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Accelerated Learning Programme

ALP CHEMISTRY

Glossary for all Units, and the full texts of Unit 2: “Atoms”, and Unit 3: “Chemical elements”, translated in English

Funded by the Asylum, Migration and Integration Fund of the European Union

IOM UN MIGRATION

ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΕΣΣΑΛΙΑΣ

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ΕΡΓΟ ALP

ΧΗΜΕΙΑ

ΣΥΓΓΡΑΦΕΑΣ ΕΚΠΑΙΔΕΥΤΙΚΟΥ ΥΛΙΚΟΥ
ΣΤΕΡΓΙΟΣ ΓΡΑΜΜΕΝΟΣ
Δρ Χημείας

ΜΕΤΑΦΡΑΣΗ ΣΤΑ ΑΓΓΛΙΚΑ
ΑΧΙΛΛΕΑΣ ΚΩΣΤΟΥΛΑΣ
Μέλος ΕΔΙΠ ΠΤΔΕ Πανεπιστημίου Θεσσαλίας

ΕΙΚΟΝΟΓΡΑΦΗΣΗ
ΑΝΝΑ ΠΑΠΑΪΩΑΝΝΟΥ

ΕΠΙΣΤΗΜΟΝΙΚΑ ΥΠΕΥΘΥΝΟΣ ΕΡΓΟΥ ALP
ΓΙΩΡΓΟΣ ΑΝΔΡΟΥΛΑΚΗΣ
Διευθυντής του Εργαστηρίου ΜΔΔ Ελληνικής Γλώσσας και Πολυγλωσσίας
Πανεπιστήμιο Θεσσαλίας

ΥΠΕΥΘΥΝΟΙ ΓΙΑ ΤΗ UNICEF
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ΕΚΠΡΟΣΩΠΟΣ ΓΝΩΜΟΔΟΤΙΚΗΣ ΕΠΙΤΡΟΠΗΣ ΙΕΠ
ΝΤΟΡΕΤΤΑ ΑΣΤΕΡΗ

TABLE OF CONTENTS

CHEMISTRY

Unit 2: Atoms

In this unit we will learn:

- What atoms are
- How many different types of atoms exist
- What models are

Picture A.1 Charcoal

Picture A.2 Burning charcoal

Imagine that you have a lump of charcoal. You cut it into ever smaller pieces, smaller and smaller. If you cut it into pieces so small that you cannot see them with the naked eye, and keep going, you will eventually make them into pieces so small, that you cannot even see them with a microscope. These very small pieces cannot be cut any further.

These very small pieces that cannot be cut any further are called **atom**s.

Picture A.3 Microscope

Atoms are so small that you can fit about 1,000,000,000 of them on the tip of a pin.

Picture A.4 Pins

Watch the video

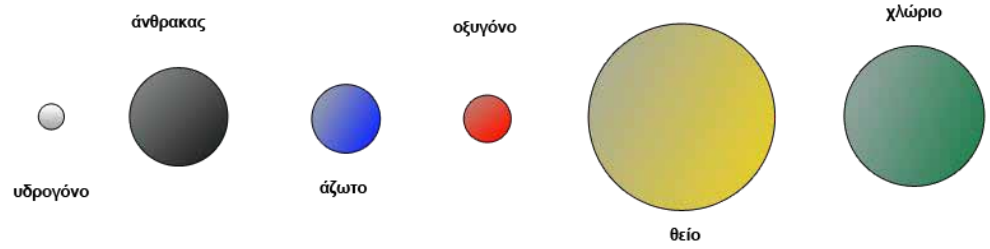
You can watch a video with atoms by clicking at the following address:

https://www.youtube.com/watch?v=LhveTGblGHY

(in this video, you can activate closed captions; this means that you can read what you listen to)

Because we cannot see atoms with our eyes, we use small balls to represent them. We call these **models**.

The world is made of various materials, which are made of atoms. Not all atoms are the same; they are different. More than 110 different atoms exist (your Junior High School Year 2 textbook mentions 115). Of these, about 100 are free in nature, and the rest were created in science laboratories. If we want to represent all atoms with small balls, we need to have 115 different small balls, i.e., 155 different models.

