

PHYSICS AND CHEMISTRY 3º ESO Exercises in English

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UNIT 1: INTRODUCTION TO PHYSICS AND CHEMISTRY

1) FILL IN THE BLANKS

science, disciplines, synonymous, distinguish, modern-day, force, Revolution, understanding, time, weapons, appliances, However, behaves

Physics is a natural that involves the study of matter and its motion through space and, as well as all related concepts, including energy and More broadly, it is the general analysis of nature, conducted in order to understand how the universe

Physics is one of the oldest academic, perhaps the oldest through its inclusion of astronomy. Over the last two millennia, physics had been considered with philosophy, chemistry, and certain branches of mathematics and biology, but during the Scientific in the 16th century, it emerged to become a unique modern science in its own right., in some subject areas as in mathematical physics and quantum chemistry, the boundaries of physics remain difficult to

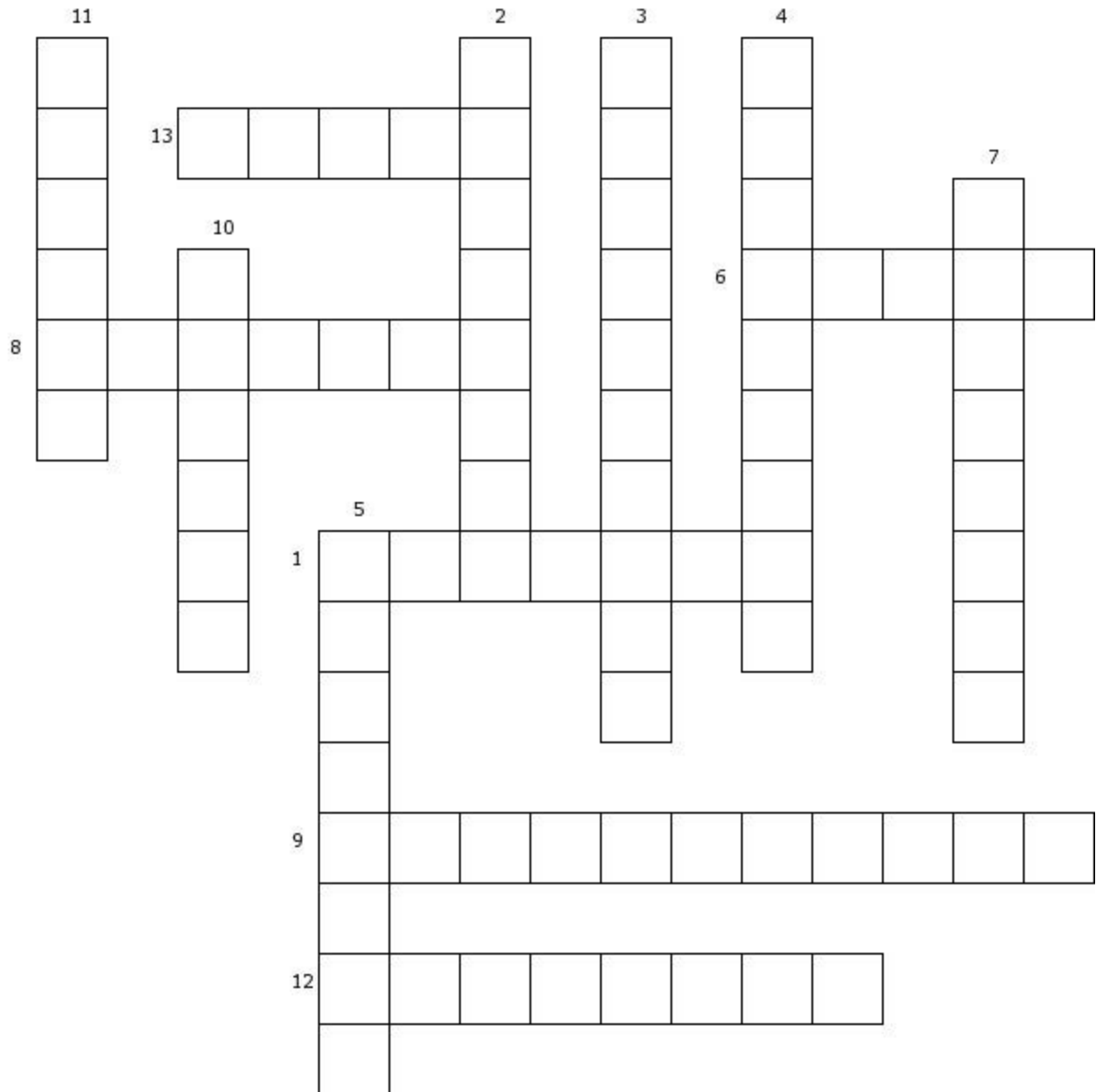
Physics is both significant and influential, in part because advances in its have often translated into new technologies, but also because new ideas in physics often resonate with other sciences, mathematics, and philosophy. For example, advances in the understanding of electromagnetism or nuclear physics led directly to the development of new products which have dramatically transformed society, such as television, computers, domestic, and nuclear; advances in thermodynamics led to the development of motorized transport; and advances in mechanics inspired the development of calculus.

