Chemistry English in Context
Course Book

ALINA BUZARNA-TIHENEA (GĂLBEAZĂ)

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FOREWORD

Chemistry English in Context. Course Book is the result of research undertaken by Assistant Professor Alina Gălbează (Buzarna-Tihenea) as part of the program of the Department of Modern Languages for Specific Purposes within the Faculty of Letters, "Ovidius" University of Constanta. It materializes the author's interest in updating the English teaching approach, in accordance with the developments of the chemical industry and of the university curricula.

The importance of being able to speak a foreign language cannot be denied nowadays. For a specialist in any field of knowledge, being a speaker of an international language means having access to the latest scientific literature. Moreover, this may grant access to more jobs on the international labour market, in the context of the increasingly globalised society.

Chemistry English in Context. Course Book has been developed for first and second year chemistry students who have an intermediate or upper-intermediate level of knowledge of English. It can also be used independently, by professionals in the chemical field who use English in their research and work and who need to communicate with colleagues, in an internationalized environment.

The aim of this course book is to help its readers achieve autonomy when communicating in English, by acknowledging their own needs, by making individual

effort and by assessing themselves periodically. It was conceived as a tool which can be used to acquire, develop and test the learner's knowledge of some of the more common terms and grammatical structures which may be encountered by students and specialists in the chemical field. The combination between the chosen authentic materials and the typology of the exercises is aimed at stimulating the creativity, fluency, grammar and lexical precision of the learners.

Chemistry English in Context. Course Book consists of eight units. The first seven deal with a different aspect of chemistry, while the eighth is a revision unit. Within the units, the exercises are increasingly specific, starting with the introduction of the topic, through brainstorming, then developing the terminology and grammar, fixing this knowledge and then challenging the learners to use their newly-acquired knowledge in the form of structured discussions and essays.

The typology of the exercises is diverse, adapted to the degree of richness of the topic and to the type of grammar taught. The exercises start with a high degree of abstraction, dealing with the theoretical side of the topic, after which they become more specific, dealing with the concrete, applied aspect of the topic. Each unit is followed by a Grammar Snapshot, consisting in a synthesis of the grammatical aspects encountered in that unit.

Assistant Professor Lavinia Istratie-Macarov

UNIT 1

SCIENCE

1. Write five words related to science. Work in teams.

2. What do you understand by the word science? Write a definition using the five words you wrote in exercise 1. Work in teams.

3. Read the text below:

Science

"Science is a systematic enterprise that creates, builds and organizes **knowledge** in the form of testable explanations and predictions about the universe.

Contemporary science is typically subdivided into the natural sciences, which study the **material world**, the social sciences which study people and societies, and the formal sciences like mathematics. The formal sciences are often excluded as they do not depend on **empirical observations**. Disciplines which use science like engineering and medicine may also be considered to be applied sciences.

During the middle ages in the Middle East, foundations for the **scientific method** were laid by Alhazen. From classical antiquity through the 19th century, science

as a type of knowledge was more closely linked to philosophy than it is now and, in fact, in the West the term *natural philosophy* encompassed **fields of study** that are today associated with science, such as physics, astronomy, medicine, among many others.

In the 17th and 18th centuries scientists increasingly sought to formulate knowledge in terms of **laws of nature.** Over the course of the 19th century, the word *science* became increasingly associated with the scientific method itself, as a disciplined way to study the **natural world**. It was in the 19th century that scientific disciplines such as physics, chemistry, and biology reached their modern shapes. The same period also included the origin of the terms *scientist* and **scientific community,** the founding of scientific institutions, and increasing significance of the interactions with society and other aspects of culture".

(excerpt from "Science", *Wikipedia*, available at <https://en.wikipedia.org/wiki/Science>)

4. What do the words/ phrases in bold mean?

5. Is the definition of science similar or different from the ones you wrote in exercise 2? Explain.

6. Answer the following questions:

a. Which are the three subdivisions of contemporary science?

b. What do natural sciences study? What do social sciences deal with?

c. Give examples of formal sciences and applied sciences.

d. Why are formal sciences different?

e. Who laid the foundations for the scientific method? When?

f. What fields are encompassed in the term natural philosophy?

g. When did the discipline chemistry reach its modern shape? What other terms originated during this period?

7. In your opinion, what is the difference between the words "science" and "a science"?

8. Fill in the blanks with the following words:

important, bound, testable, similar, published, reproducible, broader, unsatisfactory, scientific, causal, natural, independent, discarded.

The …….. method seeks to explain the events of nature in a ……. way. An explanatory thought experiment or hypothesis is put forward, as explanation, using principles such as parsimony and are generally expected to seek consilience—fitting well with other accepted facts related to the phenomena. This new

explanation is used to make falsifiable predictions that are …… by experiment or observation. The predictions are to be posted before a confirming experiment or observation is sought, as proof that no tampering has occurred.

Disproof of a prediction is evidence of progress. This is done partly through observation of …… phenomena, but also through experimentation, that tries to simulate natural events under controlled conditions, as appropriate to the discipline (in the observational sciences, such as astronomy or geology, a predicted observation might take the place of a controlled experiment). Experimentation is especially …….. in science to help establish …… relationships.

