课文及参考译文

总词汇表

制浆造纸专业英语

张金声 主编 · 徐福云 审校

翻译技巧及注释

生词与专业词汇

制浆造纸常用术语

中国轻工业出版社

制浆造纸常用略语

前　言

为了满足制浆造纸专业英语教学和广大造纸工作者工作实际的需要，笔者总结了多年的教学和工作实践经验，结合制浆造纸厂的实际情况，编写了这本既适合于制浆造纸工作者学习和参考，又适合于制浆造纸专业教学使用的《制浆造纸专业英语》。

本书共二十单元。每个单元的主要内容有课文、课文生词、课文注释、课文参考译文、阅读材料、阅读材料译文和科技英语翻译技巧。课文和阅读材料是按化学法制浆的工艺流程顺序编排的。本书还编写了总词汇表供查阅。书后附有制浆造纸常用英语词汇 3000 多条和制浆造纸常见英语缩略语 1500 余条，为学习和查阅提供了方便。

本书编写选用和参考了 JAMES P・CASEY 的《PULP AND PAPER CHEMISTRY AND CHEMICAL TECHNOLOGY》及其汉译本、凌谓民编著的《科技英语翻译教程》、钟香驹主编的《英汉造纸工业词汇》等书籍和杂志。

本书由张金声任主编，孙博任副主编，王正顺等参加了编写工作，全书由徐福云审校。本书在出版之前曾作为制浆造纸专业英语教材使用，广泛征求过多方面专家的意见。编写过程中得到各界专家的指导和支持，在此表示衷心感谢！

编　者

目 录

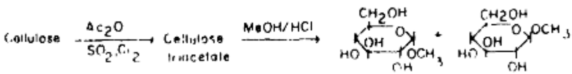
Lesson One

Text

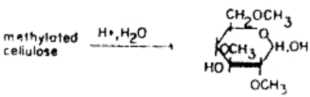
Molecular Structure of Cellulose

Cellulose was first isolated and recognized as a distinct chemical substance in the 1830s by the noted French agricultural chemist, Anselme Payen. Payen concluded, more or less correctly , that cellulose and starch were isomeric substances because both had the same carbon and hydrogen analysis and, subjected to hydrolysis, both yielded D-glucose . Yet the passage of nearly three-quarters of a century was required before the precise empirical formula of cellulose was established as $(C_6H_{10}O_5)x$. Results from earlier studies on acetylation and nitration had indicated that cellulose had three free hydroxyl groups per $(C_6H_{10}O_5)$ unit.

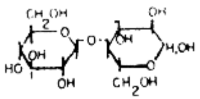
The next major question in unraveling the overall structure of cellulose was to determine if cellulose contained only D-glucose units or if it consisted mainly of D-glucose units with trace amounts of other sugars. When cellulose was hydrolyzed directly with acids, over a 90. 7% yield of D-glucose was obtained. This was good evidence that the only repeating units in the cellulose polymer were anhydro-D-glucose. Even better evidence was obtained when the cellulose was initially converted into cellulose acetate and then hydrolyzed to a mixture of methyl glucosides. With this procedure, over 95.5% yield of a crystalline mixture of methyl α-and β-D-glucosides was obtained. The reaction is shown below:



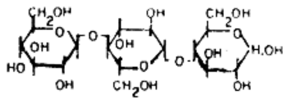
The next step in determining the overall structure of cellulose involved determining how the anhydro-D-glucose units were linked together. To determine this, samples of cellucose were methylated and then hydrolyzed to the individual monomeric units. The position of the methyl groups in the hydrolyzed units corresponds to the position of the free hydroxyl group within the cellulose molecule. The major product obtained under these conditions was 2,3,6 tri-O-methyl-D-glucose, the formula for which is:



This formula indicated that the free hydroxyl groups in cellulose were located at the 2,3,and 6 positions and that the 1,4,and 5 positions were linked by chemical bonds. The two possibilities are a 4-O-substituted D-glucopyranose or a 5-O-substituted D-glucofuranose. Further structure investigation settled the problem in favor of the pyranose form. The final question was to determine whether the linkage between the units were α or β. Evidence on this point came from experiments using partial acid hydrolysis of cellulose. This treatment converted cellulose into a series of cellulose oligomers, which include cellobiose and cellotriose. Their formulas are:

