纺织服装高等教育"十三五"部委级规划教材

Fibres, Yarns and Fabrics

纺织英语

（第三版）

编　　著：卓乃坚 Zhuo Naijian

英文审读：西蒙 C.哈罗克博士 Dr. Simon C. Harlock

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·上海·

内容提要

本书用英语介绍纤维、纱线、织物形成及染色、印花和整理等过程,涉及上千条常用纺织术语。为了方便读者理解,本书使用了不少插图,并且每章后附有练习题和阅读材料。另外,书后还附有中文参考译文和便于查阅的词汇表。

本书可以用作纺织专业学生的专业英语教材,也可以作为国际贸易专业学生了解纺织的双语教材,还可以作为有关纺织工作者及纺织品外贸工作者有益的参考读物。

图书在版编目(CIP)数据

纺织英语/卓乃坚编著. —3 版. —上海:东华大学出版社,2017.3

ISBN 978-7-5669-1176-6

Ⅰ.①纺…　Ⅱ.①卓…　Ⅲ.①纺织—英语—教材　Ⅳ.①TS1

中国版本图书馆 CIP 数据核字(2016)第 318990 号

责任编辑:张　静
封面设计:魏依东

出　　版:东华大学出版社(上海市延安西路 1882 号,200051)
本社网址:http://www.dhupress.net
天猫旗舰店:http://dhdx.tmall.com
营销中心:021-62193056　62373056　62379558
印　　刷:常熟市大宏印刷有限公司
开　　本:787 mm×960 mm　1/16　印张:13
字　　数:324 千字
版　　次:2017 年 3 月第 3 版
印　　次:2017 年 3 月第 1 次印刷
书　　号:ISBN 978-7-5669-1176-6
定　　价:35.00 元

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Preface

The textile industry is one of the oldest industries in the world. Although some people think that it is a "sunset" industry, it is clear that no one can live without the products from this industry. Textile products are playing an essential role not only in our everyday life but also in the fields of medical treatment, engineering, and aerospace technology.

It is a commonly held belief that a country should develop its industries according to its competitive advantages and it is the same for the textile industry. The textile industry in some developed countries has tended towards capital-intensive industry whereas in developing countries the industry is labour-intensive one. Such a tendency, no doubt, has greatly promoted the development of textile international trade.

As the globalization continues, communication and information are becoming more and more important for the international textile business. Although in today's world there are many means of communication and ways to search for information, language is still of the utmost importance.

English is the principal language in international communication and for anyone involved in the textile business, it is almost essential to know many specialized textile terms in English, especially if he or she intends to be engaged in international business, or is seeking outside information to develop textile industry.

Therefore the purpose of this book is to provide readers with both a fundamental insight into fibres, yarns and fabrics, and, in doing so, introduce them to many specialized textile terms in both English and Chinese.

It is envisaged that this book will serve as a suitable textbook for both students majoring in textiles as well as students majoring in international trade who are intending to become involved in textile manufacture.

What's New in this edition? Like the second edition, reading materials excerpted from some well-known English textile magazines, published in U. K.,

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U. S. A. etc. , are provided for each chapter. All reading materials in the last edition are replaced by those from the latest magazines and some useful terms in the old reading materials are kept and incorporated into the text part of the relative chapters, and thereby the author wishes to present to readers the newest information about the textile world. If this book is used as a textbook, those reading materials could be used as exercises for students to make translations.

Acknowledgement. The author would like to express his profound gratitude and sincere appreciation to Dr. Simon C. Harlock for his important contribution to this book, and the author also wish to take this opportunity to express his immense gratitude and deep reverence to all who enable him to grasp the solid knowledge in English and textiles, including Dr. G. A. V. Leaf, his (ex) Ph. D. supervisor in the University of Leeds; Jin Yuyan, his (ex) tutor of specialized English in East China Textile Institute of Science and Technology (now called Donghua University); Shen Erkang, his (ex) English teacher in middle school.

Special thanks are also extended to Mr. Zhuo Shufan for his contributions in preparing illustrations, vocabulary list and retrieving materials for this book.

