

| 高职高专染整类项目教学系列教材

黄旭 张炜栋 主编

实用 染整英语

Practical Dyeing
and Finishing English

东华大学出版社

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内 容 提 要

本教材是针对印染专业学生和技术人员学习和使用英语的需要而编写的。内容涵盖纤维和纺织品、染整助剂、染整前处理、染料、染色、印花、整理和实用贸易基础八个模块。在每个工作任务中都安排了适当的课后练习题及阅读文章,提供了多样化的学习方式。另外,在附录部分收入了一些印染及贸易专业英文术语,并附有详细的英文释义,便于读者准确理解词汇。

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前 言

《实用染整英语》是供已学完基础英语、掌握了一定数量的常用词汇和基本语法的轻化类高职高专学生使用的染整专业英语教材,旨在培养学生对染整专业英语的应用能力,在最后一个模块中补充了实用贸易基础部分,使其成为染整企业专业技术人员和从事纺织品外贸工作人员较好的参考资料。

本教材内容涵盖纤维和纺织品、染整助剂、染整前处理、染料、染色、印花、整理和实用贸易基础8个模块,分为58个工作任务,在每个工作任务中都安排了适当的课后练习题及阅读文章,提供了多样化的学习方式。

本教材由南通纺织职业技术学院染化系教师组织编写。其中,模块1由沈志平编写;模块2由李锦华编写;模块3、模块4、模块5和模块6中的任务1、任务2和任务3由黄旭编写;模块6中的任务4、任务5和任务6由贺良震编写;模块7中的任务1、任务2和任务3由潘云芳编写;模块7中的任务4、任务5和任务6由季莉编写;模块8由张炜栋编写。最后全书由黄旭统稿。

由于编者水平有限,书中难免存在缺点和错误,恳请广大读者批评指正。

编者

2009年10月

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Module One

Fiber and Fabric

Task One

Text Classification of fibers

Fiber is the basic unit of fabric. The textile fibers may be divided into four major groups as follows:

- 1) Natural vegetable fibers.
- 2) Natural protein fibers.
- 3) Regenerated fibers which use some naturally prepared substances as the raw materials.
- 4) Synthetic fibers which use some simple artificially prepared organic compounds as the initial raw materials.

The basis of the chemical composition of all vegetable fibers is cellulose, which is present to a greater or lesser extent. Apart from these vegetable fibers, some of man-made fibers, such as viscose and cuprammonium rayon fibers, also consist of cellulose. In order to distinguish them from the man-made cellulosic fibers, the vegetable fibers are called natural cellulosic fibers. Natural cellulosic fibers are usually divided into four types: seed fibers (such as cotton and kapok), bast fibers (such as flax, jute and ramie), leaf fibers (such as sisal and pina) and fruit fibers (such as coir).

Natural protein fibers such as wool and silk are obtained from animal hairs and animal secretions. All of these fibers are composed of protein in which the repeat unit is amino acid. The amino acids are linked to each other by peptide bonds (—CO—NH—) to form the protein polymer. Some of man-made fibers are also made from amino acids, but only animal fibers are natural protein fibers. Natural protein fibers have higher moisture regain and warmth than natural cellulosic fibers. Natural protein fibers have good resiliency and good elastic recovery but have poor resistance to alkalis.

There are three types of regenerated fibers: viscose rayons, acetate fibers and protein regenerated fibers. The first two types are manufactured from natural polymers (cellulose), which are usually obtained from wood and cotton linters. The latter may be produced from animal and vegetable proteins. The production flow of viscose rayon mainly includes: cellulose extraction and oxidation, cellulose modification, filament extrusion and

after-treatment.

The first synthetic fiber is nylon (one of polyamide fibers) that was commercially produced in the United States in 1939. The main kinds of synthetic fibers include: polyamide, polyester and polyacrylonitrile fibers, which are used in textile industry widely.

