

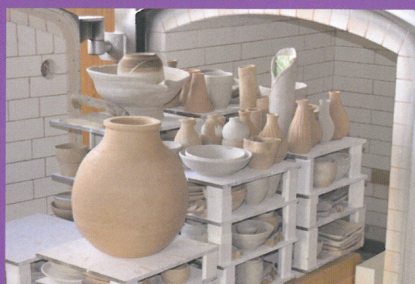
The Wonderful World of Chemistry around Us

— Insights into Nature —

素晴らしい化学の世界

— 自然を見抜く —

by
Masakazu Someya
Paul Murray
Fred Ferrasci



EIHOŠHA

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To the Student

Jokes can be funny, but along with their humor, jokes will sometimes help to highlight deeper truths. For example, take the following joke: The optimist sees the glass half full. The pessimist sees the glass half empty. The chemist sees the glass completely full, half in the liquid state and half in the vapor state. The point of the joke is that chemists are able to see reality in a way that most people can't. People, without the training of a chemist, judge things like the human body, the sun or plants superficially. Chemists can see deeper: they can peer under the surface to look at what lies beneath the exterior.

This textbook that you hold in your hands was designed to be your ticket into that hidden world seen by chemists, a place that is both fascinating and thought-provoking. The fifteen units are focused on various topics ranging from concepts as huge as our solar system to as small as an atom. For example, you will learn the reasons for the disappearance of the dinosaurs, how we can accurately date a man thousands of years old found frozen in the ice, and why our bodies are able to perform extraordinary feats of strength when danger threatens. You will even be able to figure out how much (in chemical terms) your body is worth.

The book you are about to use is written in an English designed to be understandable, useful and helpful in increasing your vocabulary of both everyday English and technical terms. Just as chemistry is a key to a hidden world, English is a key to open up the doors of the international community. English is by far the most commonly used language for academic articles, technical papers and research articles. All fifteen units come with useful exercises and handy notes to make it easier for you to understand the content.

Finally, for those of you who want to enrich your life by making a difference in the world, the solutions to many of the world's greatest problems lies solidly within the domain of chemistry, from recycling to improving the quality of the atmosphere. Our brighter future is tied firmly to chemistry.

We sincerely hope that you will enjoy exploring the exciting world of chemistry. Lastly, we wish to sincerely thank Eihosha for their assistance in making this book possible.

まえがき

ジョークはおもしろい。しかし、おかしさと共に、時として深い真実を浮き彫りにする役割もはたす。たとえば、次のジョークを考えてみよう。楽観主義者は、グラスは半分入っているとみなす。悲観主義者は、グラスは半分空だと思う。化学者は、グラスは液体で半分、あとの半分は蒸気で、全体としては完全に満ちていると考える。

化学者としての訓練を受けたことのない人々は、人体、太陽、植物などを表面的に判断する。しかし、化学者はそれらを一層深く見る。外皮の下に潜むものを見ようと、その下を深く凝視するのである。

皆さんが手に取っているこのテキストは、化学者が見る、隠されたすばらしい啓蒙的な世界へのチケットであるように工夫されている。15のユニットは、我々の太陽系と同様な大きなものから、原子と同じほどの小さなものにまで及ぶ、さまざまな話題に焦点を当てている。たとえば、恐竜の絶滅の理由、氷の中に冷凍状態で発見された数千年の時を経た人をいかに正確に年齢づけるか、我々の体は危険が迫ったとき、どうして驚くほどの力技を発揮できるのかなどについて学ぶ。人体の価値が化学的にはどれほどの値段になるのかなどについても触れる。

本テキストは、日常英語と専門的な英語の語彙の両方を増やすために、わかりやすく、有益であるように工夫されている。化学が、秘められた世界へのカギであると同様に、英語は国際社会のドアを開くためのカギである。英語は技術的および学問的な論文で、世界で最もよく使われている言語である。15のユニットには、すべて、内容をよく理解するために、有益な表現や注が施されている。

自分の人生を豊かなものにしたい人にとって、再利用することから大気の質を向上することまで、化学の領域の範囲内で解決できることは多い。

皆さんが、ワクワクするような化学の世界へ楽しく探索することを願っている。

最後に、この本の出版にご尽力いただいた株式会社英宝社に、心から感謝申し上げます。

著 者

How to Use the Book

Each of the 15 six-page units of *The Wonderful World of Chemistry around Us* is based on a topic connected with chemistry and is divided into five sections: **Warm-Up Dialog**, **Reading**, **Comprehension Questions**, **Read and Guess**, and **Composition**.