The author

December 2016

前　言

纺织业是世界上最古老的工业之一，尽管有人认为它是一个夕阳产业，但不容置疑，人们的生活离不开它的产品。纺织产品不仅在我们日常生活中，而且在医疗、工程及航天技术领域中，正发挥着必不可少的作用。

通常，人们都认为，一国应该根据自己的竞争优势发展自己的产业，纺织业也是如此。某些发达国家的纺织业已趋向成为资本密集型产业，而发展中国家的纺织业仍然是劳动力密集型的。无疑，这种趋势大大促进了纺织国际贸易的发展。

随着全球化的持续，交流和信息对于国际纺织商务越来越重要。尽管在当今的世界，交流的手段和信息搜索的方式很多，语言仍然是至关重要的。

英语是国际交往中的主要语言，对于涉足纺织商务的每个人，了解很多的英语纺织专业术语几乎是必要的，尤其如果他/她打算参与国际商务，或寻求外部信息以发展纺织业。因此本书的目的就是让读者对纤维、纱线和织物有一个基本了解，同时向他们介绍很多的英文和中文的纺织专业术语。

本书设想可以作为纺织专业和预期将涉足纺织制造的国际贸易专业的学生的教材。

本版有何新处？如同第二版，本版为每一章提供了一些摘自英美等国出版的知名英文纺织杂志的阅读材料。上一版中的所有阅读材料被那些摘自近期的杂志中的文章所替代，而老的阅读材料中某些有用的术语得以保留并融入相应各章的课文中，以此作者希望能为读者提供最新的纺织界信息。如果本书作为教材，这些阅读材料可以用作学生的翻译练习。

致谢。作者对西蒙 C. 哈罗克博士对本书所做的重要贡献深表谢意，作者还想借此机会对所有使他掌握英语和纺织方面的坚实知识的人表达无尽的谢意和深深的敬仰，其中有：G. A. V. 里夫博士，作者在利兹大学攻读博士时的导师；金玉燕，作者在华东纺织工学院（现为东华大学）时的专业英语指导老师；沈尔康，作者在中学时期的英语老师。另外，特别感谢卓书帆为制备本书的插图和词汇表以及检索本书所用材料所做的贡献。

作者

2016 年 12 月

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CHAPTER 1

TEXTILE FIBRES

Fibres are the basic elements of textiles. Generally speaking, materials with diameters ranging from several microns to tens of microns and with lengths being many times of their thickness can be considered to be fibres. Among them, those longer than tens of millimetres with sufficient strength and flexibility can be classified as textile fibres, which can be used to produce yarns, cords or fabrics.

1 TYPES OF TEXTILE FIBRES

There are many types of textile fibres. However all may be classified as either natural fibres or man-made fibres.

1.1 NATURAL FIBRES

Natural fibres include plant or vegetable fibres, animal fibres and mineral fibres.

In terms of popularity, cotton is the most commonly used plant fibre, followed by linen (flax) and ramie. Flax fibres are commonly used, but since the fibre length of flax is fairly short (25 ~ 40 mm), flax fibres have traditionally been blended with cotton or polyester. Ramie, the so-called "China grass", is a durable bast fibre with a silky lustre. It is extremely absorbent but the fabrics made from it crease and wrinkle easily, so ramie is often blended with synthetic fibres.

Animal fibres either come from the animal's hair, for example, wool, cashmere, mohair, camel hair and rabbit hair, etc., or from the animal gland secretion, such as mulberry silk and tussah.

The most commonly known natural mineral fibre is asbestos, which is an inorganic fibre with very good flame resistance but is also dangerous to health and, therefore, is not used now.

1.2 MAN-MADE FIBRES

Man-made fibres can be classified as either organic or inorganic fibres. The former can be sub-classified into two types: one type includes those made by transformation of natural polymers to produce regenerated fibres as they are sometimes called, and the other type is made from synthetic polymers to produce synthetic filaments or fibres.

Commonly used regenerated fibres are Cupro fibres (CUP, cellulose fibres obtained by the cuprammonium process) and Viscose (CV, cellulose fibres obtained by the viscose process. Both Cupro and Viscose can be called rayon). Acetate (CA, cellulose acetate fibres in which less than 92%, but at least 74%, of the hydroxyl groups are acetylated.) and triacetate (CTA, cellulose acetate fibres in which at least 92% of the hydroxyl groups are acetylated.) are other types of regenerated fibres. Lyocell (CLY), Modal (CMD) and Tencel are now popular regenerated cellulose fibres, which were developed to meet the demand for environmental consideration in their production.

