



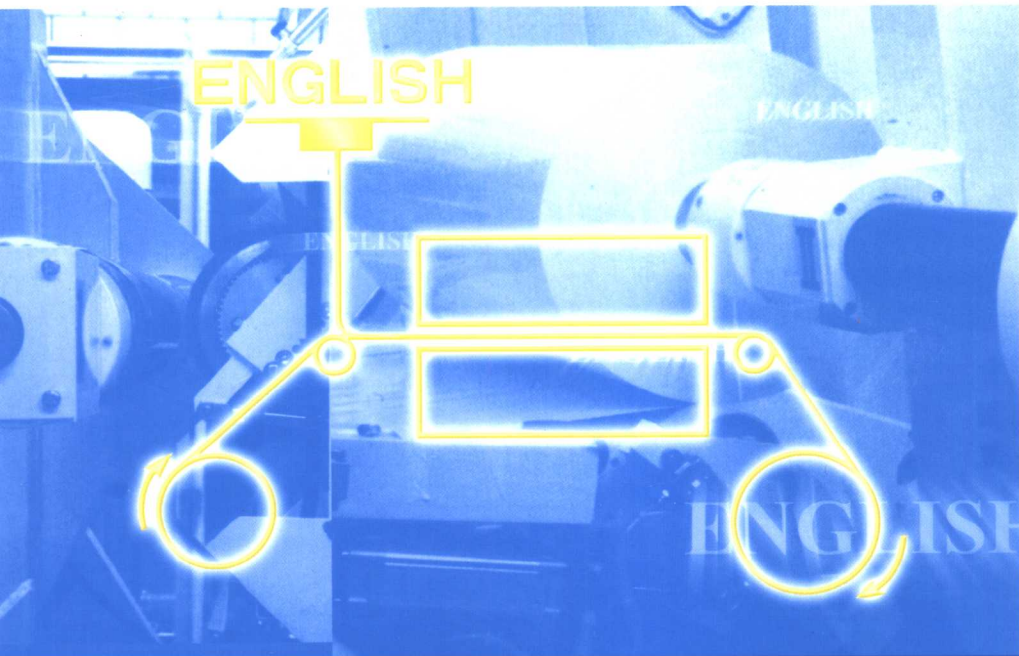
GAODENG XUEXIAO ZHUANYE JIAOCAI

• 高等学校专业教材 •

制浆造纸专业英语

zhijiang zaozhi zhuanye yingyu

曹邦威 张东成 编



中国轻工业出版社

ZHONGGUO QINGGONGYE CHUBANSHE

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前 言

进入 21 世纪,在以加入世贸组织为标志的中国商品经济全球化战略中,国际间造纸经济技术交流日益频繁,外语作为技术交流工具的重要性更加突出。新的形势对中国制浆造纸工程专业教育水平和造纸从业人员的基本素质提出了更高的要求。

我们欣喜地看到:近些年来大学生的基础外语水平较以前有了明显的进步,大学外语教育的“不断线”得到了普遍认同,专业外语教育得到强化。同时,中国造纸专业的高等教育也得到迅速发展,设有制浆造纸工程专业的中国高等院校从当初的七八所发展到今天的近 20 所,因此,更加需要一本为制浆造纸工程专业量身定做的、与当今造纸技术发展同步的专业英语教材,本书正是为此目的而编写的。

本书充分注意了内容的前瞻性,选择反映当今最新造纸技术的英文原文作为课文,程度深浅适当,内容循序渐进,覆盖面广,方便实用。既适合于高校本科生课堂教学,又能满足研究生的外语应用交流之需要,对于想提高外语水平和交流能力的职业人员也是一本很实用的参考书。

本书共分三部分,第一部分为教学课文,共有 29 课,每篇课文后有针对制浆造纸专业的生词和短语注释。课文涉及制浆造纸专业方方面面,有造纸纤维原料、纸浆与纸的性能测试、机械法制浆、碱法制浆、化学品回收及颜料涂布等 29 个方面的内容。第二部分为技术交流实用英语知识,包括申请书、求职信、简历、商务信函等的写作,科技论文的写作,国际科技会议交流等。第三部分为附录,包括所有课文的参考译文、总词汇表和国外制浆造纸专业高等院校及研究机构。特别是国外高等院校及研究机构的提供,为打

算进一步出国深造的在校大学生给予了极大的方便,可通过搜索工具检索到需要的进一步有用信息。

从全书内容来看,担任制浆造纸专业英语的主讲教师应具备较高英语水平和丰富的造纸专业知识。教师可根据本校规定的课时,选择书中全部或部分课文内容进行教学。教学中必须重视学生自学能力的培养,加强外语基本练习和交流训练。我们希望教师能够根据学生的实际水平与兴趣,加入其他合适的资料或内容,以丰富专业外语的教学活动。

