

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

**Український державний університет
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В авторській редакції

**НАВЧАЛЬНО-МЕТОДИЧНІ РЕКОМЕНДАЦІЇ ДО
ПРАКТИЧНИХ ЗАНЯТЬ З ДИСЦИПЛІНИ
«ІНОЗЕМНА МОВА ЗА ПРОФЕСІЙНИМ
СПРЯМУВАННЯМ»**

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Електронне видання

Схвалено Групою забезпечення якості освітньої програми
«Матеріалознавство» першого (бакалаврського) рівня вищої освіти

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Навчально-методичні рекомендації до практичних занять з дисципліни «Іноземна мова за професійним спрямуванням» / упоряд. Н. Ф. Шаркова; Укр. держ. ун-т науки і технологій. – Дніпро : УДУНТ, 2025. – 23 с.

Навчально-методичні рекомендації призначені для використання студентами безвідривної форми навчання спеціальності «Матеріалознавство» (бакалаврський рівень) під час практичних занять з дисципліни «Іноземна мова за професійним спрямуванням».

Методичні вказівки базуються на аналізі текстів та доповнені різними лексичними та граматичними тренувальними вправами, призначеними для засвоєння матеріалу, а також тренування словникового запасу, словотворчих моделей, передбачених програмою з даної дисципліни.

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ВСТУП

Метою навчальної дисципліни «Іноземна мова за професійним спрямуванням» є вміння розуміти і перекладати іншомовний текст, знаходити й інтерпретувати іншомовну інформацію професійного спрямування, виділяти головну думку та смислові частини прочитаного тексту, а також вміння дискутувати іноземною мовою на професійні теми, проводити презентації, використовуючи термінологію та мовні конструкції відповідного напрямку. Дане навчально-методичне видання відповідає робочій програмі навчальної дисципліни і складається із автентичних технічних текстів. Запропонований матеріал відповідає принципам особистісно-зорієнтованого підходу до навчання. Методичні вказівки, що пропонуються, стимулюватимуть вдосконаленню навичок опрацювання, критичного аналізу та інтерпретування фахової літератури англійською мовою. Лексичні й граматичні вправи, що надані після кожного тексту сприятимуть кращому засвоєнню студентами термінів, вміння знаходити лексичні відповідники в тексті, а також краще розуміти базові поняття, що стосуються визначення поняття «матерія», її типів, властивостей, станів, сполук, що вони утворюють.

Запропонований матеріал складається з окремих текстів за певною тематикою та різноманітних тренувальних вправ. Текстовий матеріал до вправ підібраний з європейських джерел. Навчально-методичні рекомендації допоможуть індивідуалізувати вивчення мови та підвищити ефективність контролю за роботою студентів на практичних заняттях.

TEXT 1

A Glimpse of British Innovations

On Tuesday, 28 September, 1928 in his laboratory in St. Mary's Hospital in London, Alexander Fleming revolutionized medicine by discovering first antibiotic, which he called "penicillin".

Eighty years ago, Fleming was just one more revolutionary in a long line of radical Britons who helped change the world with their ideas. The Industrial Revolution was, after all, a British idea, and it lead to 100 years of breakthrough, innovation and invention.

The other name is Peter Durand who transformed food conservation in 1810 when he patented the tin can. In 1813, John Hall and Bryan Dorkin opened the first canning factory and, in 1846, Henry Evans invented a machine that could increase production from six to 60 cans per hour.

Here's one more example: in 1901, young Hubert Cecil Booth saw a demonstration of a new cleaning machine at the Empire Music Hall. It had been developed to clean train cars and used high pressure air jets to blow dust into a box. But surely suction would be more efficient than blowing, thought Booth, as he watched. He quickly patented his invention and formed the British Vacuum Cleaner Company. He was soon invited to clean the carpet in Westminster Abbey in preparation of the coronation of Edward VII and Queen Alexandra in 1902. The royal family was so impressed that vacuum cleaners were bought for Buckingham Palace and Windsor Castle.

Britannia ruled the waves back then, and British inventors were filing patents faster than the empire's ships could sail to and from colonies. Has anything changed since then?

Let's look at the World Intellectual Property Organization's (WIPO) 2023 report on the international patent system. In 2023 a total of about 3.5 million international patent applications were filed. The clear leader was Switzerland, the second position went to Sweden, the third to the USA. Britain was on the fourth place, China on the twelfth and Ukraine on the 55th place.