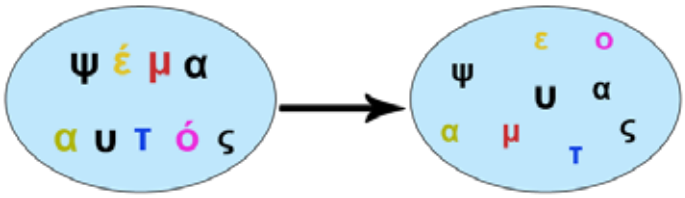


Picture A.5 Atom models

Note!

We use coloured balls to represent atoms, but this is not what they look like in reality. Atoms do not have a colour, and they do not look like balls.

All the words we use in our language are made up of the 24 letters in the alphabet που χρησιμοποιείς στα ελληνικά, γίνονται από τα 24 γράμματα του αλφάβητου.



Picture A.6 Words are made up of letters

All the songs, all the music that you listen to, is made up of seven notes.

Picture A.7 Notes

In the same way, all the materials in the world are made up of atoms.

Remember!

You already know, from your biology class, that our bodies are made up of cells. Our body cells are also made up of atoms.

Activity:

Complete the following sentences by choosing the correct word from the ones in the box.:

different, atoms, same, atom, 115

1. The smallest part of a substance, i.e., the part that we can no longer cut into smaller pieces, is called an …….
2. The world is made up of materials, and these are made of ……
3. All the atoms are ……; they are not the ……..

4. There are …… different atoms in the world.

Discuss in your group

Break a very small piece from the tip of your pencil

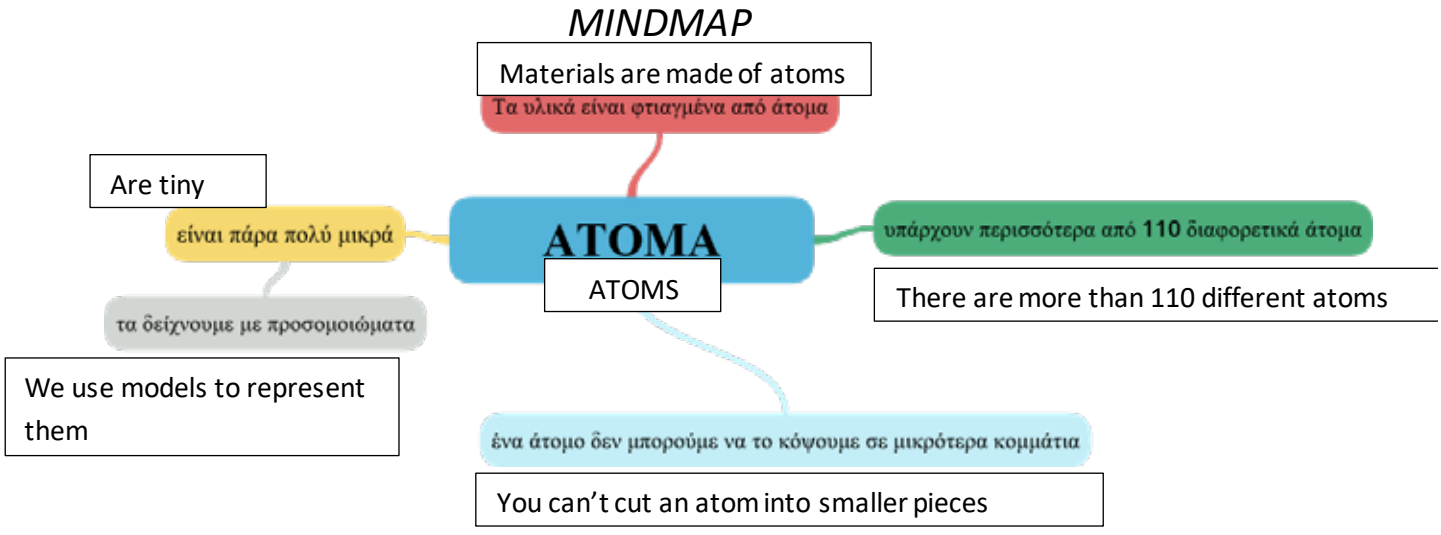
Picture A.8 Pencil tip

Discuss with your classmates: how many atoms do you think there are in this little piece?

a) about 10 atoms,
b) about 100 atoms,
c) about 1,000 atoms,
d) about 1,000,000 atoms
e) about 1.000.000.000 atoms.