参加本书的编者及分工如下:张东成高级工程师负责选编29篇英文课文,提供国外制浆造纸专业高等院校及研究机构和国外真实求职简历。曹邦威高级工程师负责所有课文的翻译及课后单词和短语注释,并排列词汇汇总表。金国斌教授负责本书第二部分主要内容,在此表示感谢。

编者希望并相信《制浆造纸专业英语》能成为造纸专业英语的优选教材,成为受造纸专业技术人员欢迎的参考书,特别是受到造纸专业外资企业与机构的从业人员的欢迎。

由于作者水平有限,希望使用本书的师生和专业人士随时提供宝贵的意见与建议,为提高我国造纸专业人士专业英语水平和技术交流能力共同努力。

编者

2006年2月

目录 CONTENTS

第一部分 教学课文 LESSONS

| | | |
|-----------|---|------|
| Lesson 1 | The history of papermaking 造纸的历史 | (1) |
| Lesson 2 | Fibrous materials of papermaking 造纸的纤维原料 | (4) |
| Lesson 3 | Pulp and paper properties and testing 纸浆与纸的性能及测试 | (8) |
| Lesson 4 | Pulping process and pulp end uses 制浆生产过程和纸浆的最终用途 | (11) |
| Lesson 5 | Mechanical pulping 机械法制浆 | (14) |
| Lesson 6 | Alkaline pulping 碱法制浆 | (17) |
| Lesson 7 | Sulfite pulping 亚硫酸盐法制浆 | (20) |
| Lesson 8 | Chemical recovery 化学品回收 | (22) |
| Lesson 9 | Brown stock washing 本色浆洗涤 | (26) |
| Lesson 10 | Screening 筛选 | (29) |
| Lesson 11 | Centrifugal cleaning 离心式净化 | (32) |

| | | |
|-----------|---|------|
| Lesson 12 | Thickening 浓缩 | (34) |
| Lesson 13 | Pulp bleaching 纸浆漂白 | (36) |
| Lesson 14 | Beating and refining 打浆与精磨 | (39) |
| Lesson 15 | Nonfibrous additives and wet-end chemistry 非纤维性助剂与湿部化学 | (42) |
| Lesson 16 | Dry and wet strength additives 干强度与湿强度助剂 | (45) |
| Lesson 17 | Internal sizing and alkaline papermaking 内施胶与碱法抄纸 | (47) |
| Lesson 18 | Sheet formation 纸页成形 | (50) |
| Lesson 19 | Pressing 压榨 | (53) |
| Lesson 20 | Paper drying 纸张干燥 | (57) |
| Lesson 21 | Calendering and supercalendering 压光与超级压光 | (59) |
| Lesson 22 | Reeling and winding 卷取与复卷 | (62) |
| Lesson 23 | Paper recycling 纸的回收利用 | (64) |
| Lesson 24 | Water pollution abatement 消除水污染 | (68) |
| Lesson 25 | Air pollution abatement 消除空气污染 | (70) |
| Lesson 26 | Pigment coating 颜料涂布 | (72) |

| | | |
|-----------|------------------|------|
| Lesson 27 | Paper converting | |
| | 纸张后加工 | (75) |
| Lesson 28 | Printing | |
| | 印刷 | (77) |
| Lesson 29 | Process control | |
| | 生产过程控制 | (80) |

第二部分 技术交流实用知识

BASIC TECHNICAL COMMUNICATION

1. 各种信函写作 WRITING OF LETTERS (83)
(1)申请信 推荐信 简历 (2)私人信件 商务信件 (3)商务缩略语
2. 科技论文写作 COMPOSITION OF SCIENTIFIC THESIS (111)
(1)提纲(OUTLINE) (2)文题(TITLE OF THESIS) (3)摘要(ABSTRACT, SUMMARY) (4)关键词(KEY WORDS) (5)语言文字(WORDS AND GRAMMAR) (6)致谢(ACKNOWLEDGEMENT) (7)参考文献(REFERENCES)
3. 国际科技会议交流 SCIENTIFIC COMMUNICATION ON INTERNATIONAL CONFERENCE (120)
(1)活动形式 (2)会前联络 (3)报告讲演 (4)提问与解答 (5)会下交流 (6)会后联络

附录 APPENDIX

1. 课文参考译文 (145)
 2. 总词汇表 (179)
 3. 国外制浆造纸专业高等院校及研究机构 (198)
- 参考文献** (201)

第一部分 教学课文

LESSONS

Lesson 1 The history of papermaking 造纸的历史

Paper derives its name from the reedy plant, *papyrus*. The ancient Egyptians produced the world's first writing material by *beating* and *pressing* together thin layers of plant stem. The first authentic *papermaking* originated in China as early as 100 AD, utilizing a suspension of bamboo or mulberry *fibers*. The Chinese subsequently developed papermaking into a highly skilled art. After a period of several centuries, the art of papermaking extended into the Middle East and later reached Europe, where cotton and linen rags became the main raw materials. Paper was first made in England in 1496. By the end of the 15th century, a number of paper mills existed in Spain, Italy, Germany and France. The first paper mill in North America was established near Philadelphia in 1690.