James Dyson, a successful British industrial designer, who invented the popular bagless vacuum cleaner, which uses a cyclone to separate dust from air, is alarmed at how rapidly Britain is replacing manufacturing with a service economy. He says some of the UK's finest engineers now work in financial services, hired because of their mathematical skills. This means lots of brilliant investment advisors but fewer great minds thinking about how best to use island's wave power. Creating complex programs for money management, ringtones for mobile phones, or software for video games and internet sites

don't fill garage space with prototypes. Although these "inventors" don't worry about filing patents, their ideas are part of a non-physical economy that is now enormously important. And, after all, it was a Briton, Tim Berners-Lee, who created the World Wide Web in 1989. Aren't you glad that he didn't patent that?

Another look at the WIPO report shows that majority of international patent applications were filed in English. Which means that the greatest British invention of all is a never-ending, truly innovative one: a global language.

(From "On the latest trends" by Fitzgerald, E.)



1. Match the word combinations with their translation:

- | | |
|-----------------------|-------------------------|
| 1. Revolutionize | a. Винайти |
| 2. A long line | b. Заявка на патент |
| 3. Breakthrough | c. Прорив |
| 4. Quickly patented | d. Швидко змінити |
| 5. To impress | e. Довга черга |
| 6. Patent application | f. Швидко запатентовані |
| 7. To invent | g. Вражати |

2. Find the English equivalents for the words and word-combinations in the text:

Дізнаватися (відкривати); привести до прориву; винахід; консервування продуктів харчування; підвищувати виробництво; консервна банка; розробляти; вагон; високий тиск; повітряне сопло; видувати; засмоктувати; ефективний; запрошувати; пілосос; королівська родина; правити морями; реєструвати патенти; заявка на патент; успішний промисловий дизайнер; циклонна система фільтрації; відділяти пил від повітря; хвилюватися; винаймати на роботу; навички; острів; енергія, що виробляється хвилями; складні програми; мати надзвичайне значення; більшість; справжній.

3. Answer the following questions:

- What is the impact of discovering penicillin on the development of medicine?
- Where did the Industrial Revolution start?
- How was food conservation transformed in 1810?
- What invention did British royal family enjoy?
- What does modern statistics say about inventions and innovations?
- How has modern economics changed since the end of the 20th century?
- What are the results of these changes?

Parts of Speech

Grammar exercise 1. Sort the following words into 3 categories: nouns, verbs, and adjectives. Translate the words into your native language. Choose the words which can function as more than one part of speech:

Discover, medicine, breakthrough, innovation, invention, transform, patent, clean, can, pressure, efficient, file, application, separate, complex, management, successful.

Grammar exercise 2. The table shows how the words are formed around the verb *invent*. List all the words you can make from the table and use them in suitable blanks in the sentences.

Invent	ion
	or
	ive
	ory

- a. Chaplin _____ his own unique style of comedy.
- b. When the police eventually arrived we made an _____ of the missing items.
- c. _____ like the electric light bulb changed the way people lived.
- d. Thomas Edison was the _____ of electric light bulb.
- e. Authors claim space for being _____ in their theoretical physics research.

Grammar Exercise 3. In these sentences, certain verbs are printed in italics. Change them into nouns which can be used in the blanks.

EXAMPLE mean (verb) -> meaning (noun)

arrive (verb) -> arrival (noun)

1. a. New antimalarial drugs were *discovered*.
b. They made interesting _____ about malaria treatment.
2. a. He *invented* the technique that allows scientist to examine DNA.
b. The _____ of a new technique allowed scientists to examine DNA.
3. a. We advertised three jobs and over 50 people *applied*.
b. We received about 50 _____ for this position.
4. a. We *managed* to change an approach to company organization.
b. In this company we have a new approach to _____.

TEXT 2

Types of Matter

Whether you are enjoying a day at an amusement park or having a picnic in the school yard, you are surrounded by matter. The objects you touch, the foods you eat, the air you breathe, and even the people around you are all matter. Matter is anything that has mass and volume. Not to be confused with weight, mass is the amount of matter in an object. Volume is the amount of space an object takes up.

There are many types of matter. Some matter is shiny, while other is dull. Some matter can bend, and some can break. Some matter is easy to see, and other matter is invisible. What makes one type of matter differ from another? The answer depends on the substances that make up matter.

The simplest type of matter is an element. An element cannot be broken down into a simpler substance. Scientists have discovered many elements. Some occur in nature, and others are created in laboratories. Hydrogen, oxygen, and carbon are a few common elements found in nature.