2) THE RIGHT OPTION

Chemistry is the science of matter and the changes it **undergoes / suffers**. The science of matter is also **known / addressed** by physics, but while physics takes a more general and fundamental **approach / approximation**, chemistry is more specialized, being **set / concerned** with the composition, behavior, structure, and properties of **energy / matter**, as well as the changes it undergoes during **chemistry / chemical** reactions. It is a physical science which studies of various atoms, molecules, crystals and other **aggregated / aggregates** of matter whether in isolation or combination, which incorporates the concepts of energy and entropy in relation to the spontaneity of chemical processes.

The branches of Chemistry are: analytical chemistry (the study of **material samples / matter portions** to obtain their compositions), organic chemistry (**carbon / silicon** based compounds), inorganic chemistry (noncarbon based compounds), biochemistry (the study of substances found in biological **animals / organisms**), physical chemistry (the study of atoms and chemical systems from a physical point of **watching / view**) and industrial chemistry (the manufacturing of chemicals in a big scale). Many more specialized **disciplines / studies** have emerged in recent years, e.g. neurochemistry the chemical study of the nervous system.

3) CROSSWORDS



Write in English:

- 1) FÍSICA
- 2) PROPIEDADES
- 3) CONVERSIÓN
- 4) CIENTÍFICO (N.)
- 5) PRESIÓN
- 6) ERROR
- 7) NOTACIÓN
- 8) MEDIR
- 9) SIGNIFICATIVA
- 10) MATERIA
- 11) VOLUMEN
- 12) INVESTIGACIÓN
- 13) POTENCIA

4) COLUMNS

Match both columns:

A	Phenomenon	H	A suggested explanation for something that has not been proved
B	Property	I	The physical substances that exist in the universe
C	Measurement	J	A quality of something
D	Error	K	An idea that is intended to explain something
E	Hypothesis	L	Something that exists or happens
F	Matter	M	The process of measuring
G	Theory	N	Mistake

5) PHRASE ORDER

Arrange these sentences:

a) tries and Science make predictions explanations. to give

.....

b) a rearrange. reaction, atoms chemical In

.....

c) and are Einstein's mass related Energy through equation.

.....

d) devices. to research leads technological scientific The

.....

e) don't and Earth fall on Satellites they high because quickly. the orbit

.....

6) QUESTIONS

a) Write two physical phenomena and two chemical phenomena.

b) Write the name of seven measuring instruments.

c) Write ten objects which use scientific principles.