Words:

- | | |
|---|--|
| 1. cellulose [ˈseljʊləʊs] <i>n.</i> 纤维素 | 8. coir [ˈkɔɪə] <i>n.</i> 椰子壳的纤维 |
| 2. seed [si:d] <i>n.</i> 种子 | 9. secretion [sɪˈkri:ʃən] <i>n.</i> 分泌, 分泌物(液) |
| 3. kapok [ˈkeɪpɒk] <i>n.</i> 木棉花 | 10. peptide [ˈpeptaid] <i>n.</i> 缩氨酸 |
| 4. bast [bəst] <i>n.</i> 韧皮 | 11. resiliency [rɪˈzɪliənsɪ] <i>n.</i> 弹性 |
| 5. jute [dʒu:t] <i>n.</i> 黄麻 | 12. linter [ˈlɪntə] <i>n.</i> 棉短绒 |
| 6. sisal [ˈsɪsəl] <i>n.</i> 剑麻 | 13. extraction [ɪksˈtrækʃən] <i>n.</i> 萃取法 |
| 7. pina [ˈpi:nə] <i>n.</i> 风梨麻 | 14. modification [ˌmɒdɪfɪˈkeɪʃən] <i>n.</i> 改性 |

Phrases and Expressions:

- | | |
|-----------------------------|-----------------------------------|
| 1. vegetable fiber 植物纤维 | 6. elastic recovery 弹性复原 |
| 2. viscose rayon 粘胶人造丝 | 7. production flow 生产流程 |
| 3. cuprammonium rayon 铜铵人造丝 | 8. filament extrusion 抽丝 |
| 4. amino acid 氨基酸 | 9. polyacrylonitrile fiber 聚丙烯腈纤维 |
| 5. peptide bond 肽键 | |

Exercises:

1. Translate the following terms and expressions into Chinese

- | | | | | |
|-----------------|--------------------|----------------------|---------------------|-----------|
| 1) peptide bond | 2) moisture regain | 3) linters | 4) wood pulp | 5) bast |
| 6) sisal | 7) link | 8) polyacrylonitrile | 9) elastic recovery | 10) kapok |

2. Translate the following terms and expressions into English

- | | | | | |
|-------|---------|--------|---------|----------|
| 1) 原料 | 2) 椰壳纤维 | 3) 分泌物 | 4) 被分为 | 5) 植物纤维 |
| 6) 尼龙 | 7) 氨基酸 | 8) 粘胶 | 9) 天然纤维 | 10) 生产流程 |

3. Translate the following sentences from English into Chinese

- Based on their chemical composition, fibers can be classified into many groups such as cellulosic fibers, protein fibers, viscose fibers, polyamide fibers, polyester fibers and polycrylic fibers, etc.
- As natural fibers cannot meet the requirement of people, many polymers that do not naturally exist in the form of fiber have been processed into fiber form.
- Most of man-made fibers have only been produced in the last 40 years, but they have made a great difference to present today society.
- The natural fibers can be subdivided into the three types of cellulosic, protein and mineral fibers according to their origins.
- Man-made fibers are usually subdivided into four groups: regenerated, modified, synthetic and mineral fibers, according to their polymer origins.

4. Translate the following sentences from Chinese into English

- 为了方便研究、讨论或应用,通常将纤维分类。
- 大多数的纤维是聚合物。

- 3) 最方便的分类方法是根据纤维的来源把它们分成两个基本类型,即天然纤维和人造纤维。
- 4) 天然纤维指所有以纤维形式从自然界中产生的纤维,包括棉花、亚麻、羊毛和蚕丝等等。
- 5) 这些纤维已被人们认识并使用了数千年。



Reading Material

Linen and Ramie

In addition to cotton, there are a number of minor vegetable fibers, the most important being linen, which is derived from flax. The stalks of plants are harvested and soaked in water under various conditions, in a process called retting. This softens the ligneous material holding the stalk fibers together. A considerable amount of processing is required to produce clean linen fibers.

Flax has relatively high strength. It is resistant to alkalis but is easily damaged by acids. Flax is considered to be the oldest textile fibers in the Western world. It had been used traditionally in the manufacture of cloths, tent fabrics, sewing threads, fishing lines and table cloths for a long time, but today it is often used as a component of blends.

Ramie, from China grass, is another vegetable fibers used for textiles. These different types of cellulosic fibers have different morphologies from cotton and are in a less pure form of cellulose. They have similar dyeing behavior but will not be dyed to the same depth of shade as cotton with a given amount of same dye.

