普通高等教育“十二五”部委级规划教材（本科）

轻化工程专业英语

（染整方向）

第2版

崔淑玲　主编

中国纺织出版社

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内 容 提 要

本教材面向轻化工程专业染整方向的读者，共安排了30篇课文：先是9篇化学英语课文，作为学生从基础英语过渡到专业英语的桥梁；然后是18篇染整课文，包括2篇纤维、4篇前处理、4篇染色、2篇印花、3篇整理、2篇染整助剂、1篇染整学术期刊目录与摘要实例，系统地介绍了与纤维及织物染整有关的基本理论、技术工艺、生产设备、性能检测、期刊摘要等内容；考虑到有不少学生毕业后将从事纺织品外贸方面的工作，本书还编写了3篇纺织品外贸实务方面的课文。

本教材每篇课文后都列有生词表，并标注了国际音标，还附有课文注释、课后练习题及参考文献。书后编写了学术英语论文的写作方法、常用化学名称的英文表达规律、常见纺织纤维的中英文名称及代码等7篇附录，可作为课内讲座或课外工具资料选用。

本教材可供高等院校轻化工程专业染整方向师生作为教材使用，也可供纺织、印染企业的工程技术人员阅读参考。

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出版者的话

《国家中长期教育改革和发展规划纲要》中提出“全面提高高等教育质量”，“提高人才培养质量”。教育部教高[2007]1号 文件“关于实施高等学校本科教学质量与教学改革工程的意见”中，明确了“继续推进国家精品课程建设”，“积极推进网络教育资源开发和共享平台建设，建设面向全国高校的精品课程和立体化教材的数字化资源中心”，对高等教育教材的质量和立体化模式都提出了更高、更具体的要求。

“着力培养信念执著、品德优良、知识丰富、本领过硬的高素质专门人才和拔尖创新人才”，已成为当今本科教育的主题。教材建设作为教学的重要组成部分，如何适应新形势下我国教学改革要求，配合教育部“卓越工程师教育培养计划”的实施，满足应用型人才培养的需要，在人才培养中发挥作用，成为院校和出版人共同努力的目标。中国纺织服装教育学会协同中国纺织出版社，认真组织制订“十二五”部委级教材规划，组织专家对各院校上报的“十二五”规划教材选题进行认真评选，力求使教材出版与教学改革和课程建设发展相适应，充分体现教材的适用性、科学性、系统性和新颖性，使教材内容具有以下三个特点：

(1)围绕一个核心——育人目标。根据教育规律和课程设置特点，从提高学生分析问题、解决问题的能力入手，教材附有课程设置指导，并于章首介绍本章知识点、重点、难点及专业技能，增加相关学科的最新研究理论、研究热点或历史背景，章后附形式多样的思考题等，提高教材的可读性，增加学生学习兴趣和自学能力，提升学生科技素养和人文素养。

(2)突出一个环节——实践环节。教材出版突出应用性学科的特点，注重理论与生产实践的结合，有针对性地设置教材内容，增加实践、实验内容，并通过多媒体等形式，直观反映生产实践的最新成果。

(3)实现一个立体——开发立体化教材体系。充分利用现代教育技术手段，构建数字教育资源平台，开发教学课件、音像制品、素材库、试题库等多种立体化的配套教材，以直观的形式和丰富的表达充分展现教学内容。

教材出版是教育发展中的重要组成部分，为出版高质量的教材，出版社严格甄选作者，组织专家评审，并对出版全过程进行跟踪，及时了解教材编写进度、编写质量，力求做到作者权威、编辑专业、审读严格、精品出版。我们愿与院校一起，共同探讨、完善教材出版，不断推出精品教材，以适应我国高等教育的发展要求。

中国纺织出版社

教材出版中心

第2版前言

《轻化工程专业英语》第1版2008年问世，至今已6年了。此次编者根据几年来专业英语教学中发现的问题，对旧版的不足之处进行了修订，更正了过去的错误，增补了部分新内容。考虑到第1版中有关皮革和造纸方面的英语文章对染整方向的学生来说，理解起来有一定困难，故新版中删去了皮革和造纸的有关内容（旧版第29、第30课），补充了2篇染整方面的课文（新版第19、第23课）。另外，删除了旧版中有关科技英语翻译方面的内容（此部分内容，学生在大学英语课程学习中已有涉及），而对学术英语论文的写作方法进行了较大的补充修改，并将这部分列入附录Ⅰ，供学生在毕业论文环节中作为英文论文或摘要写作的参考模板。第2版还增加了附录常见纺织纤维的中英文名称及其代码，以增加本教材的实用性。为与以上变动相适应，对书名做了相应的调整。