UNIT 2: MATTER

1) FILL IN THE BLANKS

vacuum work means random molecules collide container mass behaviour phases
portion empty charged kinetic neutral volume commonly plasma

The Universe is made of matter, energy and Matter is anything which has and occupies a, energy is the ability to do a and vacuum is a volume of space that is of matter.

Matter is said to exist in four states or: solid, liquid, gas and Plasma is a state of matter similar to gas in which a certain of the particles is ionized. Ionized means electrically, e.g. with more or with less electrons than a atom.

The theory tries to give an explanation of the of a gas by of the motion of particles, that is atoms and The moving particles with each other and with the walls of the

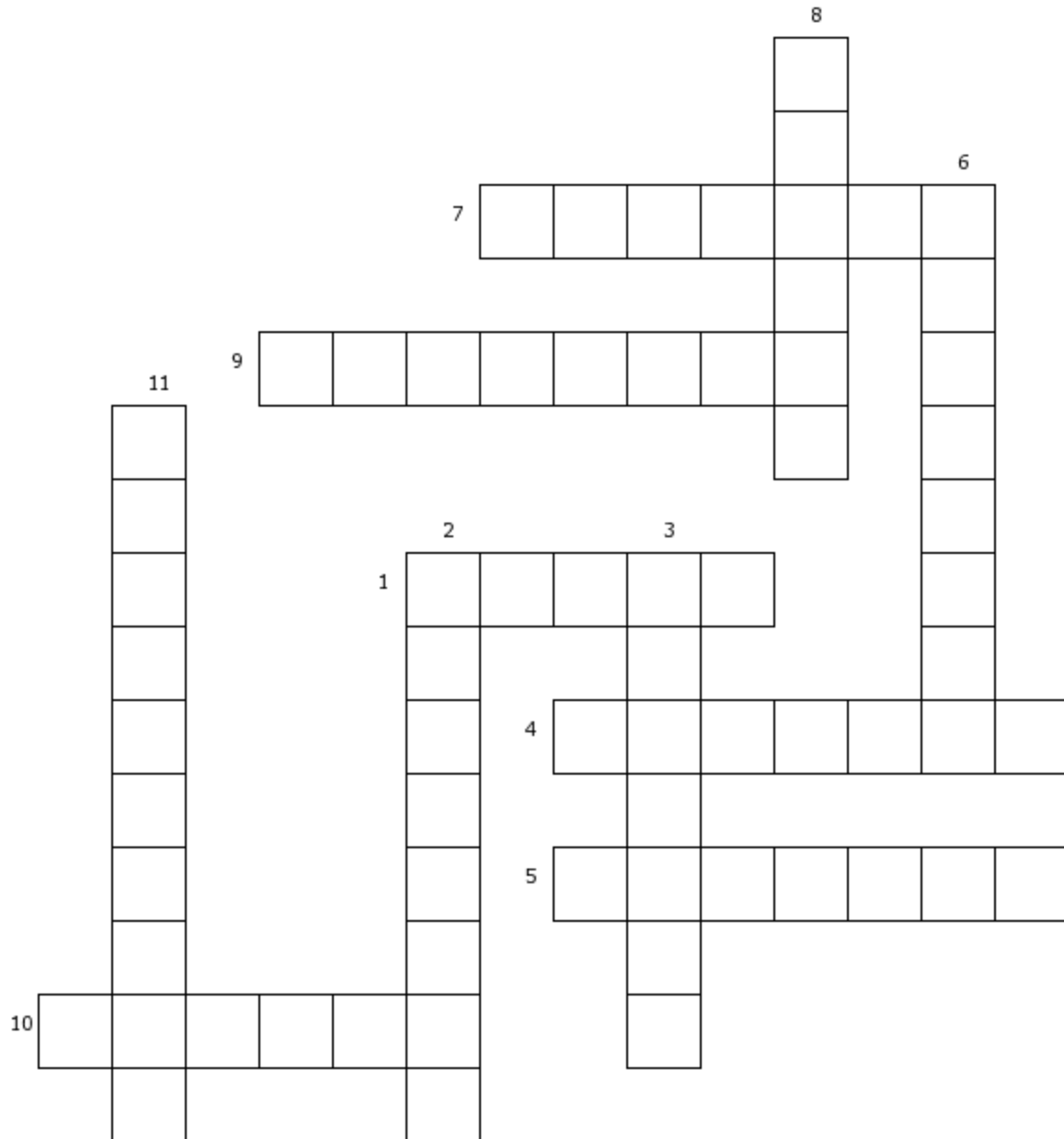
2) THE RIGHT OPTION

A phase transition is the **transformation / transforming** of one **state / estate** of matter to another. It is typical a change in some variables and the **constancy / constance** of others, mainly the temperature. Solid, liquid and gas may **coexist / to coexist** in the so called triple point. At that point, it is possible to change the **sustance / substance** to ice, liquid water, or water vapour by making small changes in **presure / pressure** and temperature.

Vapor pressure is the pressure of a vapour in **thermodynamic / termodinamic** equilibrium with its liquid. **At / In** reaching the boiling point, bubbles formed in the inside of the liquid are not air but the liquid substance which has **converted / transformed** into vapour. When the gas in touch with a liquid inside a closed container is expelled, the liquid evaporates instantaneously. That is what is called a flash evaporation.

In astronomy and cosmology, dark matter is matter that **nor / neither** emits **nor / neither** scatters light or other electromagnetic radiation, and so cannot be directly **ponderated / detected**. Dark matter is **hoped / believed** to constitute 83% of the matter in the universe. One **hypothesis / hypotesis** is that dark matter is made of neutrinos, an electrically neutral tiny particle.