The cell of the fibers is long and the cross-section is irregular in shape. The lumen narrows and disappears towards the end of the cell. Ramie fiber is white, lustrous, stiff and fairly coarse like canvas. It has high strength. The high strength of ramie is attributed to its highly ordered structure. Ramie fibers are often blended with cotton for the use in clothing such as shirts, suiting, sweaters and blouses. The ramie adds strength and the cotton introduces softness. Ramie fiber absorbs water rapidly and fabrics made from it will be laundered easily and dried quickly.

Words:

- | | |
|--|---|
| 1. minor ['maɪnə] <i>adj.</i> 较小的 | 8. ramie ['ræmi] <i>n.</i> 苧麻纤维 |
| 2. linen ['lɪnɪn] <i>n.</i> 亚麻布, 亚麻纤维 | 9. morphology [mə:'fɒlədʒɪ] <i>n.</i> 形态学 |
| 3. flax [flæks] <i>n.</i> 亚麻 | 10. lumen ['ljumɪn] <i>n.</i> 胞腔 |
| 4. stalk [stɔ:k] <i>n.</i> 茎 | 11. coarse [kɔ:s] <i>adj.</i> 粗糙的 |
| 5. retting ['retɪŋ] <i>n.</i> 沤麻 | 12. canvas ['kænvəs] <i>n.</i> 帆布 |
| 6. ligneous ['lɪgnɪəs-ɪnjəs] <i>adj.</i> 木质的 | 13. sweater ['swetə] <i>n.</i> 厚运动衫 |
| 7. tent [tent] <i>n.</i> 帐篷 | 14. blouse [blaʊz] <i>n.</i> 宽松的上衣 |

Phrases and Expressions:

- | | |
|------------------------|-------------------|
| 1. be derived from 源自于 | 3. China grass 苧麻 |
| 2. fishing line 钓丝 | |

Task Two

Text Properties of Fibers

A fiber is characterized by its high length to diameter ratio, and by its strength and flexibility. Fibers may be of natural origin, or artificially made from natural or synthetic polymers. They are available in a variety of forms. Staple fibers are short, with length to diameter ratio around 10^3 to 10^4 , whereas this ratio for continuous filaments is at least several millions. The form and properties of a natural fiber such as cotton are fixed, but for artificially made fibers, a wide choice of properties is available by design. The variations include staple fibers of any length, single continuous filaments (monofilaments), or yarns constituted of many filaments (multi-filaments). The fibers or filaments may be lustrous, dull or semi-dull, fine or ultrafine, circular or of many other cross-sections, straight or crimped, regular or chemically modified, solid or hollow. The luster and handle depend on the shape of cross-sections and on the degree of crimping.

Natural fibers have a number of inherent disadvantages. They exhibit large variations in staple length, fineness, shape, crimp and other physical properties, depending upon the location and conditions of growth. Animal and vegetable fibers also contain considerable and variable amount of impurities, whose removal before dyeing is essential and entails much processing. Artificially made fibers are much more uniform in their physical characteristics. Their only contaminants are small amounts of slightly soluble low molecular weight polymers (oligomers) and some surface lubricants and other chemicals added to facilitate processing. These are relatively easy to be removed compared with the difficulty of purifying natural fibers.

Water absorption is one of the key properties of a textile fiber. Protein or cellulosic fibers are hydrophilic and absorb large amounts of water, which causes swelling. Hydrophobic synthetic fibers, such as polyester, however, absorb almost no water and do not swell. The hydrophilic or hydrophobic character of a fiber influences the types of dyes that it will absorb. Dyeing in a wide range of hues and depths is a key requirement for almost all textile materials.

The regain of a fiber is the weight of water absorbed per unit weight of completely dried fiber, when it is in equilibrium with the surrounding air at a given temperature and relative humidity. Table 1.1 shows some typical values. The regain increases with increase in the relative humidity but diminishes with increase in the air temperature.