The most basic type of an element is an atom. An atom is the smallest part of an element that has the properties of that element. Atoms are sometimes called the building blocks of matter. Atoms are so tiny that more than one million of them can fit across the head of a pin! Each element is made up of only one type of atom. A gold crown is made up of gold atoms. Copper wire is made up of copper atoms. The neon gas inside a sign is made up of neon atoms.

The basic structure of all atoms is similar. An atom is made up of smaller particles called protons, neutrons, and electrons. Protons and neutrons are found in the nucleus, or center of an atom. Electrons travel at high speeds around the nucleus. Atoms of different elements contain different numbers of particles. The different number of particles gives elements their unique properties.

The atoms of most elements can combine with other atoms. When atoms combine, they are held together by forces of attraction that are known as chemical bonds. A compound is a pure substance formed when the atoms of two or more elements are held together with chemical bonds. Familiar compounds include sugar, salt, chalk, and water. Every water molecule on Earth is made up of two hydrogen (H) atoms and one oxygen (O) atom.

Many compounds are molecules. A molecule is the smallest unit of an element or compound that has all of the properties of that element or compound. Water is a molecular

compound. Each water molecule has two hydrogen atoms bonded to one oxygen atom. Some molecules are made up of only one type of atom. A nitrogen molecule forms when two nitrogen atoms bond together. Because nitrogen molecule consists of only one type of element it is not a compound.

(From "The Nature of Matter" by Christine Caputto)



1. Match the word combinations with their translation:

- | | |
|--------------------|---------------------------|
| 1. Amusement park | a. Плутати з |
| 2. Confuse with | b. Складатися з |
| 3. Occur in nature | c. Зустрічатися в природі |
| 4. Be made up of | d. Знайомий |
| 5. Familiar | e. Парк розваг |
| 6. Combine with | f. Хімічні зв'язки |
| 7. Chemical bonds | g. Поєднуватись з |

2. Find the English equivalents for the words and word-combinations in the text:

Торкатися, маса, вага, об'єм, відрізнитися один від одного, спільні елементи, унікальні властивості, мідь, знак (вивіска), частка, дріт, ядро, висока швидкість, хімічні зв'язки, сили тяжіння, чиста речовина, сполука, кисень, азот, водень, найменша одиниця, складатися з, основний тип.

3. Find the opposites of the following words in the text and translate them into your native language:

Shiny, difficult, visible, question, complicated, destroy, different, outside, huge, the same, common, mixture, separately.

4. Say whether these statements are True or False, and if they are false, say why:

- A. Molecule is the basic part of an element.
- B. All matter on the Earth, whether it be rocks, minerals, animals, plants, birds or insects is made up of atoms of the chemical elements.
- C. We can find matter in the nature as well as in laboratories.
- D. Silver tableware is made up of silver atoms.
- E. The tiniest part of each matter is an element.
- F. Major types of matter have the same nature.
- G. Ammonia (NH₃) is a compound formed when three nitrogen atoms bond with one hydrogen atom.
- H. Elements are sometimes called the building blocks of matter.

Adjectives and Adverbs

Grammar exercise 1. *Identify adjectives and adverbs in the following sentences.*

1. The word “compound” comes from the Latin *componere*, which means “to put together”.
2. Ammonia has many important users, including the manufacture of fertilizers used to grow crops.
3. Compounds are commonly represented by models. These models are often made up of colored spheres, or balls. Each sphere represents an atom.
4. Nitrogen gas makes up about seventy-eight percent of the air you breath.
5. Just five elements make up more than ninety percent of Earth’s crust. These elements are oxygen, silicon, aluminum, iron, and calcium. Just three elements make up over ninety percent of the human body. They are oxygen, carbon, and hydrogen.

Grammar exercise 2. *Circle the correct item.*

1. The successful/ successfully candidates will be given additional training.
2. He completed the task successful/ successfully.
3. Rodger was late/ lately to work every day last week.
4. Have you seen either of them late/ lately?
5. This is hard/ hardly the time to start discussing finances.
6. I was trying very hard/ hardly to remember her name.
7. The boiling point of water is lower at high/ highly altitudes.
8. She is a high/ highly educated young woman.
9. A climb to the mountain led to near/ nearly disaster.
10. It took near/ nearly sx hours to download this software.

