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Preface

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Simple Methods for Identification of Plastics

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Preface

Processors and users of plastics often, for many different reasons, have to determine the chemical nature of a plastics sample. In contrast to plastics producers, however, they lack the specially equipped laboratories and the analytically trained staff for this purpose.

The complete identification of a high-molecular weight organic material is a rather complicated and often expensive problem. For many practical needs it is often sufficient to determine to which class of plastics an unknown sample belongs, for example, to find out whether the material is a polyolefin or a polyamide. To answer such a question, one usually only needs to use simple methods that do not require special chemical expertise.

In this book, now in its fifth edition, the author has compiled a selection of proven procedures which, based on his own experience, will enable the technician, the engineer, and also the technical customer service representative to identify an unknown plastic, e. g., for purposes of quality control or plastics recycling. All described procedures were carried out by the author as well as by students in courses at the German Plastics Institute. Additional experience with these procedures was thus obtained and included in the book. The author welcomes any other comments and suggestions for additions by readers and users of this book.

Clearly one should not expect to obtain sophisticated information from these simple methods. In most cases, one has to be satisfied with the identification of the plastic material, whereas the analysis of sometimes very small amounts of fillers, plasticizers, stabilizers, or other additives is only possible through the use of more advanced physical and chemical methods.

Similarly, it is not possible with simple methods to identify with certainty such combinations as copolymers and polymer blends. In such cases more sophisticated methods of analysis are required.

As this book has also been found useful by collectors of historical plastics articles, professional conservators, restorers, and students of conservation sciences, in this new edition a small chapter on identification of frequently used natural resins and some other early plastics has been included.

The good reception that previous English, German, Spanish, and French editions of this book have received from users and from reviewers in various plastics journals and magazines shows that in spite of all the modern analytical methods and advances in instrumental analysis, there is still a need for simple methods for the identification of plastics. The analytical procedures described in this book do not require special chemical knowledge but they do require skills in carrying out simple operations. It is most important to remember to be careful in handling chemicals, solvents, and open flames; other precautions will be pointed out in the pertinent sections. The necessary equipment is listed in the Appendix. With most experiments it is recommended that parallel experiments with known materials are also carried out (a Plastics ID Kit is available through the Society of Plastics Engineers).

It is hoped that this edition fills the gap between the extensive plastics analysis volumes covering various methods in great detail and the tabular compilations of selected samples. Naturally, this entails a compromise between investing in a greater experimental effort or being satisfied with the more limited information that can be obtained from simple qualitative analytical methods.

The development and testing of the methods described in this book were part of the research programs at the German Plastics Institute and the author is grateful for some financial support from German research organizations. The author also thanks the various people who collaborated on this project, especially Dr. R. Disselhoff, Dr. H. Pasch, and Dr. E. Richter and also Ms. Ch. Hock who obtained the IR-spectra. As in previous editions, the author thanks the Carl Hanser Verlag for good collaboration and for taking the author's wishes into consideration.

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