HANDBOOK OF PLASTICS ANALYSIS

edited by
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Preface

Plastics are one of the enabling technologies of the 20th century. They are among the most complex engineering materials being used in the world today, with amazing properties that have revolutionized the way in which products are manufactured. They are used in almost every walk of life, ranging from the mundane to high-end applications in which no other material could serve as a replacement. In each of these applications, it has been crucially important to understand their behavior through various parts of their product life, from manufacture to utilization and eventually their reclaim or disposal. The tools and techniques used to develop this understanding are referred to as plastics analysis.

Plastics analysis can be broadly grouped into two main categories. *Physical analysis* refers to the evaluation of the physical behavior of the material. Properties such as strength, thermal behavior, and flow properties fall into this category, as do failure and morphological characteristics. *Chemical analysis* seeks to evaluate the compositional characteristics of the polymer. The combination of these two broad approaches has been used successfully to correlate the behavior of plastics to their composition.

A wide variety of modern tools are available to the plastics analyst. As the range of available tools continue to expand, it is necessary for the analyst to keep abreast of all these technologies so as to be able to apply the most appropriate technique to the solution of a particular problem. This handbook seeks to highlight the most prominent tools in use by providing information on these diverse techniques and their application, and provides guidelines on the analysis and interpretation of results. It also provides a ready source of detailed references to readers interested in a more complete understanding of the subject matter.

In order to maintain a practical focus, the book concentrates on an approach that is more phenomenological than theoretical. While not going into detailed derivations, the book sets forth the basic governing equations where necessary to provide a good theoretical understanding of the techniques. Through the use of case studies and illustrations, the reader will be aided in the understanding of possible outcomes of each analysis technique.

A number of plastics analysis techniques are currently standardized to national and international norms. The book lists these norms in the form of reference tables and provides brief descriptions where necessary.

The chapters contain:

- Introduction of the technique and a brief scientific basis; governing equations if applicable
- Illustrations of test instruments along with schematics to aid in the understanding of the techniques
- Detailed descriptions, including measurement method(s), highlighting differences in technique(s), if relevant, including merits and deficiencies of the technique
- Images of typical outcomes of the analysis
- A listing of applicable national and international standards
- Applications with typical case studies and corresponding results; these are intended to aid in the analysis and interpretation of results from the analysis
- Discussions
- Conclusion, including information on the latest advances in the field (noncommercial) so as to provide an indication of future potential of the technology
- References and additional reading

The handbook will serve as a concise reference to practitioners in the industry, providing technical information about plastics analysis and descriptions of the technology used to perform the measurements. It is aimed at laboratory personnel who need to have a working knowledge of plastics analysis techniques and would like to keep abreast of the latest developments in the field. These will include laboratory managers, supervisors, and engineers.

The book will also serve as a basic reference to research engineers and scientists who may be looking for techniques to solve problems or investigate behavioral phenomena.

Hubert Lobo
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