Grammar exercise 3. *Write whether each statement is true (T) or false (F):*

- A When you are depressed you don’t have hope for the future.
- B An exhausting job doesn’t make you feel tired.
- C People smile or laugh when they are amused.
- D When things don’t happen the way you want them to, you are satisfied.
- E A shocking film is suitable for very young children.
- F People often say, “I am so boring at work today”.
- G You usually feel very excited after working for 10 hours.
- H People usually give up reading books if they are boring.
- I We use the word “young” for objects and “new” for living things.
- J “Lazy” is the opposite of “hardworking”.

TEXT 3

Mixtures

Each element has a unique name. The names of some elements come from Latin or Greek words. Other elements are named after famous scientists. For example, Einsteinium is named for Albert Einstein. Some are named after countries, states, or planets. Americium is named after America; Californium is named after California. Can you guess what Neptunium is named after?

To make sure that scientists the world over can refer to elements in the same way, every element has a symbol. A chemical symbol is an abbreviation for a chemical element that consists of one or two letters. The first letter is always uppercase. If there is a second letter, it is always lowercase. Some chemical symbols are obvious, such as Al for aluminum and B for boron. Others can be confusing because they come from a Latin or Greek name, such as Hg for mercury (*hydrargyrum*) or Pb for lead (*plumbum*).

Just as an element can be described by a chemical symbol, a compound can be described by a **chemical formula**. A chemical formula shows the elements that make up a compound. This formula also shows the ratio of atoms for each element. A ratio is a comparison of two numbers. The atoms in the compound always combine in the same ratio. For example, a molecule of carbon dioxide has one carbon atom and two oxygen atoms. The symbol for carbon is C and the symbol for oxygen is O. The chemical formula for carbon dioxide starts out with the symbol CO. Then the subscript for the number of atoms of each element is added. A subscript is a small number written on the bottom right of a chemical symbol. The chemical formula for carbon dioxide becomes CO₂.

Elements and compounds are called **pure substances** because they have something special in common. Every sample of a given element or compound has the same exact properties as every other sample of that element or compound. All samples of pure gold have the same properties. Most of the matter you see every day is not made up of pure substances. Instead, it is made up of **mixtures**. A mixture is a physical blend of two or more substances. Unlike compounds, the parts of a mixture are not combined in a specific ratio. In addition, each substance in a mixture keeps its individual characteristics.

Ocean water is an example of a mixture. It contains water, salts, and other substances. But a sample of water from the Atlantic Ocean will not be the same as a sample from the Pacific Ocean. One sample might contain more salt than the other. Even samples from two parts of the same ocean may differ.

A mixture in which you can see the different parts is called a heterogeneous mixture. In this type of mixture, the parts are unevenly mixed. Beach sand, concrete, granite, and fruit salad are examples of heterogeneous mixtures.

A mixture in which substances are evenly mixed are called a homogeneous mixture. Air is also a homogeneous mixture. Air is a mixture of nitrogen, oxygen, and other gasses.

One important type of homogeneous mixture is a solution. In a solution one substance is dissolved into another. The substance that does the dissolving is called the solvent and the substance which is dissolved is called the solute. For example, simple syrup is a solution. When you stir sugar into water, the water is the solvent and the sugar is the solute.

(From "The Nature of Matter" by Christine Caputto)



1. Match the word combinations with their translation:

- | | |
|---------------------|--------------------------------|
| 1. Famous scientist | a. Велика літера |
| 2. To name after | b. Розчинятись |
| 3. To refer to | c. Давати назву в честь чогось |
| 4. Uppercase letter | d. Посилатись на |
| 5. Lowercase letter | e. Відомий науковець |
| 6. To dissolve | f. Речовина |
| 7. Substance | g. Маленька літера |

2. Find the English equivalents for the words and word-combinations in the text:

Хімічний символ, складатись з, очевидний, незрозумілий (неоднозначний), ртуть, свинець, утворювати з'єднання, співвідношення атомів до кожного елементу, порівняння, вуглекислий газ, вуглець, кисень, внизу, чисті речовини, суміші, властивості, поєднання двох або більше речовин, зразок води, цемент.

3. Find appropriate words in the text and fill in the gaps in the following sentences:

1. Air, rainwater, vinegar, and steel are examples of _____ mixture.
2. Seawater, pizza, and rocks in sand are examples of _____ mixture.
3. Liquid substances, such as aromatic compounds, alcohols, and water, in which other materials dissolve are called _____.
4. Sugar-water, Coca-Cola, and alloys are examples of _____.
5. Baking soda, diamond, aluminum, and silver are examples of _____ substances.
6. Hydrogen, carbon, and oxygen are examples of chemical _____.

