

Book review

Thermal Decomposition of Ionic Solids; A.K. Galwey, M.E. Brown; Elsevier, Amsterdam, ISBN 0-444-82437-5, NLG 680.00[☆]

This thoughtful book provides a timely summary of the more theoretical aspects of the decomposition of ionic solids, together with an extensive review of published information on the decomposition of specific compounds. Chapter 1 gives an introduction to the properties of solids. Chapters 2–6 deal with topics such as stoichiometry and extent of reaction, kinetic models for solid-state reactions, the influence of temperature on reaction rate, analysis and interpretation of experimental kinetic measurements, and methods for the characterisation of reactants, intermediates and products. Chapters 7–17 is a thorough survey of the published literature on the decomposition of compounds, collected together under headings such as hydrated salts, oxides, carbonates, etc. These chapters alone make the purchase of the book worthwhile, as an examination of the content will enable ready identification of areas for research. There is a final rounding off chapter in which the authors discuss the current status of the subject, and then speculate on prospects for future studies.

The authors are to be congratulated on bringing together information spread over a wide time period and from a range of journals and texts. The material is well presented and organised, and written in a lucid style. Above all, the topics are written with an authoritative ring, indicative of the experience and expertise of the two authors. Their comments are critical as well

as informative, and would be of value to the novice as well as the more experienced person.

One of the very appealing features of the text is the emphasis on the totality of any such decomposition study. The complete investigation of the decomposition of a solid should involve thorough characterisation of the starting material, followed by determination of properties such as thermal stability and decomposition temperature, a kinetic analysis if an appropriate single stage reaction has been identified, and the assignment of a solid state reaction mechanism. The mechanism should be confirmed if possible by the application of appropriate techniques to investigate surfaces and internal structures of individual particles. This, of course, is a very time consuming process, but on the other hand it is likely to be the only way in which some common threads can be distinguished between the various processes and the factors that control them.

Although the main methods used to carry out decomposition reactions are thermal analysis techniques, there is no emphasis on the reproduction of TG or DTA curves. More emphasis is given to the diagrammatic representation of reaction schemes, and photomicrographs of reacted solids.

This is a very useful and valuable book which I recommend to anyone interested in the thermal decomposition of ionic solids.

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