When a hypothesis proves…… , it is either modified or…… . If the hypothesis survived testing, it may become adopted into the framework of a scientific theory. A theory typically describes the behavior of much …….. sets of phenomena than a hypothesis; commonly, a large number of hypotheses can be logically …….. together by a single theory.

After the results of an experiment are announced or…… , it is normal practice for ……. researchers to double-check how the research was performed, and to follow up by performing ……. experiments to determine how dependable the results might be.

(excerpt from "Science", *Wikipedia*, available at <https://en.wikipedia.org/wiki/Science>)

9. Match the following branches of science with their fields of study:

1. natural sciences
2. applied sciences
3. formal sciences
4. social sciences

a. study natural phenomena (including fundamental forces and biological life);

b. study human behavior and societies;

c. are concerned with formal systems and use an *a priori*, as opposed to factual, methodology;

d. apply existing scientific knowledge to develop more practical applications, like technology or inventions.

10. Match the branches of science with their disciplines:

mathematics, logic, engineering, medicine, physics, chemistry, statistics, astronomy, biology, geography, oceanography, law, ecology, geology, meteorology, microbiology, anatomy, neuroscience, immunology, genetics, logic, physiology, pathology, biophysics, ophthalmology, medicine, anthropology, archaeology, communication, criminology, economics, education, government, linguistics, international relations, political science, psychology, sociology, mathematics, theoretical

computer science, engineering, applied mathematics, applied physics.

1. natural sciences:

2. applied sciences:

3. formal sciences:

4. social sciences:

11. Fill in the blanks with the following phrases:

natural science, applied science, social science, life science, natural sciences, life science, formal sciences, social sciences.

……. is a branch of science that seeks to elucidate the rules that govern the natural world by applying an empirical and scientific method to the study of the universe.

The term …… is used to distinguish it from the social sciences, which apply the scientific method to study human behavior and social patterns; the humanities, which use a critical, or analytical approach to the study of the human condition; and the formal sciences.

……. comprises the branches of science that involve the scientific study of living organisms,

like plants, animals, and human beings. However, the study of behavior of organisms, such as practiced in etiology and psychology, is only included in as much as it involves a clearly biological aspect.

While biology remains the centerpiece of ...……..., technological advances in molecular biology and biotechnology have led to a burgeoning of specializations and new, often interdisciplinary, fields.

The …….. are the fields of scholarship that study society.

……. is commonly used as an umbrella term to refer to a plurality of fields outside of the natural sciences.

The …… are the branches of knowledge that are concerned with formal systems and with their properties, based on definitions and rules.

…… is the application of scientific knowledge transferred into a physical environment. Examples include testing a theoretical model through the use of formal science or solving a practical problem through the use of natural science.

(excerpts from "Branches of science", *Wikipedia*, available at <https://en.wikipedia.org/wiki/Branches_of_science>)

12. Write the name of the scientist (i.e. the person who studies and performs research in the respective scientific field) for the following sciences. Use the information on suffixes presented at the end of this unit.

mathematics	genetics
engineering	pathology
physics	biophysics
chemistry	anthropology
astronomy	archaeology
biology	linguistics
ecology	criminology
geology	economics
meteorology	political science
microbiology	psychology
neuroscience	sociology
immunology	statistics

13. Read the following text and answer the questions.

Use the information presented at the end of this unit.

"A **scientific** theory is **empirical**, and is always open to **falsification** if new **evidence** is presented. That is, no theory is ever considered **strictly** certain as science accepts the concept of fallibilism. The **philosopher** of science Karl Popper **sharply** distinguishes truth from **certainty**. He writes that scientific **knowledge** consists in the *search* for truth, but it is not the search for certainty ... All human knowledge is fallible and therefore **uncertain**.

New scientific knowledge **rarely** *results* in vast *changes* in our **understanding**. According to **psychologist** Keith Stanovich, it may be the media's **overuse** of words like breakthrough that leads the public to imagine that science is **constantly** proving **everything** it thought was true to be false. Knowledge in science is gained by a gradual synthesis of **information** from different *experiments*, by **various researchers**, across **different** branches of science. Theories vary in the extent to which they have been tested and verified, as well as their **acceptance** in the scientific community. For example, heliocentric theory, the theory of evolution, **relativity** theory, and germ theory still bear the *name* theory even though, in *practice*, they are considered **factual**.

C. S. Peirce argued that **inquiry** is the *struggle* to **resolve** actual *doubt* and that **merely quarrelsome**, **verbal**, or **hyperbolic** doubt is **fruitless**—but also that the **inquirer** should try to attain genuine doubt rather than resting **uncritically** on common sense. He held that the **successful** sciences *trust*, not to any single chain of **inference** (no stronger than its weakest link), but to the cable of multiple and various arguments **intimately connected**".

(excerpt from "Science", *Wikipedia*, available at <https://en.wikipedia.org/wiki/Science https://en.wikipedia.org/wiki/Branches_of_science>)

a. Write the words in bold in the following table. What do you notice? How are they formed?

Fill in the table with the root word and the affixes. The first one is done for you.

Word	Root word	Affix	
		Prefix	Suffix
scientific	science		-fic

b. Write the words in italics in the following table and fill it in with the information required. The first one is done for you.

What do you notice?

Fill in the table with other examples.

Word	**Part of speech in the text**	**Other possible meaning**
search	Noun	Verb (to search)