The development of the *paper machine* is the most important milestone of the industry. Louis Robert, working at the paper mill owned by Ledger Didot, made his first model of the continuous paper machine in 1796 near Paris and received a French patent for his machine in 1799 at the age of 37. In 1803, a patent was issued to Fourdrinier brothers for the improved continuous paper machine designed by Bryan Donkin. At about the same time, John Dickson, a

colleague and friend of Donkin, was working his cylinder machine, which was refined by 1809.

In 1840, *groundwood pulping* method was developed in Germany. The first manufacture of pulp from wood using *soda process* was patented on July 1, 1854 to an England inventor named Hugh Burgess. In 1867, a Philadelphia chemist, Benjamin Tilgham, was awarded the U. S. patent for the *sulfite pulping process*; the first commercial sulfite pulp was produced in Sweden in 1874. C. F. Dahl is credited with the development of the *kraft (or sulfate) process*. The precursor of the kraft process was originally patented in 1854. A later patent in 1865 covered the incineration of the spent soda liquor to recover most of the alkali used in the process.

These inventions and pioneering prototypes provided the basis for the modern paper industry. The twentieth century has seen the rapid refinement and modification of the early and rather crude technology, along with the development of such techniques as *refiner mechanical pulping*, *continuous cooking*, *continuous multistage bleaching*, *on-machine paper coating*, *twin-wire forming*, and *computer process control*.

Words and Expressions (1)

1. paper 纸, 纸张
2. papyrus 纸莎草
3. beating 打浆, 捶打
4. pressing 压榨, 压合
5. papermaking 造纸, 抄纸
6. fiber 纤维
7. paper machine (PM) 造纸机
8. groundwood pulping 磨木法制浆

9. soda process 烧碱制浆法
10. sulfite pulping process 亚硫酸盐制浆法
11. kraft (or sulfate) process 硫酸盐制浆法
12. refiner mechanical pulping 盘磨机械制浆
13. continuous cooking 连续蒸煮
14. continuous multistage bleaching 多段连续漂白
15. on-machine paper coating 机内纸张涂布
16. twin-wire forming 双网成形
17. computer process control 计算机过程控制

Lesson 2 Fibrous materials of papermaking

造纸的纤维原料

Theoretically, pulp fiber can be extracted from almost any vascular plant found in nature. So far, wood is still the most abundant source of papermaking fibers. Besides, about 10% of the fiber used to make paper each year worldwide is from non-wood plant, including *straws* (*wheat*, *rye*, *rice*, and *barley*), *grasses* (*bamboo*, *esparto*, and *papyrus*), *canes and reeds* (*bagasse*, *corn stalks*, and *kenaf*), *bast* (*flax*, *hemp*, *jute*, *ramie*, and *mulberry*), and *seed hairs* (cotton). Non vegetable fibers such as *polyethylene* and *glass fibers* are also used. In recent years, secondary fiber utilization is increasing at a rapid pace.

Botanically, woods are classified into two major groups: *softwoods* or *conifers* and *hardwoods* or *broad-leaved-trees*, either deciduous or evergreen.

The vertical structure of conifers is composed almost entirely of long, tapping cells called *tracheids*. The wall of a typical tracheid or "fiber" is composed of several layers. The *middle lamella* with very high *lignin* content separates two contiguous tracheids. Each tracheid has a *primary wall* and a three-layered *secondary wall* with specific alignments of *microfibrils*. Microfibrils are bundles of *cellulose* molecules, and their orientation can influence the characteristics of a pulp fiber.

The principal vertical structure of hardwood is composed of both relatively long, narrow cells, called *libriform fibers*, and much shorter, wider cells, called *vessels*. Hardwood also have a vertical *parenchyma system* and a horizontal or ray parenchyma sys-

tem.

Generally, softwood has higher amount of fibers while hardwood has higher percentage of vessels. Softwood fibers are more than twice as long as hardwood fibers.

