

北京市普通高等学校重点立项系列教材

高等学校专业英语阅读教程

(化学化工类)

李鹏飞 吴树敬 来鲁宁 等编著

北京理工大学出版社



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北京市普通高等学校重点立项系列教材

Science Readers for Chemistry

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(化学化工类)

编 著

李鹏飞 吴树敬 来鲁宁

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内 容 简 介

本书是北京理工大学承担编写的北京市高校重点立项教材《高等学校专业英语阅读》系列教程第三分册(化学化工类)(第一分册为机电工程类,第二分册为电子信息类)。本书是为化学和化工等类专业本科生在学完大学英语四级后,进一步巩固和提高英语水平,特别是提高阅读综合科技及本专业英文资料的能力而编写的,既可作化学和化工专业学生专业英语阅读课的教材,也可供其他相关专业的读者使用。

本书共分为15个单元,45个课文。总阅读量约为100 000词左右,课文后面附有分课词汇表并编有系统的练习可供课堂教学使用。本书设有6个写作教学专题,以期对本书的使用者在科技论文写作方面给予一定指导。

图书在版编目(CIP)数据

高等学校专业英语阅读教程. 化学化工类/李鹏飞等编著. —北京:北京理工大学出版社, 2000.3

ISBN 7-81045-663-6

I. 高… II. 李… III. 英语-阅读教学-高等学校-教学参考资料 IV. H319.4

中国版本图书馆 CIP 数据核字(2000)第 13426 号

责任印制:王 军 责任校对:陈玉梅

北京理工大学出版社出版发行

(北京市海淀区白石桥路7号)

邮政编码 100081 电话(010)68912824

各地新华书店经售

北京国马印刷厂印刷

*

787毫米×1092毫米 16开本 15.5印张 318千字

2000年3月第1版 2000年3月第1次印刷

印数:1—4000册 定价:21.50元

※图书印装有误,可随时与我社退换※

前 言

国家教委颁发的《大学英语教学大纲》中有关专业阅读阶段的要求规定:专业阅读阶段的教学是通过指导学生阅读有关专业的书刊和文献,培养阅读英语科技资料的能力,使其能以英语为工具获取有关专业所需要的信息。根据上述规定,我们近年来对英语专业阅读这门课程的建设做了一定的努力和探索,对本科生的英语教学实行了四年不断线的方针。在所有专业的本科生完成了基础英语学习任务之后,三年级按学科大类为他们分别开设专业科技英语课,并在四年级为其开设专业英语文献阅读课。这些作法的目的就是为了更加全面地贯彻大学英语教学大纲,更扎实地提高学生应用英语的能力,从中进一步提高教学质量,为争取新世纪初使大学英语教学跨上一个新台阶创造有利条件。

本书为我校主编的《高等学校专业英语阅读教程》第三分册(第一分册为机电工程类,第二分册为电子信息类),是为理工科大学本科生在学完大学英语四级后,进一步巩固和提高英语水平,特别是提高阅读综合科技及本专业英文资料的能力而编写的,体现了很多专家对本课程的改革思想。本书既可作化学和化工等类专业学生专业英语阅读课的教材,也可供其他相关专业的读者进行阅读提高使用。

本书共分为 15 课,内容分别为化学教育与教学、化学与生活和生产、无机与有机化学、高分子材料、生物化学与遗传工程、人与自然、环境保护与持续发展、化学史、名家传记以及化学网络通讯、国际交流等,每课编有 3 篇文章,共 45 篇文章。可以说基本做到了“门类齐全,包罗万象,反差巨大,情趣多样”。全书阅读量约为 100 000 词左右,可供 48~79 学时教学使用。本书的写作部分,有 6 个专题,分别为写科技论文的提纲(outline)、引言(introduction)、摘要(abstract)和结论(conclusion),以期给学习者一定的启发和指导。如您所看到的,本书作为一本专业英语教科书,所提供的练习系统规范,内容丰富,从客观性的多项选择、正误判断到主观性的信息加工处理、自由填空、英汉汉英互译到写作摘要。其目的是有助于高年级本科生能在学习专业英语这门课时在提高阅读能力的同时,不断巩固基础英语阶段所学的语法和词汇知识。为使本书所提供的材料能够充分发挥作用,编者建议 A 篇可作主课文进行课堂讲练,教师可对 B 篇进行一定的教学提示。教师可根据所教的具体专业不同,也可将某些 B 篇作为主课文使用进行课堂讲练。本书课文全部选自国外书刊、杂志和科学文献或化学教科书。科学性、知识性、趣味性和语言文字的规范化是本书选材的标准。为保证本系列教程编写的选材实用性及练习质量,在学校教务处及北京理工大学出版社领导和配合下,组成了由我校化工材料学院数名教授专家组成的顾问组和以英语教师为主体的编写组。在本书编写期间聘请了吴文辉教授、杨宏丽、金韶华、毋俊生等诸位副教授为顾问组成员。杨宏丽、金韶华二位老师在选择课文上做了大量工作,并参加了部分材料审定和词汇编写工作。吴文辉教授通读和审定了全书的科技内容。