Degrees of Comparison

Grammar exercise 1. *Translate the following sentences into your native language.*

1. Every sample of a given element has the same properties as every other sample of that element. _____
2. A mixture is a physical blend of two or more substances.

3. One sample might contain more salt than the other.

4. Most of the matter you see every day is not made up of pure substances.

Grammar exercise 2. *Complete each sentence with the same as:*

1. The book on the website costs \$5 and its price in the shop is \$5.
The price of the book on the website _____
2. I and my sister look alike. I look just _____
3. John thinks that purse is too expensive. I agree with him. John thinks _____
4. My friend thinks that my behavior has changed since she last saw me. I am not _____
5. One fifth equals 20 percent. 20 percent is _____
6. One kilogram equals 2.2 lbs. One kilogram is _____
7. A fried egg contains about 100 calories. Running a mile burns off about 100 calories.
Running a mile burns off _____
8. In my old job I had to compare different samples of water. In my new job I compare different samples of water. My new job is _____

Grammar exercise 3. *Complete the following items, as in the example:*

1. A pebble/ a stone/ a rock (big).
A stone is bigger than a pebble. A rock is the biggest of all.
2. Cotton/ wood/ iron (heavy).

3. Bronze/ silver/ gold (expensive).

4. Steel/ wood/ wool (soft).

5. A bicycle/ a car/ a train (fast).

6. Sugar/ sand/ oil (soluble).

TEXT 4

States of matter

Matter can exist in different physical state. The three most common states of matter are solids, liquids, and gasses.

Matter in the solid state has a definite shape. Matter in the solid state also has a definite volume. This is because the particles that make up a solid are packed tightly together. They only have enough room to vibrate, or move back and forth in place. Attractive forces between the particles hold them in place. These forces prevent particles from flowing past one another or spreading apart.

In some solids, the particles form a regular, repeating pattern. These patterns create units known as crystals. A solid made up of crystals is called a crystalline solid. Salt, sugar, and quartz are examples of crystalline solids. A solid in which the particles do not form a regular, repeating pattern is called an amorphous solid. Plastics, wax, and rubber are examples of amorphous solids. Many foods such as mayonnaise, ketchup, and cotton candy are amorphous solids.

Matter in the liquid state has a definite volume, but not a definite shape. This means that the amount of liquid does not change if the liquid is poured into a new container. Only the shape of the liquid changes. A liquid takes shape of its container.

Liquids have this characteristic because their particles are not packed as closely as those in solid. Unlike solid particles, liquid particles are free to move past one another and can move more rapidly. Thus the liquid particles overcome the attractive forces holding them together, and the liquid flows.

In a liquid each particle attracts all of the particles around it. The particles at the surface, however, do not have other liquid particles above them. This creates an overall downward pull into the liquid. In response to this downward pull, the surface particles pull more tightly together. The result is a force across the surface of the liquid that is known as surface tension. This force causes the liquid to squeeze together into drops.

Some liquids flow quickly, while others flow slowly. Viscosity is the resistance of a liquid to flowing. A liquid with a high viscosity flows slowly while a liquid with a low viscosity flows quickly. For most liquids, viscosity decreases as the liquid gets warmer.

Matter in the gas state does not have a definite volume or a definite shape. The particles in a gas move quickly in all directions. The attractive forces between gas particles are much weaker than those between solid or liquid particles. When compared with the particles in a solid or liquid, the particles in a gas are at great distances from each

other. They can be squeezed together when placed in a small container or they can spread out to fill a larger container.

As gas particles move, they collide with each other and the walls of the container. During each collision, the gas particles exert a push, or force. This force over a given area is known as the pressure of the gas.

(From "The Nature of Matter" by Christine Caputto)



1. Match the word combinations with their translation:

- | | |
|----------------------------|---------------------------|
| 1. Solid state | a. Повторюваний візерунок |
| 2. Attractive forces | b. Твердий стан |
| 3. Repeating pattern | c. В'язкість |
| 4. Surface tension | d. Сили тяжіння |
| 5. Viscosity | e. Поверхневий натяг |
| 6. Resistance | f. Стикатися один з одним |
| 7. Collide with each other | g. Опір |

2. Find the English equivalents for the words and word-combinations in the text:

Тверді речовини, рідина, форма, об'єм, частки, ємність, достатньо місця, розлого розташовані, гума, кількість рідини, швидко, текти, поверхня, у відповідь на, щільно згуртуватись, гравітаційне тяжіння, сила, зменшуватись, стискатися.