3) CROSSWORDS



Write in English:

1) FUERZA

3) ENFRIAMIENTO

5) MEZCLA

7) CINÉTICA (ADJ.)

9) PRESIÓN

11) SUBLIMACIÓN INVERSA

2) SOLIDIFICACIÓN

4) COLISIONAR

6) COMPUESTO

8) MATERIA

10) MOVIMIENTO

4) COLUMNS

Match both columns:

A	Evaporation	H	Any change from liquid to gas
B	Viscosity	I	Consequence of the collision between molecules
C	Temperature	J	It happens at 37 °C, for instance
D	Expansibility	K	Liquids do not have it
E	Vaporization	L	Consequence of the motion of molecules
F	Pressure	M	It does not happen at 50 °C, for instance
G	Boiling	N	Some liquids cannot flow because of this

5) PHRASE ORDER

Arrange these sentences:

a) a to internal describes fluid's Viscosity resistance flow.

.....

b) A to the container. a able and liquid shape of flow take is

.....

c) The is of a thermal kinetic energy system's energy particles. the

.....

d) is the an in expansion response increase to temperature. Thermal

.....

e) A of is method. change also purification state a

.....

6) QUESTIONS

a) Try to explain briefly the water cycle.

b) Why do liquids have surface and gas do not?

c) Why do foods last longer when they are frozen?

UNIT 3: SOLUTIONS

1) FILL IN THE BLANKS

dispersed shaving flour immiscible micrometer physical undisturbed mayonnaise confused
solvent look creating settle consists jelly

Solutions and dissolutions must not be Solution is a mixture of solute and while dissolution is the process of a solution. The solution has the same state as the solvent.

There are some liquid mixtures that like solutions but are not: colloids, suspensions and emulsions are not considered solutions.

A colloid of a substance from 5 to 200 nanometers in another substance. Examples: blood, milk, and cream.

A suspension is a mixture in which the solute is larger than one The suspended particles will over time if left Examples: sand in water, in water, dust in air and andalusian gazpacho.

An emulsion is a mixture of two or more liquids that are normally Examples:, vinaigrette and homogenized milk.