Table 1.1 Regain Values of Fibers Obtained by Water Absorption at 65% Relative Humidity and 20°C

Fiber	Regain (%)	Fiber	Regain (%)
Wool	13.5~15.0	Nylon	4.0~4.5
Viscose	13.0	Cellulose triacetate	2.5~3.0
Cotton	7.0~8.0	Acrylic	1.0~2.5
Cellulose diacetate	6.0~6.5	Polyester	0.4

When dyeing, the amount of dyes used is usually expressed as a percentage of the weight of material to be coloured. Thus, 1.00% dyeing corresponds to 1.00g dye for every 100g fiber, usually weighed under ambient conditions. For hydrophilic fibers, the variation of fiber weight with varying atmospheric conditions is therefore an important factor influencing colour reproducibility in repeat dyeing. For example, the weight of 100g dry cotton varies from about 103g to 108g as the relative humidity of the air changes from 20% to 80% at the room temperature.

Words:

1. staple ['steɪpl] *adj.* 短的
2. monofilament ['mɒnəʊ'fɪləmənt] *n.* 单根长丝, 单纤维
3. multifilament [ˌmʌltɪ'fɪləmənt] *n.* 复丝, 多纤(维)丝
4. dull [dʌl] *adj.* 无光的
5. ultrafine [ˌʌltrə'faɪn] *adj.* 超细的
6. hollow ['hɒləʊ] *adj.* 空的
7. inherent [ɪn'hɪərənt] *adj.* 内在的, 与生俱来的
8. entail [ɪn'teɪl] *vt.* 需要
9. oligomer [ˌɒlɪgə'mɜː] *n.* 低聚物, 低聚体
10. humidity [hju:'mɪdɪtɪ] *n.* 潮湿, 湿度
11. diminish [dɪ'mɪnɪʃ] *v.* 减少, 变小
12. regain [rɪ'geɪn] *v.* 收回, 恢复
13. reproducibility [ˌrɪprə'dju:sə'bɪlɪtɪ] *n.* 再现性

Phrases and Expressions:

1. length to diameter ratio 长径比
2. staple fiber 短纤维
3. semi-dull 半消光的
4. chemically modified 化学改性的
5. degree of crimping 卷曲度
6. staple length 纤维长度
7. be in equilibrium with 与……平衡
8. relative humidity 相对湿度
9. cellulose diacetate 二乙酸纤维素
10. cellulose triacetate 三乙酸纤维素
11. express as 表示成……, 以……表示

Exercises:**1. Translate the following terms and expressions into Chinese**

- | | | | | |
|---------------|------------------|--------------------|-----------------|--------------|
| 1) hollow | 2) multifilament | 3) reproducibility | 4) dull | 5) inherent |
| 6) triacetate | 7) location | 8) diminish | 9) artificially | 10) circular |

2. Translate the following terms and expressions into English

- | | | | | |
|--------|--------|-------|--------|---------|
| 1) 超细的 | 2) 低聚物 | 3) 卷曲 | 4) 缺点 | 5) 相对湿度 |
| 6) 膨胀 | 7) 恢复 | 8) 直径 | 9) 短纤维 | 10) 改性的 |

3. Translate the following sentences from English into Chinese

- 1) The two basic groups can then be further subdivided.
- 2) The regenerated fibers are manufactured from natural polymers and can be divided into three types: rayon, acetate and protein.
- 3) Life would be very dull if all textile products were off-white.
- 4) The effect of the high temperature on the fibers will in most cases be slow and involves some weakening, with perhaps yellowing of white fibers and loss of brightness of coloured products.

4. Translate the following sentences from Chinese into English

- 1) 纤维素纤维来自植物原料,蛋白质纤维来自动物,在自然界中还有一种矿物纤维。
- 2) “合成”意味着聚合物完全是人造的。
- 3) 大多数的纤维通常是灰白色。
- 4) 合成纤维是通过合成非天然的聚合物的原料而制得的。
- 5) 纤维素通过化学改性,使其能溶解于有机溶剂。

**Reading Material****Carbon Fibers**

Carbon or graphite fibers have been developed for uses in various types of industrial textiles and in some types of consumer goods. These fibers are made by converting precursor filaments into 99% carbon. Graphite is the term reserved for 99% carbon fibers.