3. Complete the gaps with the words in the box.

Solid shape (x2) volume room size packed together vibrate

The (1) _____ ice sculpture has a definite (2) _____ and (3) _____. If the sculpture is moved, neither its (4) _____ nor its (5) _____ changes. The molecules are (6) _____ so tightly _____ that they barely have (7) _____ to (8) _____.

4. Say whether these statements are True or False, and if they are false, say why:

- A. The structures of quartz and paraffin give these solids different characteristics.
- B. The shape of the liquid depends on the shape of a container.
- C. Liquid particles have slower motion than those in solid.
- D. Surface tension allows some insects such as the water strider to walk across water.
- E. Surface tension allows light objects, like leaves, to float on the water.
- F. If you heat a thick liquid, it will become thin and easy to pour.

Present Simple Active and Passive Voice

Grammar exercise 1. *Translate the following sentences into your native language*

1. Particles move back and force in place. _____
2. Particles are packed tightly together. _____
3. Particles are squeezed together when placed in a small container. _____
4. The particles move quickly in all directions. _____

Grammar exercise 2. *Make these sentences passive, as in the example.*

Example: Particles make up the solids -> The solids are made up of particles.

1. These patterns create units known as crystals.
2. In some solids, the particles form a regular, repeating pattern.
3. The liquid particles overcome the attractive forces.
4. The particles at the surface create an overall downward pull.
5. Attractive forces prevent particles from spreading apart.
6. This force causes the liquid to squeeze together into drops.
7. We know this force as the pressure of the gas.

Grammar exercise 3. *Put the verbs in brackets into the present simple active or present simple passive*

You can't make a bubble with ordinary tap water, but you can with soapy water. The reason is that soap _____ (to decrease) the surface tension of water. Soap molecules are long chains of atoms. When soap _____ (to add) in water, one end of the chain _____ (to attract) water molecules at the surface. This _____ (to increase) the distance between the water molecules. The farther apart they are, the weaker the pull between them is. As a result, the surface tension _____ (to decrease) and a bubble _____ (to form).

Grammar exercise 4. *Rewrite all the steps of the process in the passive voice. Do not express the agent.*

1. People drill a well. _____
2. The drill pumps the crude oil to the ground. _____
3. People store the crude oil in large containers. _____
4. Trucks transport the crude oil to a refinery. _____
5. A machine turns the crude oil into other materials. _____
6. Factories use some of these materials to make products for us. _____

Grammar exercise 5. *Think of any technological process and describe it in passive voice in your own words.*

TEXT 5

Changes in state

The state in which matter exists depends on energy. In science, energy is defined as the ability to do work or cause change. When matter is heated, it absorbs energy. When matter cools, it loses energy. The amount of energy that particles of matter have determines how they move. As particles gain energy, they move faster and farther apart. As particles lose energy, they move more slowly and stay closer together. Matter can change from one state to another by gaining or losing energy.

The change in state from a solid to a liquid is called melting. As a solid is heated, it absorbs energy. This causes the particles to vibrate faster. With enough energy the particles break free from their fixed positions and enter the liquid state. In most pure substances, melting occurs at a specific temperature. This temperature is known as the melting point. The melting point of ice (pure water in the solid state) is 0°C (32°F).

The change in state from a liquid or a solid to a gas is called vaporization. This change occurs when the particles gain enough energy to enter the gas state. One type of vaporization is evaporation. Another type of vaporization is boiling.

Vaporization that takes place at the surface of a liquid is known as evaporation. Some particles have enough energy to escape the liquid and become a gas. A puddle on the sidewalk disappears throughout the day because the water molecules evaporate.

Sometimes a liquid changes to a gas below the surface as well as at the surface. This process is known as boiling. Bubbles form within the liquid and then rise to the surface. The temperature at which the liquid boils is known as the boiling point. The boiling point of water is 100°C (212°F). the boiling point decreases at higher elevations because there is less pressure pushing down on the particles at the surface.

The change in state from a gas to a liquid is called condensation. This change is the reverse of vaporization. When the particles of a gas lose enough energy, they slow down and form a liquid. Condensation is responsible for the fog you see on the bathroom mirror after taking a shower, the “breath” you see in front of you on a cold day, and the drops you see on the side of a cold glass.

Under some conditions, a solid can change directly into a gas without passing through the liquid state. This process is known as sublimation. Perhaps you have seen the sublimation of dry ice. Dry ice is the solid form of carbon dioxide (CO₂). At room temperature, dry ice undergoes sublimation to form a gas. A block of dry ice quickly shrinks and disappears – forming a cloud without forming a liquid.