本书由崔淑玲拟订全书总体修订框架和编写原则，并组织编写工作、统筹全书细节，最后整理完善各项内容。参编人员多为各高校常年从事专业英语教学的老师，有丰富的教学经验或留学背景，课文力求取材广泛，形式多样，内容系统、全面、实用。来自全国10所高校的13位教师参与了本书的编写，其中无机化学部分（第1、第2课）由东华大学葛凤燕编写；有机化学部分（第3~5课）由华东理工大学乐清华编写；表面活性剂化学部分（第6、第7课）、还原染料染色（第19课）、化学整理（第23课）、期刊目录与摘要（第27课）以及7个附录由河北科技大学崔淑玲编写；高分子化学与物理部分（第8、第9课）由天津工业大学陈克宁编写；纺织纤维部分（第10、第11课）由苏州大学邢铁玲编写；前处理部分（第12~15课）由上海工程技术大学潘健民编写；染色部分（第16~18课）由中原工学院汪青编写；印花部分（第20、第21课）由东华大学陈英编写；后整理部分（第22、第24课）由江南大学范雪荣、王强编写；染整助剂与性能检测部分（第25、第26课）由青岛大学朱平、中原工学院王怀芳编写；纺织品贸易部分（第28~30课）由齐齐哈尔大学高淑珍编写。

本书承蒙上海工程技术大学的李宏波老师从英语角度对全书进行了校对和修改，在此深表谢意。本书还得到教育部高等学校轻化工程专业教学指导委员会以及河北科技大学纺织服装学院领导和各位

同仁的支持与帮助，多位研究生、本科生为本书编辑资料、录入文字，作者在此由衷地向以上人员表示感谢。

由于编者水平有限，书中难免存在不妥、纰漏甚至错误之处，恳请读者批评指正。

编　者

2014 年 11 月

第1版前言

轻化工程专业英语是我国高等院校轻化工程专业本科生学完专业课程之后开设的一门专业必修课，旨在通过该课程的学习，使学生熟悉轻化工程专业领域常见的英文词汇，掌握该专业英语的特点及其翻译技巧，了解科技论文的阅读及写作方法，以便能准确迅速地通晓本专业发展动态，提高对外交往的能力。

本教材在内容的选择和安排上力求系统、全面、实用。参编人员多为各高校常年从事专业英语教学的老师，有丰富的教学经验或留学背景，课文取材广泛，形式多样，词汇量大，知识覆盖面宽。

来自全国十二所高校的十六位教师参与了本书的编写，其中第一篇科技英语概述由河北科技大学胡雪敏编写；第二篇专业文章阅读的分编情况为：无机化学部分（第1、第2课）由东华大学葛凤燕编写；有机化学部分（第3~5课）由华东理工大学乐清华编写；表面活性剂化学部分（第6、第7课）、期刊目录与摘要（第25课）以及附录部分由河北科技大学崔淑玲编写；高分子化学与物理部分（第8、第9课）由天津工业大学陈克宁编写；纺织纤维部分（第10、第11课）由苏州大学邢铁玲编写；前处理部分（第12~15课）由上海工程技术大学潘健民编写；染色部分（第16~18课）由中原工学院汪青编写；印花部分（第19、第20课）由北京服装学院陈英编写；后整理部分（第21、第22课）由江南大学范雪荣、王强编写；染整助剂与性能检测部分（第23、第24课）由青岛大学朱平、王怀芳编写；纺织品贸易部分（第26~28课）由齐齐哈尔大学高淑珍编写；皮革工艺部分（第29课）由山东轻工业学院李彦春编写；制浆造纸部分（第30课）由山东轻工业学院刘玉编写。全书由崔淑玲整理和统稿。

本书承蒙上海工程技术大学的李宏波老师从英语角度对全书进行了校对和修改，在此深表谢意。

本书得到教育部高等学校轻化工程专业指导委员会以及河北科技大学纺织服装学院领导和各位同仁的支持与帮助，多位研究生、本科生为本书编辑资料、录入文字，作者在此由衷地向以上人员表示感谢。