2) THE RIGHT OPTION

Homogeneous / Homogenous means that the components of the mixture form a single phase. Heterogeneous means **which / that** the components of the mixture form two or more **phases / faces**.

A **dissolution / solution** has the same chemical properties **than / as** its components but different **physical / phisical** properties. Example: pure water's density is not the same **as / than** salt water's.

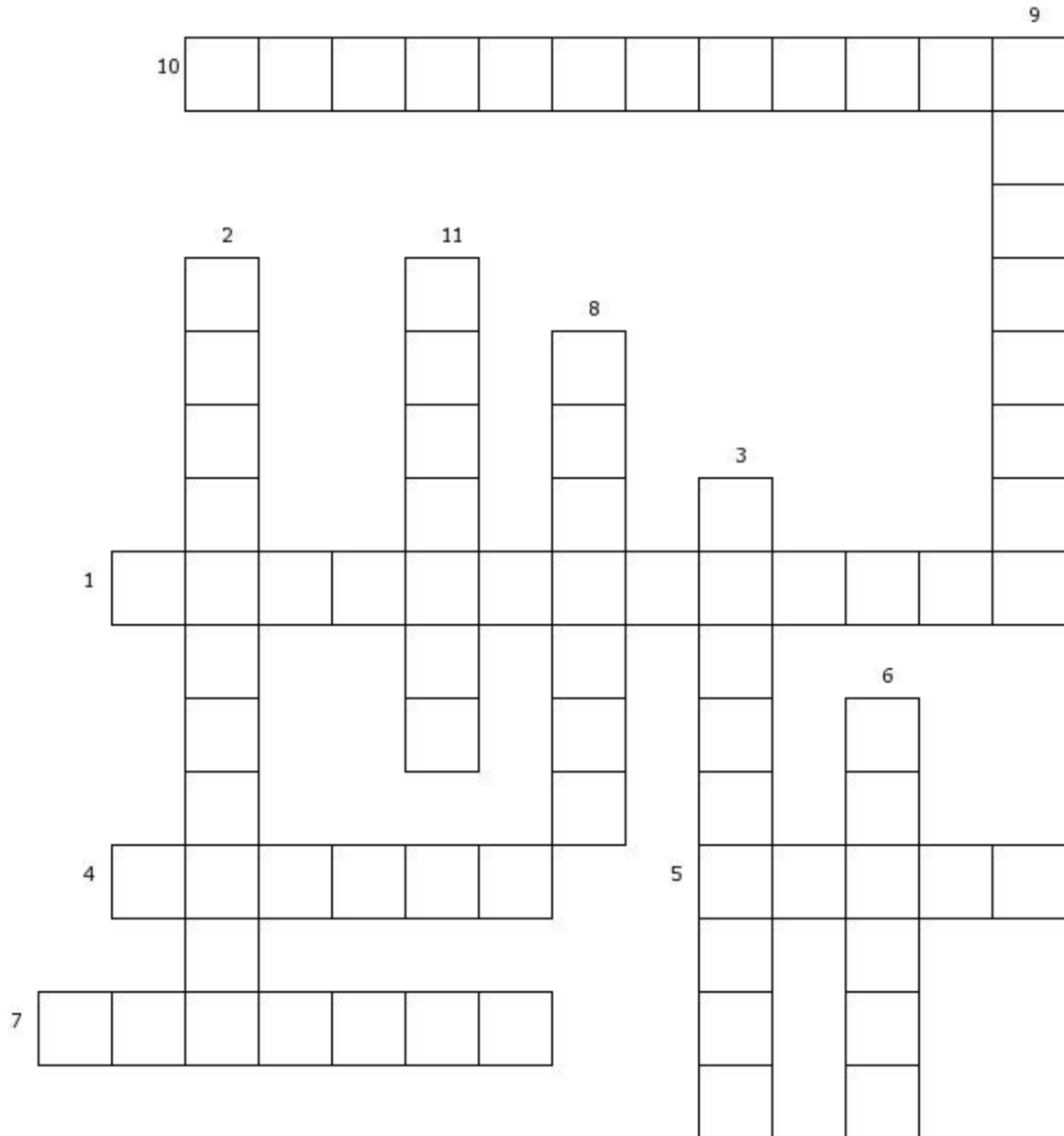
When a substance is **diluted / dissolved**, there is a breakdown of the crystal **lattice / network** into ions, atoms or molecules.