Circle the answer that you think is correct.

Discuss your answer with your teacher.



In this unit we learned:

- What an atom is
- That all materials are made of atoms
- That 115 atoms exist
- That we use models to represent atoms

CHEMISTRY

Unit 3: Chemical elements

In this unit we will learn:

- What chemical elements are
- How many chemical elements exist
- What the atoms of a chemical element look like
- What the atoms of different chemical elements look like

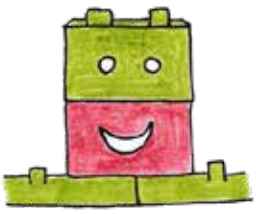
Picture C.E.1 Brick man

If you take this toy, a man that is made of bricks, you can take apart pieces of his body.

Picture C.E.2 A brick man's leg

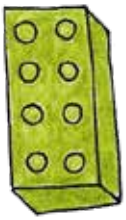
You can separate his leg, and you can also take apart the bricks that the leg is made.

Or you can separate his head, and take apart the two bricks that make it up.



Picture C.E.3 A brick man's head

But once you have taken every brick, you cannot divide it into something else, something *simpler*.



Picture C.E.4 A brick

You can break apart a brick toy, and look at each separate brick. We can do the same with most materials, that is, we can separate them into simpler substances. But there are some simple substances that we cannot divide any further. No matter how much we try, we will not be able to take a simpler substance out of them.

If you have a golden ring, you can get nothing out of it except gold, no matter how small pieces you cut it up into.

Picture C.E.5 A golden ring

Soda boxes are made of *aluminium* (some people also call it aluminum). You can cut this box into very many small pieces. But if you try to get another substance out of them, you won't be able to. You will only get aluminium.

Picture C.E.6 An aluminium orange juice container

These simple substances, which cannot be divided into something simpler, are called **chemical elements**. There are 115 different chemical elements. These chemical elements can combine in many ways.

The different bricks that you combined to make the brick man (Picture C.E.1), can also be combined in other ways. You can use them to build cars, planes, and many other toys. Chemical elements can also be combined in many ways to give is all the materials that the world is made of.

Like all other things, chemical elements are made of atoms.

- A chemical element is always made of the same type of atoms.
- Different chemical elements are mate of different types of atoms.

Imagine that you have a nail that is made of iron, and a sword that is also made of iron. Now, imagine that you can shrink to a very small size, so small that you can enter the nail and the sword and see their atoms. You will see that the iron atoms are exactly the same in both the nail and the sword. Even if you can travel in another planet where there is iron, the iron atoms there are the same as the iron atoms in the nail and the sword.

Picture C.E.7 iron nails

Picture C.E.8 An iron sword

But if you enter the nail and then enter the gold ring, you will see that the iron atoms and the gold atoms are not the same. They are different because iron and gold are *different chemical elements*.

Remember!

How do we represent the atoms of chemical elements?

In Unit 2, we said that atoms are tiny. To represent them, we draw them like small balls, which we call models. *Since there are115 chemical elements, we need to create 115 different balls to represent the atoms of all the elements.* We draw these balls large and small, and with different colours. We use such different balls to represent the oxygen atoms, carbon (coal) atoms, hydrogen atoms, nitrogen atoms, iron atoms, gold atoms, aluminium atoms, fluorine atoms and the atoms όλων των άλλων στοιχείων.

NOTE!

We use coloured balls to represent atoms, but this is not what they look like in reality. Atoms do not have a colour, and they do not look like balls.