由于编者水平有限，难免存在不妥、纰漏甚至错误之处，恳请读者批评指正。

编　者

2008年2月

课程设置指导

课程名称 轻化工程专业英语

适用专业 轻化工程专业(染整方向)

总学时 64

课程性质 本课程是轻化工程专业学生的一门专业必修课,应放在大学英语以及染整工艺学课程学习之后开设。

课程目的

1. 掌握科技英语和轻化工程专业英语的特点及其运用规律;

2. 熟悉本专业领域常见的英文词汇,扩大科技英语和专业英语词汇量;

3. 通晓科技论文的阅读及写作方法;

4. 加强英语听说能力,提高综合运用英语的技能。

课程教学基本要求

1. 在大学英语词汇的基础上,扩展科技英语及轻化工程专业英语词汇;

2. 能顺利阅读并正确理解难度中等的轻化工程专业题材的英语材料;

3. 能借助词典进行英汉及汉英双向翻译;

4. 能进行专业英语科技论文及内容摘要的写作;

5. 具有一定的听说能力,能用口语进行简单的交流。

教学内容及学时分配

1. 科技英语构词法及常见化学名称的英文表达规律(2 学时);

2. 科技论文及其摘要的写作(2 学时);

3. 化学英语和专业英语课文精读(58 学时);

4. 专业英语材料泛读(2 学时)。

本课程一般分两个学期完成。第一学期以化学英语为主,第二学期以轻化英语为主。有关科技英语各种基础知识的讲授穿插在两个学期内进行。

以上课程安排仅供参考。

目录

目录

Lesson 1 Atom, Molecule, Ion and Element

The term state of matter refers to the physical forms in which matter exists: solid, liquid and gas. All substances in the world assume one of the three different states of matter. All matter, whether it is a gas, a liquid or a solid, can all be composed of fundamental units, such as atom, molecule, ion and element. These units are very helpful in understanding chemistry. This lesson will introduce the student to the general knowledge of these particles.

1.1 Atom

All matter is composed of atoms, existing individually or in combination with each other. An atom is an extremely small electrically-neutral particle. It is the smallest unit involved in the chemical change of matter. Atoms can be treated as distinct particles because they behave as such chemically, but atoms themselves are composed of even smaller subparts, including electron, proton and neutron.

The electron is a particle with a negative electrical charge and has a mass of 9.107×10^{-28} grams. This mass is 1/1837 the mass of a hydrogen atom, and corresponds to 0.0005486 atomic mass unit (AMU). One atomic mass unit has a mass of 1.660×10^{-24} grams. Although the actual electrical charge of an electron is known, its value is too cumbersome for practical use. The electron, therefore, has been assigned a relative electrical charge of -1. The size of an electron has not been determined exactly, but its diameter is believed to be less than 10^{-12} centimeters.

The proton is a particle with a positive electrical charge. It has an actual mass of 1.672×10^{-24} grams, 1837 times the mass of an electron. This mass is slightly less than that of a hydrogen atom.[①] On the relative scale, the proton has a mass of approximately one atomic mass unit. The electrical charge of the proton is equal in magnitude but opposite to that of the electron; hence, the relative charge of a proton is +1.

The other major component of the atom, the neutron, is a neutral particle, with neither a positive nor a negative electrical charge. The mass of a neutron, 1.675×10^{-24} grams, although slightly greater than that of a proton, is practically equal to the mass of a proton. The assigned relative mass of the neutron is approximately one atomic mass unit.

An atom is composed of a positively-charged nucleus orbited by negatively-charged electrons. The nucleus is the core of an atom, containing two kinds of particles, the neutron and proton. Because the neutron is electrically neutral and proton is electrically positive, the nucleus has a positive charge. Both the neutron and proton give the nucleus its mass. The particles that orbit the nucleus are electrons. Much lighter, negatively-charged electrons occupy a relatively large space around the nucleus. The charge of one electron is equal in magnitude to that of one proton. The number of electrons orbit-

ing a nucleus is exactly equal to that of protons contained in the nucleus. The equal and opposite charge cancel each other, and the atom as a whole is neutral. The electrons are bound in the atom by electrostatic attraction. The atom remains neutral unless some external force causes a change in the number of electrons.② If an atom is expanded to the size of one of our largest football stadium, the nucleus would be about the size of a marble at the center.