In the process of **solving / dissolution**, energy may be absorbed or **emited / released**. Externally, this means an increase or a decrease in temperature.

Solutions are very useful in **chemistry / chemical** reactions for several reasons:

a) Reactants are usually **cheap / expensive**. b) In a liquid phase the contact area between the reactants is higher and the reaction **makes / takes** place better. c) If the reaction is violent, solutions prevent **spitting / splashing**.

3) CROSSWORDS



Write in English:

1) CONCENTRACIÓN

3) SATURADO

5) ALEACIÓN

7) DENSIDAD

9) DILUCIÓN

11) DISOLVENTE

2) DISOLUCIÓN (PROCESO)

4) DILUIDO

6) SOLUTO

8) MEZCLA

10) CONCENTRADO

4) COLUMNS

Match both columns:

A	Solution	H	Maximum concentration solution
B	Dissolution	I	Low concentration solution
C	Dilution	J	Mixture of solute and solvent
D	Solvent	K	Homogeneous mixture of molecules
E	Saturated	L	Addition of solvent
F	Dilute	M	High concentration solution
G	Concentrated	N	Component in higher concentration

5) PHRASE ORDER

Arrange these sentences:

a) in in liquids. cannot all, solve much All gases

.....

b) A is of forces. because electrostatic dissolved substance

.....

c) of the by of the solvent. are solute surrounded molecules molecules the The

.....

d) is of a in a solution. the formation Precipitation solid

.....

e) An is and metal. amalgam substance mercury another formed a with

.....

6) QUESTIONS

a) Write the name of ten solutions near you.

b) What would you do if you were alone in a dessert island and you had no fresh water?

c) What about energy in a dissolution?

UNIT 4: THE ATOM

1) FILL IN THE BLANKS

excess tunnelling located bigger neutral ion uncuttable basic deficiency levels
positively dense equal further Otherwise cloud bound Likewise

The atom is a unit of matter that consists of a central nucleus surrounded by a of negatively charged electrons. The atomic nucleus contains a mix of charged protons and electrically neutrons.. The electrons of an atom are to the nucleus by electromagnetic forces., a group of atoms can remain bound to each other, forming a molecule.

A positively or negatively charged atom is known as an An atom containing an number of protons and electrons is electrically neutral. it has a positive charge or a negative charge . If there are fewer electrons (electron), the charge is positive. If there are more electrons (electron), the charge is negative.