本书的编写工作由我校外语系教师承担。孙德娴编写了第一、二、六课,来鲁宁编写了第五、十一、十二、十三课,刘宁编写了第四、十四、十五课,吴树敬编写了第七、八课,李鹏飞编写了第三、九、十课,并负责全书的统稿和审定。陆晨同志作为当时的北京理工大学教务处副处长和我校承担的北京市高等学校重点教改项目《大学生外语教学第二阶段的教学实践与探

索》主要负责人,也为本书的编写做了大量的组织工作。我校现任教务处副处长韩峰博士一直关心本教材的编写和出版工作、人文社科学院副院长吴树敬教授除担任自己的一份编写工作外,也为本书的成熟做了很多组织工作。我校高年级专业英语阅读教研室副主任朱小燕博士作为一名机械和力学专家,不辞劳苦,也审阅了本书的部分材料。在本教材完稿之后,我们邀请了北京外国语大学熊德锐教授、清华大学人文社科学院外语系何福胜教授、北京工业大学外语部黄秀香教授、北京化工大学化学工程学院吴祥芝教授、北京邮电大学外语系主任石小娣副教授、北京理工大学外语系主任陈大明副教授作为本书的评审专家,对本教材进行了质量评定。上述专家在评审中对本书提出了许多宝贵的意见和建议。本书根据他们的建议作了相应的修改。在此,对上述专家对本书的贡献谨表深切谢意。

由于时间和作者水平有限,书中如有不当之处,诚望专家和广大读者不吝指正。

编者谨识
于北京理工大学
1999年11月

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Lesson One

Text A

How to Study Chemistry as a Course for Specialty

We have written this text to assist you as you study chemistry. Chemistry is a fundamental science—some call it the central science. As you and your classmates pursue diverse career goals you will find that the vocabulary and ideas presented in this text will be useful in more places and in more ways than you may imagine now.

We begin with the most basic vocabulary and ideas. We then carefully evolve increasingly sophisticated ideas that are necessary and useful in all the other physical sciences, the biological sciences, and the applied sciences such as medicine, dentistry, engineering, agriculture, and home economics.

We have made the early chapters as nearly self-contained as possible. The material can be presented in the order considered most appropriate by your professor. Some professors will cover chapters in different orders or will omit some chapters completely—the text was designed to accommodate this.

Early in each section we have attempted to provide the experimental basis for the ideas we evolve. By experimental basis we mean the observations and experiments on the phenomena that have been most important in developing concepts. We then present an explanation of the experimental observations.

Chemistry is an experimental science. We know what we know because we (literally thousands of scientists) have observed it to be true. Theories have been evolved to explain experimental observations (facts). Successful theories explain observations fully and accurately. More importantly, they enable us to predict the results of experiments that have not yet been performed. Thus, we should always keep in mind the fact that experiment and theory go hand-in-hand. They are intimately related parts of our attempt to understand and explain natural phenomena.

“What is the best way to study chemistry?” is a question we are asked often by our students. While there is no single answer to this question, the following suggestions may be helpful. Your professor may provide additional suggestions. A number of supplementary materials accompany this text. All are designed to assist you as you study chemistry. Your professor may suggest that you use some of them.