Technically, wood is xylem tissue, which consists of cellulose, *hemicellulose*, lignin, and *extractives*, hence a lignocellulosic material. *Sapwood* is the outer part of the truck and contains some living cells. *Heartwood* is found in the center of older trees, containing only dead cells, and is generally drier than sapwood. Each annual growth ring contains *earlywood*, which is characterized by large cells with thin cell walls, and *latewood*, which is characterized by small cells and thick walls.

Some of the important pulping variables of wood and wood chips are: *moisture content*, *specific gravity*, *tension and compression strength*, bark content, chemical composition, wood species, chip dimensions, and length of storage.

Words and Expressions (2)

1. straws 稻草草类
2. wheat 小麦
3. rye 黑麦
4. rice 稻谷
5. barley 大麦
6. grasses 草类
7. bamboo 竹
8. esparto 西班牙草
9. canes and reeds 蔗苇类
10. bagasse 蔗渣
11. corn stalks 玉米茎秆

12. kenaf 洋麻
13. bast 韧皮类
14. flax 亚麻
15. hemp 大麻
16. jute 黄麻
17. ramie 苧麻
18. mulberry 桑树
19. seed hairs 种毛类
20. polyethylene 聚乙烯
21. glass fibers 玻璃纤维
22. softwood 软木, 针叶木
23. conifer 针叶树, 针叶木
24. hardwood 硬木, 阔叶木
25. broad-leaved-tree 阔叶树
26. tracheid 管胞
27. middle lamella 胞间层
28. lignin 木素
29. primary wall 初生壁
30. secondary wall 次生壁
31. microfibril 微纤丝
32. cellulose 纤维素
33. libriform fiber 韧皮纤维
34. vessels 导管
35. parenchyma system 薄壁组织系统
36. hemicellulose 半纤维素
37. extractive 抽提物
38. sapwood 边材
39. heartwood 心材
40. earlywood 早材

- 41. latewood 晚材
- 42. moisture content 水分含量
- 43. specific gravity 比重
- 44. tension and compression strength 抗张与抗压强度

Lesson 3 Pulp and paper properties and testing

纸浆与纸的性能及测试

A large number of pulp testing methods are in common to characterize pulps with respect to quality, processability, and suitability for various end uses. The most “fundamental” measurements provide the means to predict behaviour while “functional” tests are designed to measure specific properties.

The *kappa number* test is used in mill control work to indicate the degree of delignification occurring during cooking and the chemical requirement for bleaching. A good indication of cellulose *degree of polymerization* (DP) can be obtained by measuring viscosity of a cellulose solution of known concentration using *cupriathylene diamine hydroxide* (CED) as a solvent.

Pulp drainability is an important property with respect to pulp processing and papermaking. Measurement of pulp drainage are known as freeness, slowness, wetness, or drain time according to the instrument or method used. Freeness and slowness scales have an inverse relationship. *The Canadian Standard Freeness* (CSF) tester and the *Schopper-Riegler* (°SR) *slowness* tester are two principal drainage testing devices used respectively for these two properties in North America and Europe. To simulate the type of drainage with microturbulence and oriented shear, the Britt dynamic drainage jar was developed for studying stock drainage phenomenon under conditions more closely approaching those of the paper machine.

The wide diversity of paper grades with different functional properties necessitates a multiplicity of paper test methods. Some basic properties are important for all grades such as *basis weight* or

grammage and caliper. Others are specifically developed to assess the performance attributes of speciality products and their application.

Since paper is a hygroscopic material and will seek equilibrium moisture with the surrounding air, paper samples must be conditioned in a standardized environment to obtain reproducible results. Due to the “*two-sidedness*”, the wire and top side’s properties must be taken into account for certain end uses. Paper has a definite “grain” caused by the greater orientation of fibers in the machine direction and by the stress/strain imposed during pressing and drying. The directionality of paper must be also taken into account in measuring physical properties. The physical tests on paper can be conveniently divided into four groups: mechanical and strength properties (*tensile, burst, tear, folding strength, stiffness, softness*, etc.); surface properties (*roughness, pick strength*); optical properties (*brightness, opacity, gloss, color*); and permeability to fluids (*sizing degree, oil resistance, air resistance, and water vapor permeability*). Paper chemical properties are important for certain grades of paper such as *photographic papers, reproduction papers, anti-tarnish papers, safety papers, electrical papers, food-wrapping papers*, and any paper requiring a high degree of performance.

Words and Expressions (3)

1. kappa number 卡伯值
2. degree of polymerization (DP) 聚合度
3. cupriethylene diamine hydroxide (CED) 铜乙二胺
4. Canadian Standard Freeness (CSF) 加拿大标准游离度
5. Schopper-Riegler slowness 打浆度(°SR)
6. basis weight 定量
7. grammage 克重