

BOOK REVIEWS

A. S. Ginzburg

BASIC THEORY AND PRACTICE OF THE DRYING OF FOODSTUFFS*

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The first volume of a two-volume text by Professor A. S. Ginzburg was published in 1973; it was developed from the well-known monograph by Ginzburg, "Drying of Foodstuffs," which was published in 1960.

The 12 chapters of this book are grouped into four parts, which give the basic modern theory of heat and mass transfer in the drying of moist materials. The basic methods for drying foodstuffs are classified, and the most common desiccation methods and the most common designs of desiccation equipment are described. The fundamentals of engineering calculations are examined; questions related to evaluating the effectiveness of desiccation equipment are discussed.

The first part of the book (Chapters I-III) deals with the physical and chemical fundamentals of drying processes, outlines the current understanding of moist materials as objects to be dried, outlines our knowledge of the thermodynamic and thermophysical characteristics of foodstuffs, describes the basic properties of moist gases, and gives the classical laws of hygrostatics. Attention is focused on the interaction of the moist material with the air in the course of the establishment of a hygrothermal equilibrium state and on the classification of the various types and shapes of the bond between the water and the material in connection with the process of removing this water.

The second part of the monograph deals with the fundamental theory of the transport of energy and moisture during the drying process. It sets forth the basic results and conclusions of the extensive research which has been done on this problem, for which much credit goes to the Soviet school founded by A. V. Lykov.

The empirical knowledge on the drying process is discussed in detail. There is a generalized discussion of the scientific material on the transfer of moisture from the surface of the material to be dried to the medium in the drying chamber and on the mathematical description of the processes of internal heat and mass transfer. A special section in the second part of the book is devoted to the use of similarity theory and the methods of the thermodynamics of irreversible processes for qualitative and quantitative analysis of the drying process. Of considerable scientific and practical interest are the current understanding (Chapter IV) on heat and mass transfer during rapid processes and on the relation between the temperature and the moisture content of the material during the drying.

Chapter V describes the methods for calculating the duration of the drying which are most commonly used in the Soviet and non-Soviet literature. This chapter also deals with methods for approximately calculating the duration of the drying of thermally unstable materials on the basis of the time required to reach the maximum permissible temperature.

The third part of the book deals with the technology of drying. Here Ginzburg describes the basic drying methods and proposes a detailed classification of the methods of thermal drying of various materials. These chapters are of particular interest for specialists dealing with questions of drying and heat treatment in various branches of industry, since

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they include, along with a detailed analysis of the basic features of the various drying methods, the results of extensive experiments, including some carried out by the author and his students. The theoretical analysis of the various drying methods is illustrated by the solution of several concrete problems and usually ends with concrete recommendations for accelerating the drying process and for choosing the optimum conditions.

Particular attention is paid to questions of drying with the help of various fields: thermoradiation drying, drying in the electric fields of rf and microwave currents, and drying in an acoustic field.

Of clear practical importance is the fourth part of the monograph, which deals with the fundamentals of engineering calculations and estimates of the effectiveness of various types of drying equipment.

In this text, professor Ginzburg has systematically classified, generalized, and described in a systematic manner the extensive material on the theory and practice of drying foodstuffs.

However, we do wish to offer a few comments which we believe should be taken into account in the preparation of the second addition of this book.

This monograph deals with the drying process for the case in which it is water which is to be removed from the material, but in many instances other solvents must be removed also. Furthermore, there should be a more detailed examination of the drying process during the migration of substances dissolved in the liquid which is being removed. The influence of a magnetic field on the moist material during the drying should be discussed, and there should be a discussion of drying in an electric field of line frequency.

In the part dealing with the techniques of drying in a suspended state, a method for carrying out calculations in connection with drying in a pneumatic tube should be included. Unfortunately, the book does not give illustrative calculations for various types of drying equipment. In view of the size of this book, these calculations should be published in a special guide on designs and pertinent calculations for equipment for drying foodstuffs.

There should also be at least a brief exposition of the basic features of sublimation drying.

This book is written for a wide variety of readers; its language is clear and precise; and it is well-illustrated with figures, diagrams, and monograms. This book will undoubtedly be useful in the training of engineers heading into the food industry; it will also be of considerable interest for engineers and scientists specializing in the drying and heat treatment of various type of moist materials.