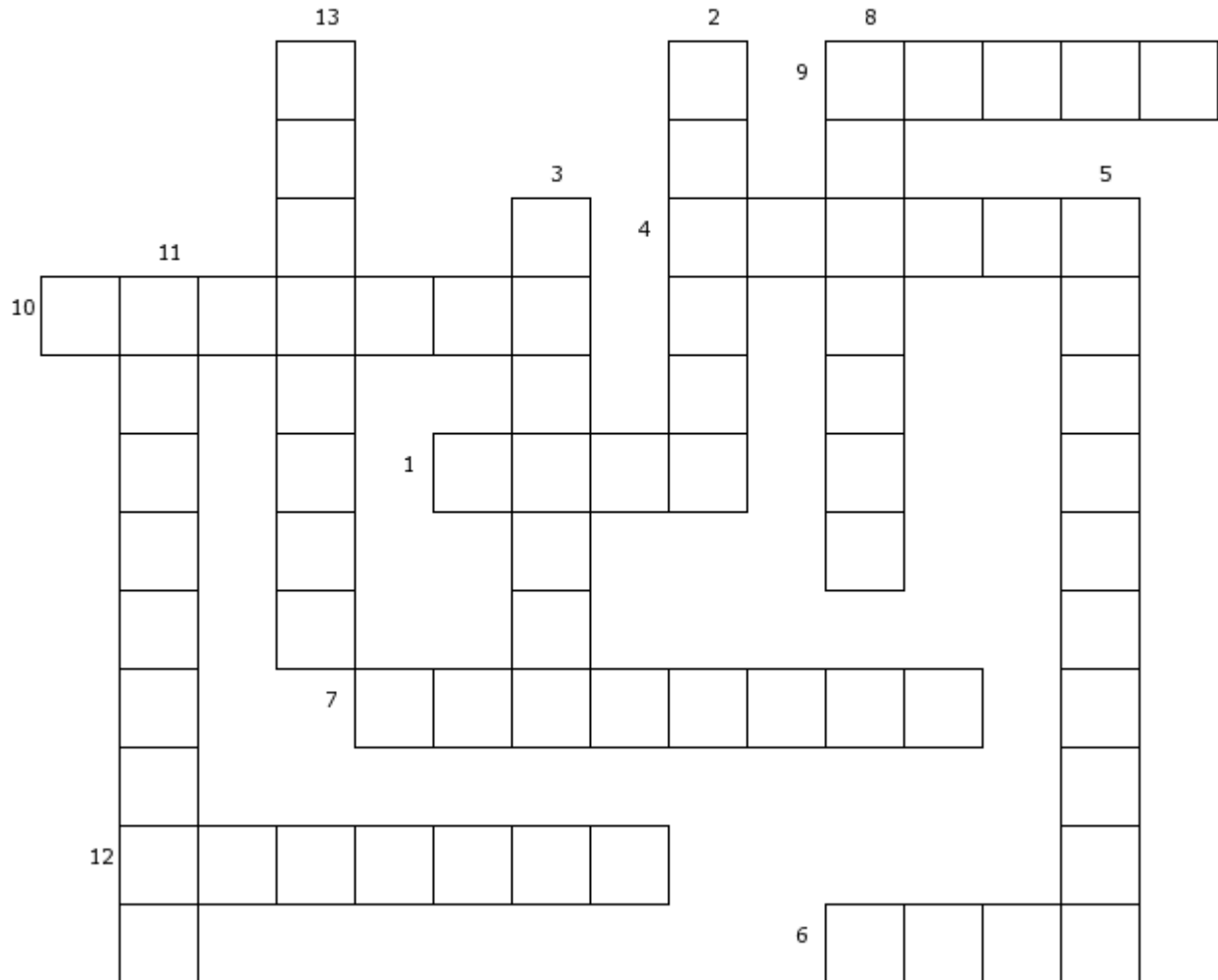
The word atom means, or indivisible, something that cannot be divided Atoms can only be observed individually using special instruments such as the scanning microscope, which is a device for viewing surfaces at the atomic level.

Electrons in the atom are not anyway, they are occupying what is called energy The the distance to the nucleus, the bigger the energy level.

