Book Reviews

Thermochemical and Thermodynamic Properties of Organometallic Compounds. By I. B. Rabinovich, V. P. Nistratov, V. I. Telnoy, and M. S. Sheiman (M. Frenkel, Editor). Begell House, New York. 1999. 181 pp. $139.50. ISBN 1-56700-124-6.

The authors, Rabinovich and Telnoy in particular, are well-known to those who use thermochemical data of organometallic compounds. The Nizhniy Novgorod thermodynamics group (Russia), founded by Professor Rabinovich, has published numerous papers reporting combustion calorimetry studies involving those substances as well as several widely quoted reviews (see e.g.: Telnoy, V. I.; Rabinovich, I. B. *Russ. Chem. Rev.* **1977**, *46*, 689; **1980**, *49*, 603) that contain standard enthalpies of formation of many transition and main-group organometallic compounds. With such credentials, I would anticipate that the title work could be a useful addition to the chemical literature, despite its high price.

The book has three parts. The first one is a summary of the "principles of chemical thermodynamics" (46 pages), the second lists "thermochemical properties of organometallic compounds" (56 pages), and the third deals with "thermodynamic properties of organometallic compounds" (79 pages).

Part 1 covers subjects ranging from basic concepts of thermodynamics, such as the definition of an isothermal process, to the brief discussion of statistical mechanics models, such as the Debye theory of heat capacity of solids. Professor G. A. Domrachev states in the Preface that Part 1 "may be used as a short but excellent complete manual on the theory of chemical thermodynamics and thermochemistry for chemists". I can hardly agree: for those who have not mastered the basic ideas in the field or just need to refresh their memory, there are many textbooks covering in more detail and using a much more pedagogical approach all the topics addressed by Professor Rabinovich (who is the author of Part 1). On the other hand, subjects that do not apply directly to the main subject of the book, such as the Einstein and the Debye models for the heat capacity of monatomic solids, are included. Instead of using about one-fourth of the book space for issues that are better covered in college manuals, the authors could have made a critical overview of the experimental methods used to obtain thermochemical and thermophysical data of organometallic substances.

In Part 2 the enthalpies of formation of more than 600 organometallic compounds are listed and used to derive metal−ligand mean bond dissociation enthalpies. The authors state that all values "were recalculated using the most up-to-date values of auxiliary parameters". It is good to know that one is dealing with a thermodynamically consistent database, but it would be better if the authors provided a table with those ancillary values. This would allow recalculating any enthalpy of formation from a different set of data. For the same purpose, I would also like to have seen the direct experimental results (e. g. enthalpies of combustion) printed in the tables.

Organizing a useful database that stands up the test of time is not an simple task and should deserve careful thought. All the information that the user needs to make his/her own assessment of the data should be included. This means, for example, that the experimental method should be indicated for each value. Although this is observed in the book under review for standard enthalpies of formation of solid or liquid substances, it is not the case for most of the gas-phase values. The nonexpert user will not be aware that many enthalpies of sublimation of organometallic compounds are estimates and that, therefore, so are the respective gaseous standard enthalpies of formation. Unfortunately, this point is not stressed in the book by Rabinovich et al.

Another important feature of a database is that it must be comprehensive in the field defined by its title. Most of the available thermochemical data involving organometallic compounds refer to enthalpies of reactions from which it was not possible to derive standard enthalpies of formation (*1*). Although this wealth of reaction enthalpy values plays a very important role in our understanding of the chemical reactivity of those substances, the data were not included in the book by Rabinovich et al. The casual reader or the student will therefore acquire the wrong idea that the present thermochemical information is limited to a few hundred values of enthalpies of formation.

Not being an expert on thermophysical properties, I admit that Part 3 of the book is better than Part 2. I wonder, however, why "thermophysical" properties, such as heat capacities or entropies, are labeled "thermodynamic" and standard enthalpies of formation are called "thermochemical". Are they not all thermodynamic quantities? The comment also applies, of course, to the book title.

In summary, although I have the greatest respect and admiration for the Russian thermodynamic school, this is not a book I would strongly recommend. "Vant-Goff" (page 1) would probably share my opinion.

Literature Cited

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