

Introduction

Polymers selected for this edition of the Handbook of Polymers include all major polymeric materials used by the plastics and other branches of the chemical industry as well as specialty polymers used in the electronics, pharmaceutical, medical, and space fields. Extensive information is provided on biopolymers.

The data included in the Handbook of Polymers come from open literature (published articles, conference papers, and books), literature available from manufacturers of various grades of polymers, plastics, and finished products, and patent literature. The above sources were searched, including the most recent literature. It can be seen from the references that a large portion of the data comes from information published in 2011-2016. This underscores one of the major goals of this undertaking, which is to provide readers with the most up-to-date information.

Frequently, data from different sources vary in a broad range and they have to be reconciled. In such cases, values closest to their average and values based on testing of the most current grades of materials are selected to provide readers with information which is characteristic of currently available products, focusing on the potential use of data in solving practical problems. In this process of verification many older data were rejected unless they have been confirmed by recently conducted studies.

Presentation of data for all polymers is based on a consistent pattern of data arrangement, although, depending on data availability, only data fields which contain actual values are included for each individual polymer. The entire scope of the data is divided into sections to make data comparison and search easy.

The following sections of data are included:

- General
- History
- Synthesis
- Structure
- Commercial polymers
- Physical properties
- Mechanical properties
- Chemical resistance
- Flammability
- Weather stability
- Biodegradation
- Toxicity
- Environmental impact
- Processing
- Blends
- Analysis

It can be anticipated from the above breakdown of information that the Handbook of Polymers contains information on all essential data used in practical applications, research, and legislation, providing such data are available for a particular material. In total, over 230 different types of data were searched for each individual polymer. The last number does not include special fields that might be added to characterize the performance of specialty polymers in their applications.

In most cases, the information provided is self-explanatory, considering that each data field is composed of parameter (or measured property), unit, value, and (in many cases) reference. In some cases, different values or a range of values are given. This is to indicate the fact that there is a disagreement in the published data which cannot be reconciled, or that the data falls into a broader range because various grades differ in properties. Utmost care is taken that the specified range contains grades known from published data. If there are specific grades differing in properties, a set of separate ranges is given in some cases.

After some data, information is given in parenthesis to indicate additional characteristics of tested samples. The usual convention is that the first value given is for pure or typical material, followed by its different modifications (e.g., reinforcements with different fibers or different levels of crystallinity, structure, or different conditions of sample preparation as to its temperature, state, etc.).

The range of molecular weights and related data (e.g., polymerization degree) requires additional explanation. In some cases, the number average molecular weight data do not correspond to mass average molecular data (as could be expected from a given range of polydispersities). This is because these data are given based on values found in literature without any attempts to reconcile them by means of calculation, which seems to be the correct approach because the data strictly reflect values found in the literature, not the results of any approximations which will artificially compare sets of data for materials coming from different experimental or production conditions. This is in agreement with one essential goal of this collection – authenticity of the data selected.

We hope that the results of our thorough search will be useful and that the data will be skillfully applied by users of this book for the benefit of their research and applications.