The number of protons in the nucleus plays such an important role in identifying the atom that it is given a special name, the *atomic number*. The symbol Z is often used for atomic number (or number of protons). Hydrogen has an atomic number of 1 and chlorine has an atomic number of 17. The atomic number is also equal to the number of electrons.

The *atomic mass number* is equal to the sum of the total number of protons (Z) and the total number of neutrons (N) as shown in equation, where A stands for the atomic mass number. Not all atoms of the same element have the same atomic mass number, although the Z is the same, the N and thus the A are different.③ Atoms of the same element with different atomic mass numbers are called isotopes.

$$A=Z+N$$

1.2 Molecule

When two or more atoms combine chemically, they form a molecule. The molecule is the smallest particle of a pure substance that has the composition and properties of that substance and is capable of independent existence. A molecule may contain atoms of the same element or atoms of two or more elements joined in a fixed ratio. Like atoms, molecules are electrically neutral. The hydrogen molecule, symbolized as H_2, is called a diatomic molecule because it contains only two atoms. Other elements that normally exist as diatomic molecules are nitrogen (N_2) and oxygen (O_2), as well as the Group ⅦA elements: fluorine (F_2), chlorine (Cl_2), bromine (Br_2) and iodine (I_2). Of course, a diatomic molecule can contain atoms of different elements. Examples are hydrogen chloride (HCl) and carbon monoxide (CO). The vast majority of molecules contain more than two atoms. They can be atoms of the same element, as in ozone (O_3), which is made up of three atoms of oxygen, or they can be combinations of two or more different elements. Molecules containing more than two atoms are called polyatomic molecules, such as water (H_2O) and ammonia (NH_3).

The weight of a molecule, the *molecular weight*, is the total mass of the individual atoms. Therefore, it is fairly simple to calculate the mass of any molecule if its formula is known. Note that the terms mass and weight are used interchangeably in chemistry.

1.3 Ion

The atom as a whole is neutral, because the number of negative charges equals to that of positive charges. If an electrical imbalance is created in the atom by the removal or addition of one or more

electrons, the result is an ion. Thus, an ion is an electrically charged atom (or molecule). It can be either positive or negative, depending on whether it could contain fewer electrons or more electrons than the neutral atom (or molecule) does.④ When an atom gains one or more electrons, it acquires a negative charge and is known as an anion; when an atom loses one or more electrons, it acquires a positive charge and is known as a cation. For example, the hydrogen ion, H^+, is a cation and has one free proton, and the fluoride ion, F^-, contains an extra electron and is an anion.

1.4 Element

Atoms that have the same number of protons are grouped together and constitute a chemical element. All known substances on earth are formed from a sort of the periodic table consisting of 111 known elements. An element is a fundamental or elementary substance that can not be broken down by chemical means. Elements are the basic building blocks of all substances.

In this section, we will introduce these important elements, including H, C, N, O and S.

1.4.1 Hydrogen

Hydrogen, the lightest of the elements, possesses interesting properties in its own right, and forms important compounds with nearly all of the other elements in a variety of bonding situations. The element exists as the diatomic gas, H_2, which forms the simplest example of a molecular covalent bond. Hydrogen exists in nature in three isotopic forms. The most abundant, with nuclear mass one, is commonly referred to as hydrogen (symbol H). The isotope of mass two is called deuterium (symbol D), and that of mass three is called tritium (symbol T).

1.4.2 Carbon

Carbon exists in two crystalline structures—diamond and graphite. The diamond structure, based on tetrahedral bonding of hybridized sp^3 orbital, is encountered among Group ⅣA elements. In fact, graphite is so soft that it exists in the form of a microcrystal or merely as a powder. Typical of the Group ⅣA diamond-type crystalline elements, it is a nonconductor and shows other nonmetallic properties.

1.4.3 Nitrogen

The element is the major constituent of the earth's atmosphere. Nitrogen is found in inorganic materials in the form of nitrate (NO_3^-) compounds. It is widely and heavily distributed in plants and animals. The pure element is conveniently obtained by distillation of liquid air. Among the most important considerations in nitrogen chemistry are the nitrogen cycles in plants, animals, and in the earth's crust. The nitrogen of the atmosphere is converted in various ways into nitrogen compounds, such as NO, NO_2. The dioxide is washed down by rain, and then enters into the plant cycle. Rain may also contain ammonia, which enters the air as a result of decomposition of plant and animal material.