The **Warm-Up Dialog** section is based on a dialog between two college students, Japanese and American, who touch on the topic of the unit. First, you are to listen to the dialog with your book closed and answer the four questions in simple English. Then, open your book and listen to the dialog again, filling in the missing parts of the dialog. Finally, practice acting out the dialog with a partner.

The **Reading** section has a reading passage together with vocabulary notes in a column to the right. To enhance your comprehension of the article, we suggest that you familiarize yourself with the vocabulary before reading the article. It is also highly recommended that you listen to the passage on the CD prior to reading it. Getting used to English sounds will help you become a better English speaker.

After you finish reading the passage, open your book to the **Comprehension Questions** section on the following page, listen to each of the five questions, and choose the best of the four choices provided. After completing the questions, listen to the article with your book open. Finally, read the story again, search for the correct answers to each of the questions, and ask your professor if you have any questions.

Before going on to the **Guess the Word** section, study the notes in the **Reading** section again, paying attention to the spelling and meaning of each item. Then, go on and read the hints to each of the five items and guess the word or phrase from the notes and write it in the space provided. Don't look at the notes again until you have tried to guess the items described.

The **Composition** section has three English composition exercises. For each exercise, read the Japanese sentence and arrange the six words (or groups of words) on the broken line in order to complete the English sentence on the second line.

本書の使い方

本書は15 Unit から成り、それぞれのUnit は6 ページ構成である。内容はすべてが化学と関係しており、各Unit は、次のように区分されている。

Warm-Up Dialog

このセクションは、日本人とアメリカ人の二人の大学生との間で交わされる会話で、Unit の話題に言及する。まず、テキストを閉じて会話を聞き、簡単な英語で答えることから始めたい。その後テキストを開き、会話を再び聞いて空欄を埋め、正解を確認したあと、パートナーと会話練習をするとよい。

Reading

それぞれのUnitの話題についての長文で、右横には注を付記している。長文の内容をよく理解するために、側注を参考にするとよい。しかし、記事を読む前に、CDを聞き、聴解力の向上につとめたい。英語の音声に慣れることが、英語の上達につながる。

Comprehension Questions

Readingの内容についての5つの質問がある。音声を聞きながら、それぞれ4つの選択肢のなかから最もふさわしい答えを選び、記号で答える問題である。答えの選択が終わったら、テキストを開いて音声を聞き、答えを確かめるとよい。その後、Readingに目を通し、それぞれの質問にたいする正解を探したい。

Read and Guess

この問題を解くに先立って、Readingの側注に再び目を通し、それぞれの単語の意味と綴りを確認しておきたい。それから5つの問題を読み、説明にふさわしい側注の語句を選び、空欄に書き入れる。

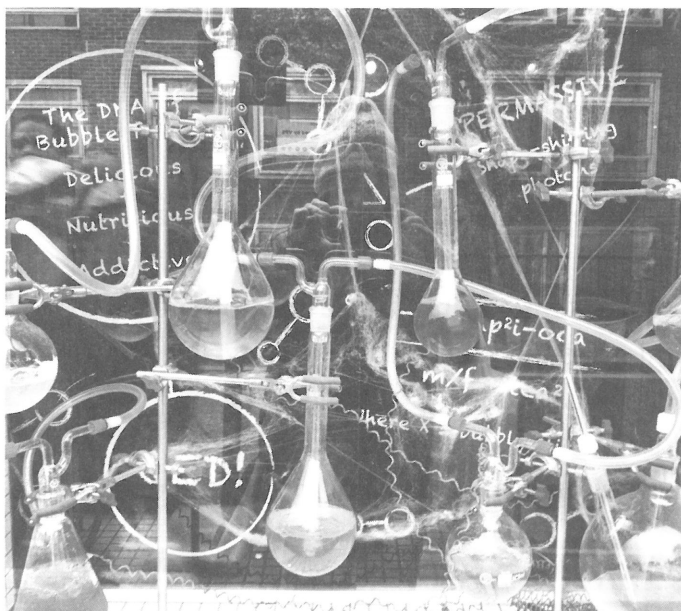
Composition

3つの英作文の問題である。それぞれの日本語をよく読んで、それに相当する英文になるよう、与えられた英語の語句を組み立てて記号で答える問題である。

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Unit 1 What is chemistry?





1 Warm-Up Dialog

会話を聞いて、空欄を埋めなさい。

Hiroshi is trying to find a seat in a crowded cafeteria.

H: Excuse me, (1)?

J: No it's not. Have a seat.

H: Thanks. This noon-day rush is a **madhouse**.

madhouse 混乱した場所

J: (2). By the way, I'm Jennifer.

H: I'm Hiroshi. Thanks for letting me share a table with you.

J: (3) where you're from?

H: Not at all. I'm from Japan. I'm from Fukuoka, Japan. How about you?