We can therefore represent iron atoms and gold atoms like the ones below:

Iron atoms gold atoms

Picture C.E.9 Iron and gold atoms

Some chemical elements include:

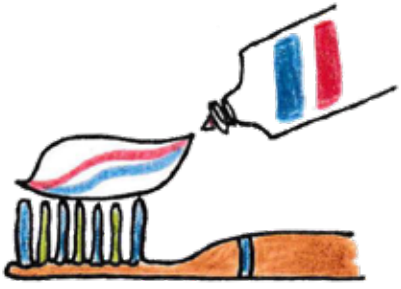
- The oxygen we breathe,
- The nitrogen in the atmosphere,
- The iron that nails are made of,
- The copper that wires are mate of,
- The mercury that we find in old thermometers,
- The helium that we use to fill up balloons,
- The gold that is used to make expensive rings,
- The calcium in our bones,
- The carbon in charcoal and the tip of your pencil,
- The fluorine in your toothpaste.

Picture C.E.10 Copper wires

Picture C.E.11 Mercury thermometer

Picture C.E.12 Helium balloons

Picture C.E.13 Burning coal



Picture C.E.14 Toothpaste

Activity:

Draw two atoms of gold, two atoms of iron and two atoms of copper. Make it clear in your drawing that these are atoms of three different elements.

Question:

There are 115 different chemical elements. How many different atoms do you think exist in the world?

a) 10
b) 1005
c) 115
d) 315

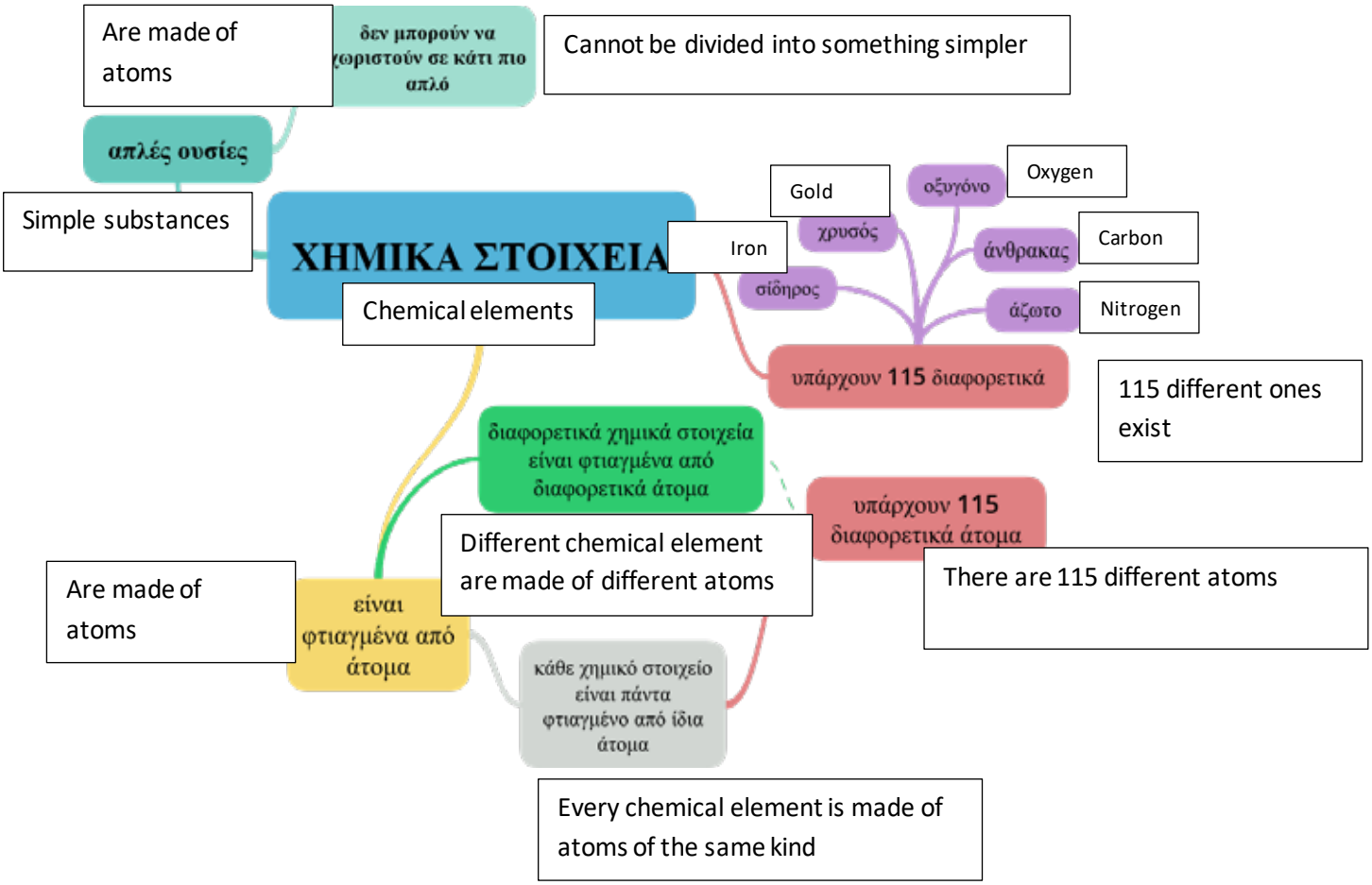
Circle the right answer.