Precursor filaments such as acrylic or cellulose (mainly rayon) are carbonized at a high temperature. Graphite fibers are formed under treatment at temperatures above 2500°C, which converts the precursor filaments to 99% carbon. Fibers treated at temperatures up to 1500°C, which are converted to 95% carbon, are those identified as carbon fibers. Interestingly, the term “carbon” may be used for both types of fibers. Carbon fibers have an extremely high modulus and a low elongation; thus they are highly suited for uses where high strength and little or no stretch are desired. In addition, they are highly resistant to heat.

The tenacity of the fibers varies from about 3g/D to more than 19g/D and the elongation is less than 1%. Tensile strength of fabrics is higher than any other commercially available fibers except for sapphire whiskers and graphite in whisker form. Fiber density is approximately 1.5g/cm³. A few carbon fibers may have a density as high as 2g/cm³, but these are usually designated for very special uses.

Carbon fibers have a diversity of applications. They are used to reinforce resins and metals to provide structural materials with high strength and stiffness and light weight. The resulting composites are used in rotor blades for helicopters, compressor blades in jet engines, golf club shafts, bicycle parts, skis and machinery parts. The carbon filaments are also used to make fabrics that are flameproof and can be used for a variety of protective apparel. They provide for the military where nuclear, biological and chemical resistance

are important, and they are being promoted as an alternative to asbestos.

Words:

- | | |
|-------------------------------------|------------------------------------|
| 1. graphite [ˈgræfɪt] n. 石墨 | 8. sapphire [ˈsæfɪə] n. 蓝宝石 |
| 2. precursor [ˈpri(:)ˈkɜ:sə] n. 母体 | 9. whisker [ˈhwɪskə] n. 晶须 |
| 3. carbonize [ˈkɑ:bənaɪz] v. 碳化 | 10. helicopter [ˈhelɪkɒptə] n. 直升机 |
| 4. modulus [ˈmɒdjʊləs] n. 模数 | 11. compressor [kəmˈpresə] n. 压缩机 |
| 5. elongation [ˌɪlɒŋˈgeɪʃən] n. 伸长率 | 12. shaft [ʃɑ:ft] n. 杆 |
| 6. tenacity [tɪˈnæsɪti] n. 强度 | 13. ski [ski:] n. 滑雪橇 |
| 7. gram [græm] n. 克 | 14. asbestos [æzˈbestɒs] n. 石棉 |

Phrases and Expressions:

- | | |
|--------------------------|---------------------------|
| 1. carbon fiber 碳纤维 | 4. sapphire whisker 蓝宝石晶须 |
| 2. consumer goods 生活消费品 | 5. rotor blades 动叶片 |
| 3. tensile strength 抗张强度 | 6. jet engine 喷气发动机 |

Task Three

Text Yarn Twist

Fibers are formed into yarns with a certain amount of twist in the final yarn. The amount of twist is sometimes identified broadly as low, medium or high. The amount of twist necessary is determined by the end use of the yarn in a cloth. Both single and ply yarns are given twist. Normally the yarn becomes finer, it requires more twist; heavier yarns can have very low twist. The strength of yarns is due, in part, to the amount of twist that has been imparted. Strong yarns require considerable twist. However, beyond an optimum point, additional twist will cause yarns to kink and finally to lose strength.

Twist is defined as the number of turns about its axis per unit of length, noted in a fiber or a yarn. It is expressed in turns per inch, or turns per meter.

The twist counter is an instrument that determines the number of turns of twist per inch in all types of yarns. It is also used to find the amount of take-up in yarns due to twist. The sample to be tested is inserted between two clamps, one of which is stationary, while in order to remove the twist from the yarn, the other is free to be revolved on either direction and connected to a revolution counter. The distance between the clamps is adjustable and can be set according to standard test requirements. The tension on the sample or specimen, as well, is adjustable, the counter being equipped with a device for

recording the actual amount of twist in the yarn.

The direction of twist is also important. Yarns can be twisted with either S twist or Z twist. The direction of twist confirms to the center bar of the letter S or Z.