J: I'm from San Francisco, (4).

H: Do you **have your sights set on** any special career?

have your sights set on ~ ~を視野に入れる

J: I haven't even (5) yet. My main purpose is to find a field that offers good employment possibilities, so I'm **scouting out** some things like chemistry, physics and medicine.

scout out ~を探す

H: Wow! Those are some **heavy-duty** fields.

heavy-duty 重要な

J: I know I **have a tough road ahead** of me, but I'll do my best.

have a tough road ahead 前途は多難である





Questions

次の質問に、簡単に答えなさい。

1. Where are Hiroshi and Jennifer talking?

2. Are Hiroshi and Jennifer sharing the same table?

3. Where was Jennifer born?

4. Has Jennifer decided her main field of study?

Role-Play

役割をきめて、会話練習をしてみましょう。



2 Reading

次の文章を読んで質問に答えなさい。

To find out what chemistry is, we need to step back for just a second and **put it in perspective**. Chemistry is one of the natural sciences which together form a systematic study of nature. The natural sciences are usually divided up into two parts: the physical sciences and the biological sciences. The physical sciences include chemistry, physics, **geology** and astronomy, while the biological sciences **comprise botany** and **zoology**. Chemistry, which is what this textbook is about, may be defined as the study of **matter**, its composition, and

2 **put ~ in perspective** ~を大局的に見る

6 **geology** 地質学

7 **comprise** ~を包む

botany 植物学

8 **zoology** 動物学

9 **matter** 物質

how it undergoes changes.

Such definitions in the paragraph above were generally accepted in the early part of the twentieth century and are still valid today. However, things have recently begun to become more complicated and less clear. There is such an **overlapping** of fields of study that it is difficult to say where one field starts, and the other begins. To give just one example, parts of astronomy and chemistry have **blended together**, and a new, hybrid field has emerged: **astrochemistry**.

10 **As long as** we are focusing on the advantages of studying chemistry, some of the brightest spots in the field are its **employment opportunities**. With chemistry **flexing its muscles** and expanding into almost every field of science and industry, the job prospects are bright, even in a **sluggish economy**.
15 Look at just a few of the fields available: **agrochemistry**, environmental chemistry, **petrochemistry**, **polymer** chemistry, **neurochemistry**. The list goes on and on.

If you still don't think that chemistry is absolutely essential to modern life, just look at the chemical industry.

20 It converts raw materials such as metals, minerals, air and water, oil and natural gas into an estimated 70,000 different products. Just look around your house or apartment. Almost everything you see has been produced or improved through chemistry.

6 **overlapping** 重複

8- **blend together** 渾然一体となる

9 **astrochemistry** 宇宙化学

10 **as long as** ~ ~する限り

12 **employment opportunities** 雇用機会

flex one's muscles ~の威力を示す

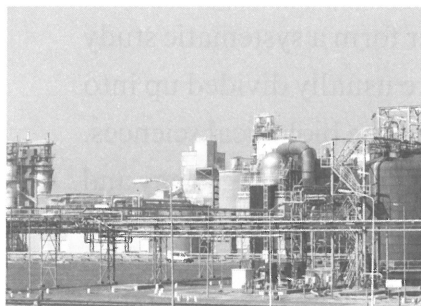
14 **sluggish economy** 停滞している経済

15 **agrochemistry** 農芸化学

16 **petrochemistry** 石油化学

polymer ポリマー、重合体

17 **neurochemistry** 神経化学



3 Comprehension Questions

Readingの内容として最もふさわしいものをa~dから選びなさい。

1.

a. Chemistry.

b. Physics.

c. Geology.

d. Botany.
2.

a. Energy and how it is produced.

b. Matter, its composition, and how it goes through changes.

c. Plants and animals and their relation to the environment.

d. The human body and how diseases are cured.
3.

a. Chemistry has become more popular than any of the other sciences.

b. Chemistry has become easier to define.

c. New fields of study involving chemistry have emerged.

d. Chemistry has become less essential to modern life.
4.

a. It will train you to organize your ideas.

b. It will help you come up with ideas for new products.

c. It will help you determine which products are safe.

d. It will help you find a good job.
5.

a. It converts raw materials into useful products.

b. It helps us recycle raw materials.

c. It gets raw materials from the earth.

d. It has made our economy strong.