Discuss your answer with your teacher.

Chemical elements cannot be separated into other, simpler elements. But we can cut and divide them into smaller pieces. These are their atoms.

As we've said, atoms cannot be cut into smaller pieces.

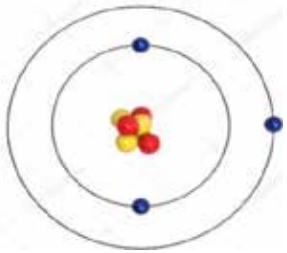
MINDMAP

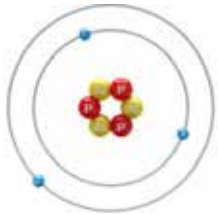


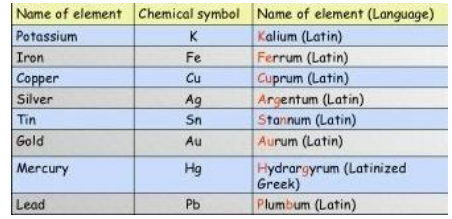
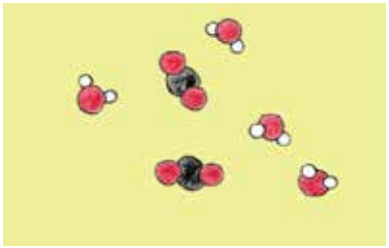
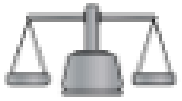
In this unit we learnt:

- What chemical elements are
- That all chemical elements are made of atoms
- That materials are made of chemical elements
- How many chemical elements there are in the world
- That the atoms of a chemical element are the same
- That the atoms of different elements differ

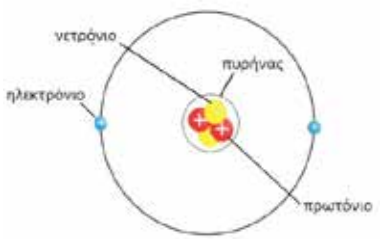
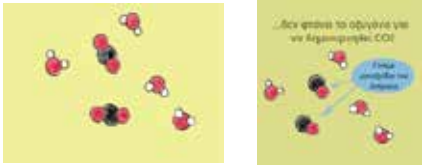
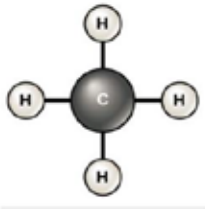
Chemistry Glossary