Nowadays regenerated protein fibres are also becoming popular. Among these are soyabean fibres, milk fibres and Chitosan fibres. Regenerated protein fibres are particularly suited for medical applications.

Synthetic fibres used in textiles are generally made from coal, petroleum or natural gas, from which the monomers are polymerized through different chemical reactions to become high molecular polymers with relatively simple chemical structures, which can be melted or dissolved in suitable solvents. Commonly used synthetic fibres are polyester (PES), polyamide (PA) or Nylon, polyethylene (PE), acrylic (PAN), modacrylic (MAC), polypropylene (PP) and polyurethane (PU). The aromatic polyesters such as polytrimethylene terephthalate (PTT), polyethylene terephthalate (PET) and polybutylene terephthalate (PBT) are also becoming popular. In addition to these, many synthetic fibres with special properties have been developed, of which Nomex, Kevlar and Spectra fibres are well known. Both Nomex and Kevlar are the registered brand names of the Dupont Company. Nomex is a meta-aramid fibre with an excellent flame retardant property and Kevlar can be used to make bullet-proof vests because of its extraordinary strength. Spectra fibre is made from polyethylene, with ultra-high molecular weight, and is considered to be one of the strongest and lightest fibres in the world. It is particularly suited for armour, aerospace and high-performance sports goods. Research is still going on. The research on nano fibres is one of the hottest topics in this field and in order to ensure that nanoparticles are safe for man and the environment, a new field of science called "nanotoxicology" is derived, which currently looks at developing test methods for investigating and evaluating the interaction between nanoparticles, man and environment.

Commonly used inorganic man-made fibres are carbon fibres, ceramic fibres, glass fibres and metal fibres. They are mostly used for some special purposes in order to perform some special functions.

2 PROPERTIES OF TEXTILE FIBRES

Much research has been conducted into the properties of textile fibres. These include sorption properties to find whether a particular fibre is hydrophilic, hydrophobic, hygroscopic, oleophilic, or oleophobic, and other properties, such as tenacity, elastic recovery, abrasion resistance, flexibility, creep properties, combustibility, chemical properties and resistance to biological organisms, etc. Figure 1.1 presents a brief summary of the performance characteristics of some common textile fibres.

Generally speaking, protein fibres have higher resilience and they are hygroscopic or hydrophilic fibres, whose mechanical properties change as they absorb moisture. Alkalis impair their mechanical properties and ultraviolet light may cause them to yellowing and weaken. The actual properties of different protein fibres differ according to their particular morphological and chemical structures. For example, wool has a scaly surface, which makes it prone to felting unless treated to prevent it. In contrast, silk has a smooth surface, which imparts a shiny lustre to it.

Cellulosic fibres are also hydrophilic, and their mechanical properties will also change after moisture absorption. Compared to natural protein fibres, they have lower resilience and much better resistance to alkaline degradation. Among them, ramie has excellent tenacity and very good resistance to UV light. Their specific morphologies and chemical structures also affect their properties. An individual cotton fibre is convoluted, like a deflated hose-cotton has lower thermal insulation because the lumen in most cotton fibres collapses as the fibre dries out after growing. The chemical

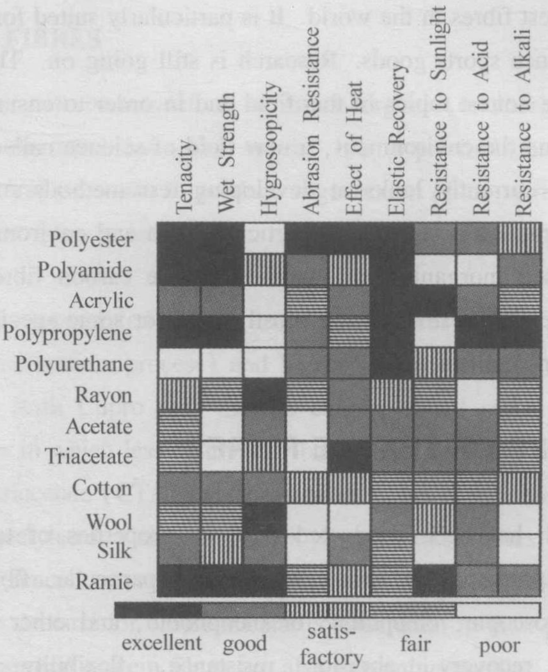

Fig. 1. 1 Performance ratings of prominent textile fibres

component of the viscose fibres is similar to that of the cotton, which gives them similar characteristics. However, since the degrees of polymerization and crystallization in viscose are lower than those of cotton, viscose has a better hydroscopic property but poorer tensile strength, especially in the wet state.

