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TEXTILE SCIENCE AND TECHNOLOGY

S.R. KARMAKAR

**CHEMICAL TECHNOLOGY
IN THE PRE-TREATMENT
PROCESSES OF TEXTILES**

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CHEMICAL TECHNOLOGY IN THE PRE-TREATMENT PROCESSES OF TEXTILES

BY

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PREFACE

Textile chemical processing today, particularly the pre-treatment processes require a highly sophisticated technology and engineering to achieve the well known concepts of "Right first time, Right everytime and Right on time" processing and production. Chemical pre-treatment may be broadly defined as a procedure mainly concerned with the removal of natural as well as added impurities in fabric to a level necessary for good whiteness and absorbancy by utilising minimum time, energy and chemical as well as water.

This book discusses the fundamental aspects of chemistry, chemical technology and machineries involved in the various pre-treatment process of textiles before subsequent dyeing, printing and finishing. With the introduction of newer fibres, specialty chemicals, improved technology and sophisticated machineries developed during the last decade, all attempts have been made to fill a gap in this area of technology. New chapters are integrated and introduced to upgrade the information and the subject matter and contents are so chosen that it will permit the teacher to rearrange units to suit the needs of individual groups of students. Efforts are also made to provide an in-depth exposition of the topic with a review of the most exciting recent developments in the rapidly moving field. But the real strength of this book is its clear perception of ample background description, which will enable to understand most current journals empowering the reader to stay abreast of the latest advances in the field.

The interplay between fibre structure, morphology and chemistry is an integral part of all pre-treatment processes and in Chapter 1 an attempt is made to cover the most up-to-date information regarding all the principal classes of fibres, viewed in the light of research and commercial exploitation. Chapter 2 is devoted to mechanical fabric preparation before chemical processing commences to achieve smooth and trouble free results in subsequent dyeing and finishing. Chapter 3 discusses the chemistry of different sizing agents with respect to their removal from the fabrics. Chapter 4 covers a purifying treatment of textiles to reduce the amount of natural impurities sufficiently to enable level and reproducible dyeings and finishing to be produced. Specialty chemicals have very high value in the chemical processing of textiles and the applications of chemical auxiliaries are included in the relevant processes. Chapter 5 describes the various machineries that have been developed

for the purifying operations. Chapter 6 deals with the detailed understanding of various bleaching agents and their mechanisms or mode of action on various fibres. The chemistry, technology and care guides are included separately for each fibre and blended fiber fabrics. New machineries have been developed for the bleaching of textiles and Chapter 7 looks at the machineries involved in such process. Recent technological advances of mercerizing and heat-setting of textiles are included in Chapters 8 and 9 respectively. Textile fibres do not appear perfectly white even after chemical bleaching and Chapter 10 describes the chemistry and mechanism of optical brightening agents as well as their applications to various kinds of fibers. All serious efforts have been directed in Chapter 11 towards shortened or combined pre-treatment processing in order to minimize energy consumption. Chemical degradation or damages caused by improper application of processes, erroneous concept of procedure, faulty operation of machines and chemicals are critically reviewed in Chapter 12. A changing concern in matters relating to environmental pollution from pre-treatment processes involved in textile mills and processing house in particular is increasingly demanded and thus all these varied developments in legislation, in analysis and standards and in treatments are included in Chapter 13. Pre-treatment or surface modification of textiles with low temperature glow-discharges or plasma is of great interest in near future and Chapter 14 discusses its application as an alternative to conventional techniques. Enzymatic pre-treatment (a biological approach) is becoming an important commercial process and Chapter 15 contains the development in the field of enzyme treatments for textiles. Testing, analyses and evaluation of the efficiency of processes present the time domain approach to modern process control, which allows for the formation of precise performance objectives that can be examined. Thus, Chapter 16 will be a valuable resource for practicing process control technologists and students.

I hope the reader will find the book interesting and useful with suggested references in each chapter along with simplified flow diagrams showing various processes and machineries involved in pre-treatment technology of textiles. No single text can be sufficient unto itself. Any constructive suggestions and comments are therefore welcome for future revisions and corrections.

**Serampore, Hooghly, West Bengal,
(India), April 1999.**

Samir Ranjan Karmakar

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