Words:

- | | |
|-------------------------------|--|
| 1. twist [twɪst] <i>n.</i> 捻度 | 4. clamp [klæmp] <i>n.</i> 夹子 |
| 2. kink [kɪŋk] <i>n.</i> 扭结 | 5. revolution [ˌrevəˈluːʃən] <i>n.</i> 旋转 |
| 3. inch [ɪntʃ] <i>n.</i> 英寸 | 6. specimen [ˈspesɪmən] <i>n.</i> 样品, 待试验物 |

Phrases and Expressions:

- | | |
|-----------------------|--------------------------|
| 1. ply yarn 合股线 | 3. take-up 收缩率 |
| 2. number of turns 圈数 | 4. direction of twist 捻向 |

Exercises:

1. Translate the following terms and expressions into Chinese

- | | | | |
|-----------|---------------|-------------|--------------------|
| 1) clamp | 2) revolution | 3) optimum | 4) number of turns |
| 5) device | 6) distance | 7) strength | |

2. Translate the following terms and expressions into English

- | | | | |
|-------|-------|---------|--------|
| 1) 英寸 | 2) 轴 | 3) 合股线 | 4) 固定的 |
| 5) 捻向 | 6) 扭结 | 7) 最终用途 | |

3. Translate the following sentences from English into Chinese

- 1) Man-made fibers can be produced with many kilometers of yarn on a single package.
- 2) Many man-made fibers are also produced as staple, so that they can be processed on the same machinery as natural staple fibers.
- 3) The strength of a textile material ultimately depends on the strength of the individual fibers from which it is made.
- 4) The materials need to be extended under the stress and be flexible.
- 5) Tights are just one particular application; all fibers need to be extensible and elastic, but to differing degrees.

4. Translate the following sentences from Chinese into English

- 1) 纤维横切面积通常较小,其长度远远超过其宽度。
- 2) 这些纤维天生较短,称为短纤维。
- 3) 这个类型的纤维被称为连续长丝。
- 4) 真丝是唯一的天然连续长丝纤维。
- 5) 有用的纤维,必须具有一定程度的强力。



Reading Material

Yarn Number

Yarn number is a measure of linear density. To some extent the yarn number is an

indication of diameter when the yarns of same fiber content are compared.

Direct yarn number is the mass per unit length of yarn, expressed as grams per meter, pounds per foot, or equivalent units. It is a quotient obtained by dividing the mass of a fiber or a yarn by its length. Tex system is the internationally accepted system of expressing linear density of fibers, filaments, slivers and yarns, or other linear textile materials. The basic unit is tex, which is the mass in grams of the product. It is a recognized SI unit. In this method, the lower numbers relate to finer yarns and the higher numbers to heavier yarns.

Indirect yarn number is the length per unit mass of yarn. It is used for most spun yarns such as cotton, wool and linen. Cotton yarns are numbered by measuring the weight in pounds of one 840 yard hank; the count is then reported as the number of 840 yard hank required to weigh 1 pound. For example, if 840 yards, or one hank, of cotton weights 1 pound, the yarn number is 1^s; if it requires 30 hanks to weight 1 pound, the yarn number is 30^s. A heavy yarn would be 1^s, a medium yarn 30^s, and a very fine yarn 120^s. The lower numbers mean heavier or thicker yarns while the higher numbers refer to finer yarns.

Words:

- | | |
|-----------------------------------|----------------------|
| 1. mass [mæs] n. 质量 | 6. yard [jɑ:d] n. 码 |
| 2. foot [fʊt] n. 英尺 | 7. hank [hæŋk] n. 绞纱 |
| 3. quotient ['kwɔ:ʃənt] n. 商 | 8. weigh [wei] v. 称重 |
| 4. tex [teks] n. 特克斯 | |
| 5. sliver ['slɪvə, 'slɑ:və] n. 纱条 | |

Phrases and Expressions:

- | | |
|--------------------------------|--|
| 1. yarn number 纱线细度 | 4. indirect yarn number 定重制纱线线密度 |
| 2. linear density 线密度 | 5. SI unit (International System of unit)
国际单位制 |
| 3. direct yarn number 定长制纱线线密度 | |

Task Four

Text Types of Textile Fabrics

There are three major types of textile fabrics:

1) Woven fabrics have yarns interlaced at right angles in a repeated pattern (a, in Figure 1.1).

2) Knitted materials consist of interlocking loops of yarn with a regular pattern. There are weft knitted fabrics (b, in Figure 1.1) and warp knitted fabrics (c, in Figure 1.1).