Synthetic fibres generally have lower moisture regain, and most of them are oleophilic but hydrophobic. Unlike the protein and cellulosic fibres, synthetic fibres have good resistance to moths, mildew and fungi. The actual properties of synthetic fibres will depend on their molecular length, chemical composition, arrangement of polymers, bonds between the molecules and the shape of their cross sections, etc. For example, the more the amorphous regions and the more the H-bonds or polar groups that are present within the structure, the more hydrophilic the fibre will be; the more the molecules are orientated in the axial direction of the fibre, the higher the fibre's tenacity will be. To increase the orientation, most synthetic filaments were stretched or drawn during their manufacture. The properties of the synthetic fibres are highly dependent on their chemical composition. For example, polyester has good tenacity due to its higher crystallinity, poor hydrophilicity due to a lack of hydrophilic groups, good resistance to acid but less good to alkalis due to its chemical composition.

3 THE QUALITY OF FIBRES

Attention must be paid to fibre quality, because this critically affects the quality of yarns and fabrics made from them. The quality of fibres can be considered from two perspectives, *viz.* apparent quality and inherent quality.

Fibres that are stuck together during their manufacture will affect the apparent qualities of man-made fibres, and furthermore, faults in their appearance would also affect the inherent quality. Another example is the sulphur spots that can occur in viscose fibres due to insufficient desulphuration.

The inherent qualities are principally the mechanical and chemical qualities, which might affect the later processing or the end-use of fibres. Measurements of breaking strength, elongation at break, fibre length variation, regularity of fibre fineness, proportion of over-length fibres, crimp frequency and moisture regain, etc. need to be made in order to evaluate fibre quality. For some fibres, further tests may be required such as wet tenacity, loop strength and residual sulphur content for viscose, dye-uptake rate for acrylic and boiling shrinkage for polyester.

For natural fibres, tensile tests are performed to determine their breaking strengths and extensibility, from which the variabilities in strength or elongation might be calculated. The fineness of the fibre specimens are usually measured to find their mean values and variation coefficients. Any impurities, such as vegetable content in cotton or oil in wool, need to be checked, and they are important factors in the evaluation of fibre quality.

Before testing, textile fibres should be conditioned to bring the testing material into moisture equilibrium with standard atmosphere for testing. Testing on textile fibres is conducted in standard atmospheric conditions which are a relative humidity of 65%±2% and a temperature of 20℃±2℃ in the air at local atmospheric pressure. For some materials, such as polyester and acrylic, which are known to be relatively unaffected by changes in relative humidity, the tolerance in relative humidity can be extended to ±5%. For tests on yarns or fabrics, the same conditions should also be strictly followed, especially for those sensitive to humidity.

Words and Phrases

fibre [ˈfaɪbə]	纤维
textile	纺织品
micron [ˈmaɪkrɒn]	微米
natural fibre	天然纤维
man-made fibre	化学纤维
synthetic [sɪnˈθetɪk] fibre	合成纤维
plant fibre	植物纤维
vegetable fibre	植物纤维
animal fibre	动物纤维
mineral [ˈmɪnərəl] fibre	矿物纤维
cotton	棉
linen [ˈlɪnɪn]	亚麻织物或纱线
ramie [ˈræmɪ, ˈreɪ-]	苎麻
flax [flæks]	亚麻
polyester [ˌpɒlɪˈestə] (PES)	涤纶/聚酯
bast [ˈbæst] fibre	韧皮纤维
wool	羊毛
cashmere [kæʃˈmɪə]	羊绒/开司米
mohair [ˈməʊheə]	马海毛
camel [ˈkæməl] hair	驼毛
rabbit hair	兔毛
animal gland [glænd] secretion [sɪˈkriːʃən]	动物腺分泌液
mulberry [ˈmʌlbərɪ] silk	桑蚕丝
tussah [ˈtʌsə]	柞蚕丝
asbestos [æzˈbestɒs]	石棉
organic [ɔːˈgænɪk] fibre	有机纤维
inorganic [ˌɪnɔːˈgænɪk] fibre	无机纤维
polymer	聚合物,聚合体
regenerated fibre	再生纤维

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