1.4.4 Oxygen

Oxygen is the most abundant element in the earth's crust, and is second only to iron in abund-

ance in the earth as a whole. In addition, it presents itself in the earth's atmosphere as molecular oxygen and to a less extent as O and O_3. Oxygen is covalently bonded to hydrogen in water, which is very abundant on the earth's surface. It is also associated with a great many metals in the form of oxides, such as corundum, Al_2O_3; hematite, Fe_2O_3. With many non-metals and metals, it forms oxyanions which are common in nature, such as sulfate, SO_4^{2-}; phosphate, PO_4^{3-}; iodate, IO_3^-; chromate, CrO_4^{2-}. The industrial preparation of oxygen involves liquefaction of air and subsequent fractional distillation.

1.4.5 Sulfur

Sulfur is a fairly abundant element in the earth's crust, it is estimated to average a little over one pound per ton. It exists mainly in the form of solid mineral sulfides. There are some metals which are found in nature mainly as oxides, and others largely as sulfides. The sulfate ion, SO_4^{2-}, is the second most abundant anion in sea water. In addition, a number of solid sulfate minerals are known. Calcium sulfate, the best known of these, is found as the hydrous salt, $CaSO_4 \cdot 2H_2O$. Hydrogen sulfide may occur as a by product of the formation of petroleum. There is one exceptional petroleum gas field in southern France which contains up to 18 percent hydrogen sulfide by volume. The hydrogen sulfide is removed by absorption in a solvent under pressure, then recovered from solvent and catalytically decomposed to yield sulfur. The operation produces about 4000 tons of sulfur per day.

New Words and Expressions

atom ['ætəm] n. 原子
molecule ['mɔlikju:l] n. 分子
electron [i'lektrɔn] n. 电子
proton ['prəutɔn] n. 质子
neutron ['nju:trɔn] n. 中子
atomic [ə'tɔmik] a. 原子的,原子能的,微粒子的
electrical [i'lektrik(ə)l] a. 电的,有关电的
nucleus ['nju:kliəs] n. 原子核
orbit ['ɔ:bit] n. 轨道;vt. 绕……轨道而行
hydrogen ['haidrədʒən] n. 氢
isotope ['aisəutəup] n. 同位素
fluorine ['flu(:)əri:n] n. 氟
chlorine ['klɔ:ri:n] n. 氯
bromine ['brəumi:n] n. 溴
iodine ['aiədi:n] n. 碘,碘酒
ozone ['əuzəun] n. 臭氧
cation ['kætaiən] n. 阳离子
diatomic [ˌdaiə'tɔmik] a. 双原子的,二价的
nuclear ['nju:kliə] a. 核子的,原子核的,中心的
deuterium [dju:'tiəriəm] n. 氘
tritium ['tritiəm] n. 氚(氢的放射性同位素)
crystalline ['kristəlain] a. 水晶的
hybridize ['haibridaiz] v. (使)杂交
nonmetallic ['nɔnmi'tælik] a. 非金属的;n. 非金属物质
decomposition [ˌdi:kɔmpə'ziʃən] n. 分解,腐烂
nitrate ['naitreit] n. 硝酸盐,硝酸钾
nitrogen ['naitrədʒən] n. 氮
corundum [kə'rʌndəm] n. 刚玉,金刚砂
hematite ['hemətait] n. 赤铁矿
sulfate ['sʌlfeit] n. 硫酸盐
phosphate ['fɔsfeit] n. 磷酸盐
iodate ['aiədeit] n. 碘酸盐;vt. 以碘处理
chromate ['krəumeit] n. 铬酸盐

liquefaction [ˌlikwi'fækʃən] n. 液化
yield [ji:ld] v. 产生，生成；n. 收率，产量
sulfur ['sʌlfə] n. 硫黄；vt. 用硫黄处理
symbol ['simbəl] n. 符号，记号，象征

Notes to the Text

① 句中 less than 引导的是比较状语从句，译为“比……更轻(少)……”。参考译文：质子的质量比一个氢原子的质量稍轻些。

② 参考译文：原子是电中性的，除非外力改变了它的电子数目。

③ Not all 部分否定意义，修饰主语，译为“不是同元素的全部原子……”。参考译文：同元素全部的原子不都具有相等的原子质量数，因为虽然 Z 相等，但是 N 值不同，A 值也会不同。