Students often underestimate the importance of the act of writing as a tool for learning. Whenever you read, do not just highlight passages in the text, but also take notes. Whenever you work problems or answer questions write yourself explanations of why each step was done or how you reasoned out the answer. Keep a special section of your notebook for working out problems or answering questions. The very act of writing forces you to concentrate more on what you are doing, and you learn more. This is true even if you never go back to review what you wrote earlier. Of course, these notes will also help you to review for an examination.

You should always read over the assigned material before it is covered in class. This helps you to

recognize the idea as your professor discusses them. Take careful class notes. At the first opportunity, and certainly the same day, you should recopy your class notes. As you do this, fill in more detail where you can. Try to work the illustrative examples that your professor solved in class, without looking at the solution in your notes. If you must look at the solution, look at only one line (step), and then try to figure out the next step. Read the assigned material again and take notes, integrating these with your class notes. Reading should be much more informative the second time.

Review the "key terms" at the end of the chapter to be sure that you know the exact meaning of each. Work the illustrative examples in the text while covering the solutions with a sheet of paper. If you find it necessary to look at the solutions, look at only one line at a time and try to figure out the next step. Answers to illustrative examples are displayed on blue backgrounds. At the end of most examples, we suggest related questions from the end-of-chapter exercises (EOC). You should work these suggested EOC's as you come to them.

This is a good time to work through the appropriate chapter in the *STUDY GUIDE TO GENERAL CHEMISTRY*. This will help you to see an overview of the chapter, to set specific study goals, and then to check and improve your grasp of basic vocabulary, concepts, and skills. Next, work the assigned exercises at the end of the chapter.

The appendices contain much useful information. You should become familiar with them and their contents so that you may use them whenever necessary. Answers to all even-numbered numerical exercises are given at the end of the text so that you may check your work.

The *STUDY GUIDE* provides an overview of each chapter and emphasizes the threads of continuity that run through chemistry. It lists study goals, tells you which ideas are most important and why they are important, and provides many forward and backward references. Additionally, the *STUDY GUIDE* contains many easy to moderately difficult questions that enable you to gauge your progress. These short questions provide excellent practice in preparing for examinations. Answers are provided for all questions, and many have explanations or references to appropriate sections in the text.

The *SOLUTIONS MANUAL* contains detailed solutions and answers to all even-numbered end-of-chapter exercises. It also has many helpful references to appropriate sections and illustrative examples in the text.

If you have suggestions for improving this text, please write to us and tell us about them.

(Adapted from the section "To the student", *General Chemistry*)

Exercises

I. Comprehension:

Choose a, b, c, or d to complete each unfinished statement, making it closest in meaning to the relevant part of the text.

1. The ideas developed here are necessary and useful in all the fields EXCEPT _____.
 - a. medicine
 - b. engineering
 - c. agriculture
 - d. industry
2. The text was designed to _____.

- a. accommodate chapter orders and contents to that considered most appropriate by professors
 - b. cover chapters in different orders and omit some chapters completely
 - c. present the material in the order considered most appropriate by some professors
 - d. present the material in a particular order
3. Successful theories are very important in an experimental science in that _____.
- a. they help explain experimental observations and predict the results of experiments
 - b. they enable us to explain facts fully and accurately and predict the results of experiments
 - c. they enable us to understand and explain natural phenomena
 - d. they are intimately related to experiments
4. One of the best ways to study chemistry is taking notes which has all the following benefits EXCEPT _____.
- a. forcing you to concentrate more on what you are doing
 - b. helping you to learn more
 - c. helping you to answer questions
 - d. helping you to review for an examination
5. After class, you should recopy your class notes in all the following way EXCEPT _____.
- a. fill in more detail
 - b. try to work the illustrative examples solved in class
 - c. work the illustrative examples with the help of the solution in your notes
 - d. work the illustrative examples by looking at the solution in your notes
6. When a chapter is finished, you should do all the following EXCEPT _____.
- a. make sure you know the exact meaning of each "key term"
 - b. work the illustrative examples in the text without looking at the solutions
 - c. work the illustrative examples on a sheet of paper
 - d. work those suggested EOC's questions when you come to them
7. The appropriate chapter in *STUDY GUIDE TO GENERAL CHEMISTRY* will NOT help you to _____.
- a. see an overview of the chapter
 - b. set specific study goals
 - c. check and improve your grasp of basic vocabulary, concepts and skills
 - d. work the assigned exercises at the end of the chapter
8. The *STUDY GUIDE* provides _____.
- a. answers to many short easy to moderately difficult questions that enable you to gauge your progress
 - b. answers to many difficult questions that help you to prepare for the examinations
 - c. answers to all questions with explanations and references to appropriate sections in the text
 - d. answers to all questions with backward and forward references
9. Detailed solutions and answers to all even – numbered EOC are provided in _____.
- a. *SOLUTIONS MANUAL*
 - b. *STUDY GUIDE TO GENERAL CHEMISTRY*