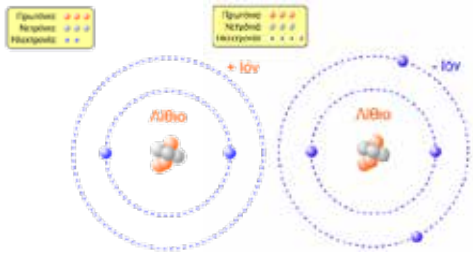
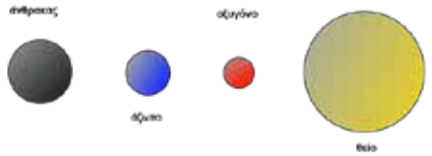
Scientific word in English	Scientific word in your language	Scientific word in Greek	What does it mean?	*What does it mean? (Written in the translation language)*	Example / picture
acidic		όξινος χαρακτήρας	All the acids: • Taste sour. • React with calcium salts and produce carbon dioxide (CO_2). • They react with many metals and produce hydrogen (H_2). • They change the colour of indicators.		 
acids		οξέα	Chemical compounds that produce hydrogen cations (H^+) when we place them in water.		
atom		άτομο	The smallest part of an element, which we cannot cut into smaller ones.		

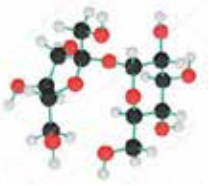
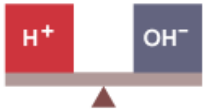
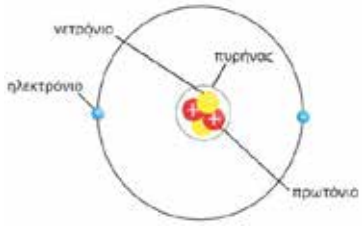
atomic number		**ατομικός αριθμός**	The number of protons in the nucleus of a chemical element. We show this using the letter Z.		
bases		**βάσεις**	Chemical compounds that produce hydroxide anions (OH^-) when we put them in water.		
basic		**βασικός χαρακτήρας**	All the bases: • Have a burning taste. • Have a soap-like feel. • Change the colour of indicators.		
chemical compound		**χημική ένωση**	A substance with a molecule that is made up of different atoms. There are millions of chemical compounds.		
chemical elements		**χημικά στοιχεία**	These are simple substances that we cannot divide in something simpler. The atoms that make up their molecules are all the same kind. There are 115 chemical elements.		

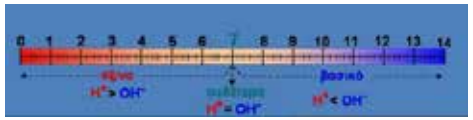
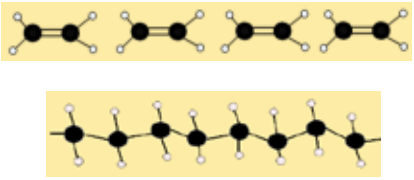
chemical reaction		**χημική αντίδραση**	This happens when we start with some substances and get new substances that didn't exist before.		
chemical symbol		**χημικό σύμβολο**	One or two letters that show a chemical element.		
combustion		**καύση**	When a substance reacts with oxygen and produces heat (warmth) and light (flame).		
complete combustion		**τέλεια καύση**	When there is enough oxygen during the combustion (burning) of a carbohydrate and the products we get are carbon dioxide and water.		
conservation of mass		**νόμος διατήρησης μάζας**	In a chemical reaction, products will weigh as much as reactants.		

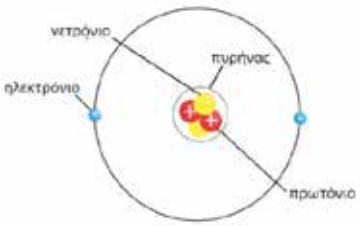
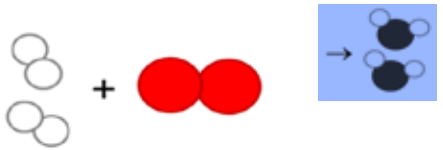
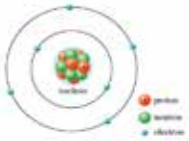
Name of element	Chemical symbol	Name of element (Language)
Potassium	K	Kalium (Latin)
Iron	Fe	Ferrum (Latin)
Copper	Cu	Cuprum (Latin)
Silver	Ag	Argentum (Latin)
Tin	Sn	Stannum (Latin)
Gold	Au	Aurum (Latin)
Mercury	Hg	Hydrargyrum (Latinized Greek)
Lead	Pb	Plumbum (Latin)