④ 句子主要成分 It can be either positive or negative，depending on ... 分词结构作状语，同时引导状语从句whether ... or ...，在这个句型中又包括 than 引导的比较状语从句。参考译文：根据离子与中性原子相比所具有的电子数是多还是少，来判定离子是正电性的还是负电性的。

Exercises

1. Calculate the molar mass for each of the following.

(1) H_2O

(2) H_3PO_4

(3) $MgCl_2$

2. Fill in the blanks with the given words.

element, atom, electron, isotope, neutron, proton

All matter is composed of tiny, indivisible particles called _____, which are neither created nor destroyed in chemical reactions. An atom consists of a very dense central nucleus containing _____ and _____, with _____ moving about the nucleus at a relatively large distance from it. _____ are positively charged, _____ have no charge, and _____ are negatively charged. Atoms of the same _____ with the same number of protons but different numbers of neutrons are called as _____.

3. Translate the following sentence into English.

第一条也是最重要的原理是，化学物质是由分子组成的，分子中不同元素的原子是以一定的方式连接在一起的。

4. Translate the following into Chinese.

The basic postulates (n. 假设，基本原理) of Dalton's theory were as follows:

(1) Each element is composed of extremely small particles called atoms.

(2) All atoms of a given elements are identical.

(3) Atoms of different elements have different properties (including different masses).

(4) Atoms of an element are not changed into different types of atoms by chemical reactions. Atoms are neither created nor destroyed in chemical reactions.

(5) Compounds are formed when atoms of more than one element combine.

(6) In a given compound, the relative number and kind of atoms are constant.

References

[1] YODER J. DOE HDBK－1015/1－93, DOE Fundamentals Handbook: Chemistry [M]. Washington D.C.: U.S. Department of Energy, 1993.

[2] BROWN T L. General chemistry [M]. 2nd ed. Ohio: Charles E. Merrill Publishing Company Columbus, 1597.

Lesson 2 Acid, Base, Salt and pH

Substances that form ions when they are dissolved in water are called electrolytes, which fall into three types: acids, bases, and salts.

The concept of acids and bases has been important in chemistry for a long time. Many acid-base theories have been advanced over these years. While most of these are valid within narrow limits of applicability, they are not based upon a clear understanding of principles of chemical valence. Not until the Lewis theory had been established could a satisfactory general theory of acid-base behavior be formulated.[①] It is not surprising, therefore, the most useful acid-base theory is called Lewis theory. Brönsted-Lowry theory was developed at about the same time as the Lewis theory. It is applicable to water and water-like solvents, and is widely used. In addition, the theories in the conventional sense are restricted to the aqueous solution, but they can be also used in some extent up to now, especially, Arrhenius theory. Therefore, in the chapter, these three acid-base theories including Arrhenius theory, Brönsted-Lowry theory and Lewis theory will be discussed.

2.1 Acid-base Theory

2.1.1 Arrhenius Theory

Acids are substances that dissociate in water to produce hydrions (H^+). An example of a common acid is sulfuric acid, H_2SO_4. In solution, H_2SO_4 dissociates to form hydrogen and sulfate ions according to the following equation:

$$\underset{\text{acid}}{H_2SO_4} \longrightarrow 2H^+ + SO_4^{2-} \qquad (2-1)$$

Additional examples of acids are vinegar, aspirin, and lemon juice. These substances share the following common properties.

(1) Acid solutions taste sour (acid means "sour" in Latin). Lemons, oranges and other citrus fruits owe their sour taste to the presence of citric acid; the taste of sour milk is due to the presence of lactic acid.

(2) Acids react with many metals to form hydrogen gas. Reactions of this type were studied in connection with the preparation of hydrogen.

$$\underset{\text{acid}}{2HCl} + \underset{\text{metal}}{Mg} \longrightarrow \underset{\text{metal salt}}{MgCl_2} + \underset{\text{hydrogen gas}}{H_2\uparrow} \qquad (2-2)$$

(3) Acids turn litmus paper red. Litmus is a dye which has a red color in acid solution and a blue color in basic solution; paper which has been soaked in litmus is defined as litmus paper. Substances of this type, which enable us to determine whether a given solution is acid or base, are called