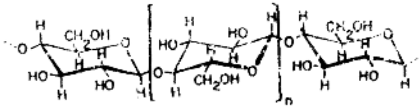


Cellobiose



Cellotriose

Structural studies of these two compounds indicated that the linkage connecting the individual units was β. Therefore, cellulose is a linear polysaccharide consisting of anhydro-D-glucopyranose units linked between the 1 and 4 position of adjacent sugar units by a β linkage. as shown below:



New Words and Expressions

molecular [mou'lekjulə] 分子的

cellulose ['seljulous] 纤维素

isolate ['aisəleit] ①隔离，使孤立；② <电学> 绝缘；
③ <化学> 离析

distinct [dis'tiŋkt] ①清楚的，明晰的，明显的 ②各别的，（性质）不同的

isomeric [aisou'merik]（同分）异构体的

carbon ['kɑ:bən] 碳

hydrolysis [hai'drɔlisis] 水解

yield [ji:ld] 得率，收获率，（衬板）紧度

D-glucose [di:'glu:kous] D-葡萄糖

empirical [im'prikəl] 经验的

formula ['fɔ:mjulə] 公式；化学式；配方

acetylation [æsiti'leiʃən] 乙酰化(作用)

nitration [nai'treiʃən] 硝化（作用）

hydroxyl [hai'drɔksil] 羟基(的)

unit ['ju:nit] 单位；个体；设备，装置

unravel [ʌn'rævəl] ① 解开……线，拆开② 阐明；解决

sugar ['sugə] 糖

polymer ['pɔlimə] 聚合物

anhydro-D-glucose [æn'haidrou di:'glu:kous] 失水-D-葡萄糖

acetate ['æsitit] 醋酸盐；醋酸酯；醋酸根(基)

methyl ['meθil] 甲基的

glucoside ['glu:kəsaid] 葡萄糖甙

procedure [prə'si:dʒə] 程序；手续

crystalline ['kristəlain] 结晶的；晶体的

methylate ['meθileit] 甲基化；甲基化产物

monomeric [mɔnə'merik] 单体的

chemical bond ['kemikəl bɔnd] 化学键

substitute ['sʌbstitju:t] 被取代的

D-glucopyranose [di:glu:kə'pirənous] D-吡喃式葡萄糖

D-glucofuranose [di:glu:kə'fjuərənous] D-呋喃式葡萄糖

pyranose ['pirənouz] 吡喃的，吡喃型的

linkage ['liŋkidʒ] 连接；键合

oligomer ['ɔligoumə] 低聚物

cellobiose ['seləbaiəs] 纤维二糖

cellotriose ['selətraiəs] 纤维三糖

compound ['kɔmpaund] 化合物；复合，混合

linear ['liniə] 线状的，线性的

polysaccharide [pɔli'sækəraid] 多糖

adjacent [ə'dʒeisənt] 接近的，邻近的

Notes

1. Payen concluded, more or less correctly, that cellulose and starch were isomeric substances because both had the same carbon and hydrogen analysis and, subjected to hydrolysis, both yielded D-glucose.

这是一复合句。more or less correctly 是插入语，that 引导的是宾语从句，其中含有 because 引导的原因状语从句。

2. The next major question in unraveling the overall structure of cellulose was to determine if it consisted mainly of D-glucose units with trace amounts of other sugars.

句中的 in unraveling the overall structure of cellulose 是定语，用来修饰主语 question；从 to determine 开始一直到全句结束是动词不定式短语作表语。

翻译技巧一：

翻译标准和过程

（一）翻译标准

翻译是一种语言表达法。译者根据原作者的思想，用本国的语言表达出来，这样就要求译者必须确切地理解和掌握原著的内容，不可离开它而主观地发挥译者个人的想法或进行推测，在确切理解和掌握原著的基础上，译者又必须很好地运用本国语言把原文通顺而流畅地表达出来。

翻译必须兼顾两个方面：一、求其易懂。二、保存原著的风姿。严复先生讲过"译事三难。信、达、雅"。所谓"信"就是忠实原著，达和雅都是指汉语的表达方式，既要表达深刻又要讲究语言艺术。总体说来，翻译的标准包括以下两方面：