4. Try to work the illustrative examples that your professor solved in class, without looking at the solution in your notes.
5. The STUDY GUIDE provides an overview of each chapter and emphasizes the threads of continuity that run through chemistry.

B. Translate the following passage into Chinese, paying attention to the underlined parts in the passage.

Practitioners of distance education in chemistry have had to address a range of problems which include limited access of students to teachers, access to intermediate sources such as libraries, and restrictions in laboratory work. Many creative and ingenious approaches have been devised which today have a wide applicability. Almost everyone involved in tertiary and secondary chemistry education is facing the challenge of providing a high quality education for increasing numbers of students with limited resource. The experiences of distance learning can provide the means to address this problem.

C. Translate the following sentences into English by paying attention to the uses of the different clauses.

1. 假如有经济收集工序的话,热塑废物回收是相当简单的。
2. 对净化环境的支出有相当可靠的预算,而对不采取行动的花费几乎没有什么估算,但是污染的费用要比降低污染的费用高得多,这确是显而易见的。
3. 任何有机会参观过我们这个星球上哪怕是一小块自然奇观的人,都会承认我们居住在一个非常奇妙的世界里。
4. 在固体废物和空气污染(这是大城市的主要问题)的地区,大部分费用都是由市政当局和私有部门负担的。
5. 重金属区别于其他有毒污染物的最重要的地方在于他们是不可生物降解的。
6. 因此,即使所选择的脆弱性技术是有效的,劣质数据也会导致估价结果的不准确。土壤中化学物质高于正常值会是很危险的,19世纪70年代中期,人们突然意识到这一问题。

V. Word-formation exercise:

Find as many family or related words for the productive words given below.

- | | | |
|---------|---------|--------|
| 1. cent | 2. mate | 3. use |
| 4. view | 5. ward | 6. add |

VI. Vocabulary expansion and comprehension:

A. Choose the definition which best fits the word or phrase as it is used in the text.

1. cover

a. hide	b. spread over	c. travel	d. deal with
---------	----------------	-----------	--------------
2. accommodate

a. provide lodging for	b. gave space enough for
c. adapt	d. oblige, esp. with a loan of money
3. sophisticated

a. made complex	b. too artificial	c. no longer primitive	d. worldly
-----------------	-------------------	------------------------	------------

4. figure out
 - a. arrive at
 - b. solve
 - c. take account of
 - d. consider
5. numerical
 - a. of large number
 - b. pertaining or denoting number
 - c. a number of
 - d. too many to be counted
6. present
 - a. introduce formally
 - b. offer as a gift
 - c. cause to face
 - d. submit for consideration
7. highlight
 - a. the part of a surface that catches most light
 - b. the outstanding part of a performance, book etc.
 - c. to draw special attention to something
 - d. to render the light - catching surfaces of
8. self-contained
 - a. complete in itself
 - b. dependent on contact with others
 - c. having all necessary things
 - d. of the same kind as the rest
9. run through
 - a. penetrate
 - b. spend quickly and completely
 - c. examine rapidly
 - d. rehearse
10. evolve
 - a. change from simple to complex
 - b. unfold
 - c. develop
 - d. open out

B. Matching: Match the words given under A with the meanings given under B according to the text. List B has some extra items.