Dry ice is often used for medical purposes because its temperature is very cold, $-78,5^{\circ}\text{C}$ ($-109,3^{\circ}\text{F}$). It can keep biological materials cold, slow the growth of bacteria, and disappear as a gas without leaving a messy liquid behind.

Remember it is not gaseous carbon dioxide that is seen around dry ice. It is a cloud of liquid water drops that form in the air through condensation. The dry ice absorbs heat energy from the air around it, making the air colder. The colder air cools the surrounding water vapor until it turns into liquid. (From "*The Nature of Matter*" by Christine Caputto)



1. Match the word combinations with their translation:

- | | |
|---------------------|-----------------------|
| 1. To absorb energy | a. Витрачати енергію |
| 2. To lose energy | b. Отримувати енергію |
| 3. To gain energy | c. Поглинати енергію |
| 4. Melting point | d. Точка плавлення |
| 5. Boiling point | e. Точка кипіння |
| 6. Vaporization | f. Пароутворення |
| 7. Evaporation | g. Випаровування |

2. Using the table given below compare the melting and boiling points of the metals.

Metal	Melting point	Boiling point
<i>Copper</i>	1083	2595
<i>Silver</i>	960	2212
<i>Gold</i>	1063	2966

3. Circle the answer that best completes the statement.

- Compared to the other metals in the table copper has _____ melting point.
 - the highest
 - similar to
 - equal
- _____ copper the melting point of silver is not very high.
 - unlike
 - similar to
 - different from
- The boiling point of silver is _____ one.
 - identical
 - the lowest
 - the highest
- _____ to its melting point, the boiling point of gold is much higher.
 - compared
 - comparable
 - unlike
- Gold has _____ boiling point of all mentioned metals.
 - the same
 - the highest
 - the lowest
- Copper and gold have almost _____ melting points.
 - equal
 - alike
 - the same

Past Simple and Present Perfect

Grammar exercise 1. *Translate the following sentences into your native language*

1. Perhaps you have seen the sublimation of dry ice. _____
2. Has anything changed since then? _____
3. Scientists have discovered many elements. _____
4. Peter Durand patented the tin can in 1810. _____
5. Alexander Fleming revolutionized medicine. _____

Grammar exercise 2. *Put the verbs in brackets into the present simple active or passive, or past simple.*

The fourth state of matter, plasma, _____ (to exist) at very high temperatures. Recall that atoms _____ (to make up) of even smaller particles. One of those particles is the electron. At high temperatures. The atoms of a gas _____ (to move) so fast that they their collisions _____ (to cause) some electrons to be completely knocked out of the atoms. The result is a plasma.

The name for this state of matter _____ (to come from) the name of blood plasma. In 1927, scientist Irving Langmuir _____ (to choose) this name because he _____ (to feel) that matter in the plasma state _____ (to behave) like plasma in the blood.

Natural plasmas are not very common on Earth because it is generally too cold for matter to reach this state. Only lightning strikes _____ (to create) the conditions needed to produce plasma.

Grammar exercise 3. *Write the second and third form of the following verbs.*

Begin; break; choose; cut; fall; find; found; freeze; get; grow; have; hit; hold; keep; know; leave; light; lose; make; pay; rise; see; send; spend; take; think; throw; write.

Grammar exercise 4. *These sentences are in the past simple. Rewrite them in the present perfect simple. Change the sentences if necessary.*

1. Fiona didn't finish the report. _____
2. In 1935, the Zeppelin Company designed commercial passenger-carrying airship. _____
3. Scientist found ways to test aerogels starting from 1931. _____
4. The liquid water changed into water vapor. _____
5. We were in Africa last winter. _____
6. When did you finish this book? _____
7. We did the first part of the worksheet. _____

TEXT 6

Properties of matter

Matter has two kinds of properties. We can use physical properties and chemical properties to describe matter. A physical property is a trait you can observe without changing the composition of the matter. Color, odor, texture, and density are physical properties. Melting point, boiling point, and the state of matter are also physical properties.

Some physical properties are known as extensive properties. These depend on the amount of matter that you have. Length, mass, volume, and weight are examples of extensive properties. They all increase or decrease as the amount of matter changes. Other physical properties do not depend on the amount of matter. These properties are called intensive properties. These remain the same no matter how much of the matter you have. The state of matter, boiling point, melting point, and density are other examples.