第一、弄懂英语原文的语言，准确而又完整地理解全部内容（包括思想、精神与风格），不要任意增删和曲解。

第二、汉语译文必须规范化，译出的词句应符合汉语的表达法，力求通顺易懂，不要逐词死译。

（二）翻译过程

为使译文达到上述标准，在翻译过程中要注意理解、表达和校核三个阶段。

1. 理解阶段

在理解原文时，首先应把整篇整章阅读一遍，对全文大意有个初步理解，然后逐词、逐句、逐段地推敲，再下笔翻译。在科技文献方面，正确地处理译文，特别重要，往往一个单词含义较多，因专业不同，译法不同。例如：parallax 这个词，在数学方面译作“倾斜的线”，而在物理方面译作“视差”。在词组方面，也有同样情况。例如：“dual vector ”这个词组，数学上的含义是“对偶相量”；而在物理上的含义是“反串矢”。在科技英语中这类词和词组不胜枚举，因而一定要在翻译前通读全文，首先了解这篇文章说的是哪方面的内容，然后再着手翻译，否则会铸成大错，或笑话百出。

2. 表达阶段

表达就是选择恰当的汉语，把已经理解了的原作内容重新叙述出来。表达的好坏取决于理解原文的确切程度和对汉语的掌握程度。只是正确理解原文而不能用通顺流畅的汉语表达，仍不能有较好的译文。例如：Matter is anything having weight and occupying space . 这句话如果只按英语结构翻译，可译作“物质是有重量和空间的任何东西”。基本上表达了英文原意，但如译成：“所有物质都具有重量和占有空间。”要比上述译法简单、通顺、流畅。对译文的要求就是除了

不误解原文的内容外，还要善于运用规范化的汉语来表达。

3. 校核阶段

校核阶段是理解与表达的进一步深化，是对原文内容进一步核实以及对译文语言进一步推敲的阶段。这个阶段要对译文进行两个方面的检查：第一，译文是否能正确无误地转述原作的内容。要注意译文在人名、地名、日期、方位、数字等方面有无错漏；译文的段、句或重要的词有无错漏；译文段落、标点符号是否正确无误。第二，译文的表达方法是否规范化，读起来不感到费解。

为了把原文翻译得更好，在翻译过程中，应按下列程序进行工作：

①首先把原文通读一遍，肯定它是哪方面的内容。在翻译之前，熟悉一下有关专业知识，然后再着手翻译。

②遇到生僻或不理解的词组应该辨别它是属于专业用语还是普通用语，然后分头去查阅专业词典和日常用语词典。

③翻译科技文献时，要求定义、术语准确，译文概念清楚，逻辑明确，文字简练，语句通顺易懂，公式或数据无误。

④翻译时不要逐词逐句地死译，应该注意上下文的联系，使译文通顺流畅。

⑤译文中所用的词句应绝对避免外国腔调，使读者在阅读译文时，就象阅读汉语的作品一样。

Reading Material
Cellular Structure of Cellulose

It would be impossible to understand the chemical reactions occurring in the pulping process, account for the physical properties of wood, or even fully appreciate the complex process of biogenesis without some understanding of the arrangement of cellulose, hemicelluloses and lignin in the cell wall. There are several excellent monographs and articles in which the subject is presented in great detail. The present discussion will briefly cover some features relevant to the pulping of wood.

Plant cells are distinguished from animal cells by the presence of true cell walls containing polysaccharides as the major structural material. Cellulose is the major structural component of plant cell walls. It exists in the cell wall as long, thread-like fibers (microfibrils). The cellulose microfibrils in mature wood cells are embedded in a matrix composed mainly of hemicelluloses and lignin.

Electron-microscope studies of mature wood cells show that they consist of several layers of cell wall surrounded by an amorphous, intercellular substance (I). A simplified drawing of the organization of a typical softwood tracheid or hardwood fiber is seen in Fingure 1.

Between the cells is a region , called the compound middle lamella, that contains mainly lignin and pectic substances. The primary wall (P), which is only 0. 1 to 0. 2 μm in thickness, contains a randomly and loosely organized network of cellulose microfibrils embedded in a matrix that for many years was considered to consist of amorphous pectins and hemicelluloses lacking structural orientation. However, Later studies have shown that the hemicelluloses are partially oriented. Immediately below the primary wall is the secondary wall comprising, in fact, nearly all of the cell wall. The secondary wall is divided into three layers called S_1, S_2, and S_3. The outer layer of the secondary wall (S_1) is 0.1-to 0.3-μm thick and has a cross-hatch pattern of microfibrils. The S_2 layer of the secondary wall is 1 -to 5-μm thick and accounts for the major part of the cell-wall volume. The microfibrils in this portion of the secondary wall are oriented almost parallel to the fiber axis. In the thin S_3 layer (0.1 μm) the microfibrils form a flat helix in the transverse direction. The innermost portion of the cell wall consists of the so called warty layer, most likely formed from protoplasmic debris.