A	B
1. fully	___ a. measure accurately
2. supplementary	___ b. the state of being continuous
3. review	___ c. completely
4. reason out	___ d. making clear by means of examples
5. recommend	___ e. consider again
6. gauge	___ f. satisfactorily
7. illustrative	___ g. speak favorably of
8. continuity	___ h. suggest
	___ i. think out logically
	___ j. additional; extra

C. Find single words or phrases in the passage which have roughly the meanings given below.

1. things that appear to or is perceived by the senses

2. turned or related to practical use
3. focus one's attention on
4. when the earliest chance is obtained
5. a piece of
6. once
7. combine into a whole
8. with numbers giving whole numbers when divided by two
9. an indication on a work of some other work to be consulted
10. to a limited extent

Text B

Epilogue

What does the future hold, chemically speaking? No one knows! However, this will not keep thoughtful persons from extrapolating from past and current events to the future for a variety of reasons. Some enjoy the intellectual challenge, others are dedicated to the solution of current and developing human problems, while many simply want to position themselves in a strong financial capability in the ebb and flow of the appetite expressed by our society.

Barring catastrophic disasters such as a thermonuclear war or a contagious uncontrolled disruption of "normal" cellular chemistry, molecular manipulations and chemical understandings will cause and (or) allow us to:

1. Produce vastly greater amounts of food through both the modification of the food-producing organism and the chemical environment in which it lives, and the chemical transformation of previously unacceptable food raw materials into usable foodstuffs.
2. Use to near extinction the petroleum reserves of the world for its burnable energy content, necessitating renewed and increasing interest in the clean use of coal (Engineers are presently working on new designs for coal-fired trains.).
3. Generate a larger percentage of electricity with nuclear power, generating ever larger stockpiles of radioactive wastes that require centuries of protected storage.
4. Proceed slowly with alternative sources of energy, such as solar, geothermic, and wind, as long as fossil fuels can be burned to produce cheaper energy.
5. Move toward environmental controls that will include the cost of waste disposal and cleanup in the cost of the item or material produced.
6. Produce an almost endless array of new materials that will revolutionize structural and facade materials in construction and in transportation and that will offer many new choices in the materials we use in clothing, personal tools, and surroundings for pleasure and comfort.
7. Continue the explosion in our ability to store and process information by the controlled molecular changes on the surface of semiconductor materials. The transmittal of knowledge will be increasingly

cheap, allowing more human energy to be devoted to understandings and value choices; this will expand human creativity.

8. Expand our knowledge and control of genetic engineering and genetic coding of life controlling information, producing microbes designed to control specific chemical change in and out of other life forms, and modifying the chemistry of complex organisms to affect gross functions. Considerable environmental risk will be taken in this area as we try to sort out "cause and effect" at the same time we are modifying organisms that have the ability to reproduce at an exponential rate.

9. Continue to improve health and conquer disease by using recently acquired chemical knowledge to design and synthesize drugs to alleviate cancer, atherosclerosis, hypertension, and disorders of the central nervous and immune systems.

Human control of chemical change is neither good nor bad in and of itself relative to most of our value systems; rather, it is the use made of the controlled change that can be classified as good or bad. It is evident that it can go either way in mass (possibly from the lack of purposeful choice or the lack of the understandings of consequential results) or for the individual who can dramatically alter his or her life through chemical choices.

Perhaps the most important question of all is the choice of the chooser! Who should he entrusted with these fateful choices? (1) Should it be the person or company that stands to make a financial profit from the change? (2) Should it be a government agent or agency that is properly schooled to make such selections for those who are represented or controlled? (3) Should it be a scientist, or a group of them, who gain their position in history by advancing new ideas (hopefully correct ones) and by having them accepted? The answer to this question of who is to be the chooser of the chemical choices is not altogether obvious because of personal limitations in knowledge and understanding. However, we believe that the most important scientific attribute, after intelligence, of course, is skepticism. Scientific skepticism calls for relatively little regard for human authority in explaining nature and total acceptance of natural displays as the final authority in understanding what is and what is not. Theory from any source, even though it can many times predict fact, must always be subservient to observable phenomena. If the mass in society can understand this most fundamental working in this and the other sciences, the public will realize that it cannot depend on any vested interest group to make the societal chemical choices and will, through government, seek to force the common sense of consensus choices. It is because of this belief that our future depends on this high level of societal chemical responsibility. We have presented to you the story of chemistry, how it works, and what its potentialities are. We hope you are convinced that you do not have to be a chemist to participate, through good citizenship and personal choices, in the control of the unfolding chemical story.

Exercises

I. Comprehension:

Read each of the following statements carefully and decide whether it is TRUE or FALSE according to the text.