electron		**ηλεκτρόνιο**	Subatomic particle that orbits around an atom's nucleus. This has the smallest negative charge (-). (*picture on the right ->* *ηλεκτρόνιο: electron,* *νετρόνιο: neutron,* *πυρήνας: nucleus,* *πρωτόνιο: proton*)		
exhaust gas		**καυσαέρια**	The products of combustion (burning) (*picture on the right ->* *There is not enough oxygen to produce CO_2.* *We became carbon monoxide*)		
hydrocarbons		**υδρογονάνθρακες**	Chemical compounds whose molecules are made of carbon (C) and hydrogen (H) atoms.		
incomplete combustion		**ατελής καύση**	Combustion (burning) of a carbohydrate when there is not much oxygen. This produces carbon monoxide and smoke. (*picture on the right ->* *There is not enough oxygen to produce CO_2.* *We became carbon monoxide*)		

ion		**ιόν**	An atom that has lost or gained electrons. Ions are not electrically neutral. (*picture on the right -> Πρωτόνια: Protons, Νετρόνια: Neutrons, Ηλεκτρόνια: Electrons, Λίθιο: Lithium, Ιόν: Ion*)		
mass number		**μαζικός αριθμός**	We get the mass number if we add the protons and neutrons that exist in an atom's nucleus. We show this with the letter A.		
mixture		**μίγμα**	Something that is made of more than one material.		
model of atoms		**προσομοιώματα**	Small balls that show atoms. (*picture on the right -> άνθρακας: Carbon, άζωτο: Nitrogen, οξυγόνο: Oxygen, θείο: Sulphur*)		
molecular formula		**μοριακός τύπος**	The symbols of molecules in a chemical compound		H_2O molecular formula for water

molecule		**μόριο**	The smallest part of a substance that can exist free in the world and can be exactly the same as the substance from which we took it.		 Sugar molecule
neutral ph		**ουδέτερο ph**	This is ph with a value of 7. Pure water has ph=7. It is neutral.		
neutralization		**εξουδετέρωση**	A neutralization reaction happens when a base reacts with an acid. This produces water and a salt.		
neutron		**νετρόνιο**	A subatomic particle in an atom's nucleus. It has no electrical charge (*picture on the right -> ηλεκτρόνιο: electron, νετρόνιο: neutron, πυρήνας: nucleus, πρωτόνιο: proton*)		

periodic table		**περιοδικός πίνακας**	A table with all the chemical elements. It has 7 horizontal lines 18 vertical columns.		
ph scale		**κλίμακα ph**	It starts at 0 and ends at 14. We use it to count how strong an acid is and how string a base is. In a ph scale, acids are from 0 to 7. In a ph scale, bases are from 7 to 14. (*picture on the right ->* *όξινο: acidic,* *ουδέτερο: neutral,* *βασικό: basic*)		
polymerization		**πολυμερισμός**	Many small molecules bind with each other. They make a very large molecule, a macromolecule.		
products		**προϊόντα**	A substance or substances that comes out of a chemical reaction		

proton		**πρωτόνιο**	A subatomic particle in an atom's nucleus. It has the smallest positive charge (+). (*picture on the right -> ηλεκτρόνιο: electron, νετρόνιο: neutron, πυρήνας: nucleus, πρωτόνιο: proton*)		
pure substance		**καθαρή ουσία**	Something that is made of one material only.		
reactant(s)		**αντιδρώντα**	A substance or substances that exist before a chemical reaction.		
salts		**άλατα**	Chemical compounds that are formed together with water, in a neutralization reaction.		
subatomic particles		**υποατομικά σωματίδια**	An atom is made up of these. These are protons, neutrons, and electrons.		
substances		**υλικά**	Various things that make up the world.		

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Αυτή η έκδοση χρηματοδοτήθηκε από την Ευρωπαϊκή Ένωση. Το περιεχόμενό της εκφράζει τις απόψεις των συγγραφέων της και δεν μπορεί να θεωρηθεί ότι αντικατοπτρίζει την επίσημη θέση της Ευρωπαϊκής Ένωσης.