4 Read and Guess

説明にふさわしい語を 2 Reading の側注から選び、空欄に書き込みなさい。

1. This is one of the natural sciences. It is the study of the structure of the earth and how it was formed. ()
2. It's hard to get a job in this business condition. This is a period in which there is little buying and selling of products and services. ()
3. This is a field of study. It involves the refining of petroleum and natural gas. ()
4. Biology and chemistry have done this to form biochemistry. In other words, biochemistry is a mixture of biology and chemistry. ()
5. We say that something does this when it gains strength or power. ()

5 Composition 日本文に合うように、英語を並べ替えなさい。

1. 英語の勉強を続ける限り、あなたの英語は上達します。
Your English _____ it.
a. long b. will improve c. as you d. as e. studying f. keep
2. 今日の動物学の授業で、私たちは珍獣について学びました。
In _____, we _____ animals.
a. rare b. class c. learned d. zoology e. about f. today
3. 私たちはその問題を大局的に見る必要があります。
We _____.
a. in b. put c. to d. the problem e. need f. perspective

Unit

2

How has chemistry developed?



1 Warm-Up Dialog

会話を聞いて、空欄を埋めなさい。

Jennifer **bumps into** Hiroshi, who is working at the campus library.

bump into ～と鉢合わせする

H: Hi, Jennifer, nice to see you again.

J: I saw you working at the information counter, so I thought I would **pop over** to say hello and (1) with you.

pop over ひょっこりやって来る

H: Fine. How about you, how are your classes?

J: Funny you should ask. Not only do I love them, but my very favorite one is taught by a Japanese professor. He teaches chemistry, and he makes the class (2). He even cracks jokes.

H: About chemistry? **No way**. OK, tell me a good one.

No way. まさか。

J: (3). What's the difference between cooking and chemistry?

H: I give up.

J: In cooking, you can **lick** the spoon!

lick ～をなめる

H: That's true. Is he teaching you any Harry Potter **alchemy** tricks?

alchemy 錬金術

J: Very funny. He is strict and gives a lot of homework, but I am learning a lot. I think chemistry (4).

H: Let's meet (5) and have a chat.

J: **You got it**. **Take it easy**.

You got it. そうしましょう。

Take it easy. じゃあまた。





Questions

次の質問に、簡単に答えなさい。

1. Where is Hiroshi working?

2. What is Jennifer's favorite class?

3. What does Jennifer's professor sometimes do?

4. Does her professor give a lot of homework?

Role-Play

役割をきめて、会話練習をしてみましょう。



2 Reading

次の文章を読んで質問に答えなさい。

First, imagine a chemist. Chances are you will think of the **stereotypical** figure of a man in a white lab coat working with glass **beakers** filled with chemicals. Now, imagine an **alchemist**. Perhaps you will imagine a Harry-Potter-type person with magical powers. From our modern day scientific **perspective**, it is hard to believe that for much of history, the terms *chemistry* and *alchemy* were used **interchangeably** and that alchemists and chemists shared many of the same interests.

2 **stereotypical** 型通りの

3 **beaker** ビーカー

4 **alchemist** 錬金術師

6 **perspective** 視点

7 **interchangeably** 交互に

There is much debate on the origins of the word *chemistry*. For most of **the Middle Ages**, the common form of the word was *alchemy*, an Arabic word but whose root was borrowed from the Greek or the the Egyptian languages. It was not until the seventeenth century that the modern **distinction** appeared between the two words. Today, alchemy is primarily linked with the **mystical** arts of magic, and focuses on the changing of base metals into gold on the one hand, and the discovery of the **elixir of life** leading to **immortality** on the other. In contrast, chemistry is one of the most important sciences, and **rigorously** follows the scientific method. The French scientist Antoine Lavoisier (1743-1794) is generally considered the father of modern chemistry. He discovered how oxygen affects **combustion** and invented the chemical system of **nomenclature** that is still in use today.

The history of chemistry dates back to the origin of written language, roughly 5,000 years ago. The science was **crucial** to the development of civilization, and was **instrumental** in changing **ores** into metals and the making of **alloys** such as bronze, which was used for making tools, weapons and **armor**. Chemistry was also used for **fermenting** juice to make wine, **brewing** beer, making pottery and **glazes**, inks and dyes, **extracting** medicine and perfume from plants, and **countless** other processes.

In our modern era, chemistry is primarily concerned with the relations of atoms with other atoms. It is sometimes called “the central science” since it is closely connected to biology, physics and geology.

2 **the Middle Ages**
中世

6 **distinction** 区別

7 **mystical** 神秘的な

9 **elixir of life** 不老不死の薬

10 **immortality** 不滅

11 **rigorously** 綿密に

14 **combustion** 燃焼

15 **nomenclature** 命名

18 **crucial** 極めて重要な

19 **instrumental** 有益な

ore 鉱石

20 **alloy** 合金

21 **armor** 甲冑(かっちゅう)

ferment ~を発酵させる

22 **brew** 醸造する

glaze 釉薬

23 **extract** ~を抽出する

24 **countless** 数え切れないほどの