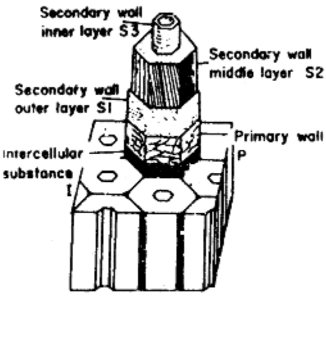


Figure 1. Simplified structure of the cell wall of a softwood tracheid or a hardwood fiber

New Words and Expressions

cellular ['seljulə] 蜂窝状的

pulp [pʌlp] 纸浆

biogenesis [baiou'dʒenisis] 生源学说

arrangement [ə'reindʒmənt] 整理，排列；筹备，安排

hemicellulose [hemi'seljulous] 半纤维素

lignin ['lignin] 木素

monograph ['mɔnəgrɑːf] 专题，论文

relevant ['relivənt] 切题的，中肯的

plant cell [plɑːnt sel] 植物细胞

cell wall [sel wɔːl] 细胞壁

thread -like fiber 线状纤维

microfibril ['maikrou'faibril] 微细纤维

embed [im'bed] 埋放，嵌入

matrix ['meitriks] 字型纸板；字型塑料板；矩阵；(磨石用的)粘合材料，模压制品

amorphous [ə'mɔːfəs] 无定形的

intercellular [intə'seljulə] 胞间层的

softwood tracheid [sɔftwud trə'keid] 软木管胞

hardwood fiber [hɑːdwud'faibə] 硬木纤维

lamella [lə'melə] 胞间层；薄片，薄层；薄板

pectic ['pektik] 果胶的

primary wall 初生壁

network ['netwəːk] 网状的

pectin ['pektin] 果胶

orientation [ɔːrien'teiʃən] 定向，定位

oriented ['ɔ:riəntid] 定向的

secondary wall 次生壁

comprise [kəm'praiz]由……组成；包括，包含

layer ['leiə] 层

cross-hatch [krɔs hætʃ] 交叉排列

parallel ['pærəlel] 平行

axis ['æksis] 轴

helix ['hi:liks] 螺旋型；螺旋线

transverse ['tʃænzvə:s] 横切的，横断的

warty ['wɔ:ti] 木瘤

protoplasmic [proutə'plæzmik] 原生质体的

debris ['debri:z] 碎屑，碎纤维

Lesson Two

Text

Hemicelluloses

The cellulose and lignin of plant cell walls are closely interpenetrated by a mixture of polysaccharides called hemicelluloses. The name hemicelluloses was originally proposed by Schulze in 1891 to designate those polysaccharides extractable from plants by aqueous alkali. Today most workers limit the term hemicelluloses to designate cell-wall polysaccharides of land plants, excluding the cellulose and pectin components. The hemicelluloses are generally water-insoluble, alkali-soluble substances that are more readily hydrolyzed by acid than is cellulose. Structurally, the hemicelluloses differ from cellulose in that they are branched and have much lower molecular weights. The hemicelluloses that are found in the stalk or supporting tissue of woody plants are primarily modified xylans, galactoglucomannans, glucomannans, and arabinogalactans. the arabinogalactans are soluble in water and are commonly classed among the extractives. They are discussed in this chapter because of their widespread distribution in conifers and for comparison of their structure and composition to other nonglucose polysaccharides. All of these polysaccharides are built up from a relatively limited number of sugar residues; the principal ones are: D-xylose, D-mannose, D-glucose, D-galactose, D-arabinose, and 4-O-methyl-D-glucuronic acid.

Although related, the hemicelluloses in wood from gymnosperms and angiosperms are not the same. In angiosperms (hardwoods) the predominant hemicellulose is a partially acetylated (4-O-methyl glucurono) xylan with minor amounts of a glucomannan. In gymnosperms (softwoods) the hemicelluloses consist of partially acetylated galactoglucomannans with smaller, but substantial, amounts of an arabino (4-O-methylglucurono)xylan. The larches occupy a unique postion among the gymnosperms in that they contain arabinogalactan as a major constituent. The difference between angiosperms and gymnosperms can best be illustrated by showing the chemical composition of some typical hardwoods and softwoods. This is shown in Table 1 for hardwoods and Table 2 for softwoods taken from Timell.

Numerous reviews of the chemistry and biochemistry of the hemicelluloses are available. Several detailed reviews on their biogenesis, X-ray analysis, and morphology have been published.