimed at undergraduates and postgraduate students who are starting out at the bench and an attempt is made to provide both a background to organometallic chemistry as well an introduction as to the techniques.

The first two chapters are devoted to general ideas about organometallic chemistry. They are intended to be quite a quick refresher; nevertheless they are very superficial. The section on ligands is essentially restricted to CO and phosphines, giving no real sense of the richness and breadth of possibilities available. What is more, the reader is left with the impression that a phosphine ligand acts simply as a donor—nowhere are the π -acceptor properties mentioned. In addition, nitrogen donors, which find increasing application for a wide range of stereoselective reactions, are not even mentioned, let alone contrasted with phosphines. This is unfortunate because it is important to emphasize the wide range of possible ligands available to the practising chemist.

The chapter on techniques is essentially a rehash of what is presented, better, in various other works, notably John Cooper's excellent article in Wayda and Darenbourg's *Practicum in Air Sensitive Synthesis*. The usefulness of the chapter is not helped by a combination of poor translation and editing—the sections on Toepler pumps and on the mounting of crystals are very hard to follow.

Subsequent chapters are devoted to specific groups of elements. Thus, rather than discussing complexes related by ligand or by reactivity, each chapter is devoted to a summary of the chemistry of a particular set of elements. The result is that most chapters start by reminding the reader that a wide range of complexes of the Group X elements are known. Hardly a surprise! Nowhere are general routes for the introduction of ligands such as CO, Cp, hydride and alkyl listed or discussed. The book can therefore be likened to an organic chemistry text in which the chemistry is classified by alkyl substituent rather than by functional group. In my view, this approach is very unhelpful to a student. Space limitations ensure that each section skims the surface of the chemistry of a group of elements, although in most cases the key reactions are covered and a good range of phenomena are addressed.

Even so, coverage is patchy: while the chapter on the iron group runs to 263 references, the chromium group has a mere 60. The omission of organomercurials and organothalliums is inexplicable, as they are widely used both for transmetallation and methathesis. Furthermore no mention is made of the utility of, and general routes to, organosodium and potassium reagents which are of critical importance in the metallation of a wide range of organic substrates.

Each chapter also contains a number of procedures for the preparation of 'key' organometallics. The criteria for selection are not made clear since commonplace, commercially available (but historically important) compounds are included as well as some real exotica. Nor is it clear that the reactions have been thoroughly tested by the authors. For example, the procedure for the preparation of decamethylsamarocene fails to include a warning that argon must be used to avoid the formation of Evans' famous dinitrogen compound (a reaction mentioned in the body of the chapter).

More annoying is the fact that no ligand syntheses are provided. Tested, optimized, general routes for the preparation of commonly used ligands such as substituted and *ansa*-cyclopentadienyls, phosphines (chiral and not), polyamines, oxazolines, BINAP-based ligands and so on could advantageously have been collected here. What useful material has been included is hidden by a poor index. Thus there is no efficient way of finding, for example, a method for determining the concentration of a Grignard reagent by classical indirect titration rather than by the more modern method of a reactive indicator. Several useful organometallics are intermediates in the syntheses of others, but are not mentioned in a heading or indexed. Nor is there a molecular formula index.

In conclusion, therefore, this text is a missed opportunity for a truly integrated and valuable work. Readers are better advised to arm themselves with a good organometallic chemistry book (of which there are several) and a copy of Errington's excellent new *Advanced Practical Inorganic and Metal Organic Chemistry* and browse through *Inorganic Syntheses* for a more detailed and ultimately rewarding account of this exciting area of research.

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