A chemical property of matter is the ability to change into different substances. Unlike a physical property, you cannot observe a chemical property without actually changing the matter. For example, coal has the ability to burn in air. This is a chemical property known as flammability. You can't observe this property by simply looking at a piece of coal, however. You have to burn the coal to know that it is flammable. Once burned, the coal is a different substance. Other chemical properties include the ability to rust, tarnish or react with other substances.

When coal burns, iron rusts, or silver tarnishes, it undergoes a chemical change. A chemical change occurs when a type of matter changes into a different type of matter. A chemical change produces one or more new substances with properties different from the original substances. Another way to describe a chemical change is as a chemical reaction.

In a chemical reaction, the substances that are changed are called the reactants. The substances that are formed are called the products. During a chemical reaction, reactants change into product. The products have different properties than the reactants. Unlike a physical change, a chemical change cannot be undone by physical means.

In the 1770s, a French chemist named Antoine Lavoisier conducted experiments with chemical reactions. Lavoisier proposed the law of conservation of mass, which states that matter is neither created nor destroyed during a chemical reaction. As a result, the mass of the reactants is always equal to the mass of the products.

The explanation behind the law of conservation of mass is that during a chemical reaction, the bonds between the atoms of the reactants are broken. The atoms are then

rearranged and new bonds are formed in the products. All of the atoms of the reactants are present in the products, but they are arranged in a different way.

(From "The Nature of Matter" by Christine Caputto)



1. Match the word combinations with their translation:

- | | |
|--------------------------|------------------|
| 1. Composition of matter | a. склад матерії |
| 2. State of matter | b. стан матерії |
| 3. To rust | c. речовина |
| 4. To tarnish | d. реагент |
| 5. Undergo a change | e. іржавіти |
| 6. Reactant | f. змінюватись |
| 7. Substance | g. тьмяніти |

2. Find the English equivalents for the words and word-combinations in the text:

Властивості; особливість; спостерігати; запах; щільність; екстенсивні та інтенсивні властивості; залежати від; довжина; об'єм; вага; залишатись незмінним; збільшуватись; зменшуватись; горіти; легкозаймистий; вступати в реакцію з іншими речовинами; хімічні перетворення; проводити експерименти; скасувати хімічні перетворення; руйнувати; закон збереження маси; рівний чомусь; пояснення; зв'язки між атомами; зв'язки порушуються; зв'язки формуються; перебудувати. улаштовувати по-іншому.

3. Match properties to their explanations:

<u>Property</u>	<u>Explanation</u>
State	Form or phase of the matter (solid, liquid, gas, or plasma)
Boiling point	Temperature at which the matter changes to the liquid state
Melting point	Temperature at which bubbles are formed inside the liquid
Malleability	Ability to be pulled into the shape or wire
Ductility	Ability to be pounded into thin sheet
Conductivity	Ability to let heat or electricity pass through
Luster	How the matter feels
Density	How the matter reflects light
Volume	Mass per unit volume of the matter
Mass	Measure of how much space an object takes up
Texture	Measure of how much matter is in an object

Modal Verbs

Grammar exercise 1. *Translate the following sentences into your native language:*

1. A chemical change cannot be undone by physical means. _____
2. Under some conditions, a solid can change directly into a gas. _____
3. They can be squeezed together when placed in a small container. _____
4. One sample might contain more salt than the other

Grammar exercise 2. *Use a verb with can or can't to complete the sentences.*

Meet see stay hear eat

1. A whale _____ underwater for more than 30 minutes.
2. I _____ you tonight because I have a lot of homework.
3. Please turn up the volume of the TV, I _____ it very well.
4. Jane wears glasses because she _____ well without them.
5. I _____ eggs, I am allergic to them.

Grammar exercise 3. *Make polite requests from the words.*

1. Open/ you/ the door/ could _____
2. Close/ could/ you/ the window _____
3. You/ can/ me/ help/ my homework/ with _____
4. Can/ bring/ the dessert menu/ you _____
5. Some milk/ could/ buy/ you _____
6. The music/ turn down/ you/ could _____

Grammar exercise 4. *Read each scenario and write a sentence using a modal verb and the words in brackets:*

1. It's the middle of summer but there are dark clouds in the sky (rain)

2. Henry just drank a liter of water. Now he bought a carton of orange juice (be thirsty) _____
3. You are stuck in traffic. Your plane leaves in one hour (miss the plane)

4. You give some food to your cat but it doesn't eat any of it (be hungry)

5. Your mother fell asleep in her chair at 7 p.m. (be tired)

6. Carla walked all day in the sun without a hat (be sunburnt)

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