1. Chemically speaking, since no one knows what the future hold, people are discouraged to

extrapolating from past and current events to the future.

2. Chemically speaking, if destructive disasters such as a thermonuclear war or a contagious, uncontrolled disruption of "normal" cellular chemistry, molecular manipulations and chemical understandings are obstructed, there will be many potentialities in a variety of fields.
3. Using up the petroleum reserves of the world, people will become interested in using coal again.
4. The larger percentage of electricity is produced with nuclear power, the larger stockpiles of radioactive wastes are generated.
5. Solar, geothermic and wind are cheaper than fossil fuels in producing energy.
6. To control the environment will add the cost of waste disposal and cleanup to the cost of the item or material produced.
7. People will take great environmental risk in trying to find out the secret of gene while changing the shape of creatures that have the ability to reproduce at an exceptionally high rate.
8. As far as our value systems are concerned, human control of chemical change can be classified as either good or bad.
9. Because of personal limitations in knowledge and understanding, it is hard to say who is to be the chooser of the chemical choices.
10. Intelligence is the second most important scientific attribute.

II. Processing:

Fill in the blanks with an illustrative/defining/equivalent word or phrase, using information obtained from the text.

1. Chemically speaking, the future holds great potentialities in the fields of _____, _____, _____, _____, _____, _____ and _____.
2. Catastrophic disasters refer to such things as _____ or _____ of "normal" cellular chemistry, _____ and _____.
3. Fossil fuels are _____ and _____ etc. and the alternative sources of energy are _____, _____ and _____, etc.
4. A continuous array of new materials produced will be used in _____ and _____ as well as in _____, _____, and _____.
5. By controlling molecular changes on the surface of semiconductor materials, we have greatly expanded our ability to _____ and _____ information.
6. Genetic engineering and genetic coding of life concern _____, _____ designed to control specific chemical changes in and out of other life forms, and _____ to affect gross functions.
7. With recently acquired chemical knowledge drugs are designed and synthesized to relieve _____, _____, _____ and _____.
8. It is _____ rather than _____ that can be classified as good or bad.

9. The three possible choosers of chemical choices as mentioned in the text are _____, _____ and _____.
10. Scientific skepticism need to completely accept _____ rather than _____ as the final authority in understanding what is and what is not.

III. Questions and Answers:

Answer the following questions with the information obtained from the text.

1. What are the reasons that thoughtful persons will not give up extrapolating from past and current events to the future even though chemically speaking, they do not know what the future hold?
2. Barring catastrophic disasters, how can we produce vastly greater amounts of food?
3. Why are engineers presently working on new designs for coal-fired trains?
4. Why are alternative sources of energy not developed quickly?
5. In what fields will an array of newly produced materials bring a complete change?
6. How will human creativity be expanded?
7. Why is it hard to say who is to be the chooser of the chemical choices?
8. What is the relationship between theory and phenomena?
9. Who should be entrusted with the chemical choices?
10. What is the author trying to explain?

IV. Translation:

A. Put the following sentences into Chinese.

1. Some enjoy the intellectual challenge, others are dedicated to the solution of current and developing human problems, while many simply want to position themselves in a strong financial capability in the ebb and flow of the appetite expressed by our society.
2. Generate a larger percentage of electricity with nuclear power, generating ever larger stockpiles of radioactive wastes that require centuries of protected storage.
3. It is evident that it can go either way in mass (possibly from the lack of purposeful choice or the lack of the understandings of consequential results) or for the individual who can dramatically alter his or her life through chemical choices.
4. If the mass in society can understand this most fundamental working in this and the other sciences, the public will realize that it cannot depend on any vested interest group to make the societal chemical choices and will, through government, seek to force the common sense of consensus choices.
5. We hope you are convinced that you do not have to be a chemist to participate, through good citizenship and personal choices, in the control of the unfolding chemical story.

B. Translate the following passage into Chinese.

What is environmental chemistry? This question is a little difficult to answer because environmental chemistry encompasses many different topics. It may involve a study of Freon reactions in the stratosphere or an analysis of toxic Kepone deposits in ocean sediments. It also covers the basic chemistry of toxic trace element species synthesized during the manufacture of synthetic natural gas from coal. A reasonably all-inclusive definition is: "Environmental chemistry is the study of the sources, reactions, transport