2) THE RIGHT OPTION

Radioactivity, also called radioactive **falling / decay**, is the process by which an atomic **nucleus / nucleous** of an unstable atom **loses / looses** energy by emitting ionizing particles. The process may be an **artificial / artifitial** or a natural process. Radioactive decay is a random process at the **layer / level** of single atoms. The decay, or loss of energy, results when an atom with one type of nucleus (the parent) transforms to an atom with a nucleus in a different **estate / state**, or a different nucleus (the **daughter / son**). Often the parent and **daughter / son** are different chemical elements, and **that / in** such cases the decay process results in nuclear **transmutation / mutation**. The SI unit of activity is the becquerel (Bq). Radioactivity was first **discovered / discovered** in the **19th / 20th** century by the **French / British** scientist Henri Becquerel, while working on **phosphorescent / fosforescent** materials. He wrapped a photographic plate in black paper and placed various salts on it. All results were negative **until / when** he used uranium salts, which yielded the **blackening / blacking** of the plate. At first it **looked / seemed** that the new radiation was similar to the **then / them** recently-discovered **X-rays / rays-X**, but it is a **significantly / significanty** more complicated kind of radiation. There are three types of decay: alpha, beta and gamma decay depending **of / on** the nature of the emitted particles. Acute **effects / efects** of radiation were first observed in the use of X-rays. The **genetic / genetical** effects of radiation, including the effect **of / on** cancer risk, were recognized much later. Some uses of radioactive isotopes are: nuclear combustible in nuclear plants and in atomic bombs, **archaeological / archeological** dating (the C-14 test), food irradiation to make it safer to eat, radioactive tracers in **scientific / scientifical** experiments, industrial applications and medical uses (diagnostic **tecniques / techniques**, radionuclide therapy and biochemical **analysis / analisis**).

3) CROSSWORDS



Write in English:

1) ÁTOMO

3) NEUTRO

5) ELEMENTAL

7) MOLÉCULA

9) CORTEZA

11) ENUNCIADO

13) PARTÍCULA

2) VACÍO

4) CARGA

6) MUY PEQUEÑO

8) ESPARCIR

10) ISÓTOPO

12) NÚCLEO

4) COLUMNS

Match both columns:

A	Isotopes	H	The atom is losing energy and subatomic particles
B	Molecule	I	Pure chemical substance
C	Shell	J	The atom has gained or lost electrons
D	Element	K	Uncuttable for the Greek
E	Atom	L	The atoms joined
F	Radioactive	M	Equal number of protons and different number of neutrons
G	Ion	N	The external part of the atom

5) PHRASE ORDER

Arrange these sentences:

a) Physics, is by the atom modern-day Quantum In studied Mechanics.

.....

b) cannot Atoms be by optical microscopes. observed

.....

c) the is heavy, be the nucleus may radioactive. atom too If

.....

d) A up and collide. accelerator speeds particles make them particle subatomic

.....

e) a is the reaction each chain, In another product reactant of reaction.

.....

6) QUESTIONS

a) Are you in favor of nuclear plants? Why or why not?

b) What's the use of a particle accelerator?

c) What's your opinion about having or not atomic bombs?

UNIT 5: PERIODIC TABLE AND CHEMICAL BOND

1) FILL IN THE BLANKS

location shell trend synthetic also Most organized same credit ability given exhibit
chemist attempts primary on increasing configuration display current

The periodic table of the chemical elements is known as the periodic table or periodic table of the elements. It is a tabular of the 118 known chemical elements by certain properties of their atomic structures. The of the periodic table is given to Russian Dmitri Mendeleev, although there were previous of classification and scientists working it. The main value of the periodic table is the to predict the chemical properties of an element based on its on the table. Elements are listed in order of atomic number of these elements are found naturally on the Earth and only 24 are, that is to say produced by human technology. The factor of an element's chemical properties is its electron, particularly the valence electrons. A element has one more electron than the previous element in the period. In some groups, the elements have very similar properties and a clear in properties down the group.

2) THE RIGHT OPTION

A chemical **bond / union** is an **attraction / attraction** between atoms that allows the formation of chemical **sustances / substances**. The strength of chemical bonds **changes / varies** considerably; there are strong bonds such as covalent or ionic bonds and weak bonds such as Van der Waals forces and hydrogen bonding. This attraction may be seen as the result of different behaviors of the **outermost / outer** electrons of atoms.

Covalent bonding **involves / implies** sharing of **pairs / couples** of electrons in which the positively **loaded / charged** nuclei of two or more atoms simultaneously attract the negatively **charged / loaded** electrons that are being shared between them.

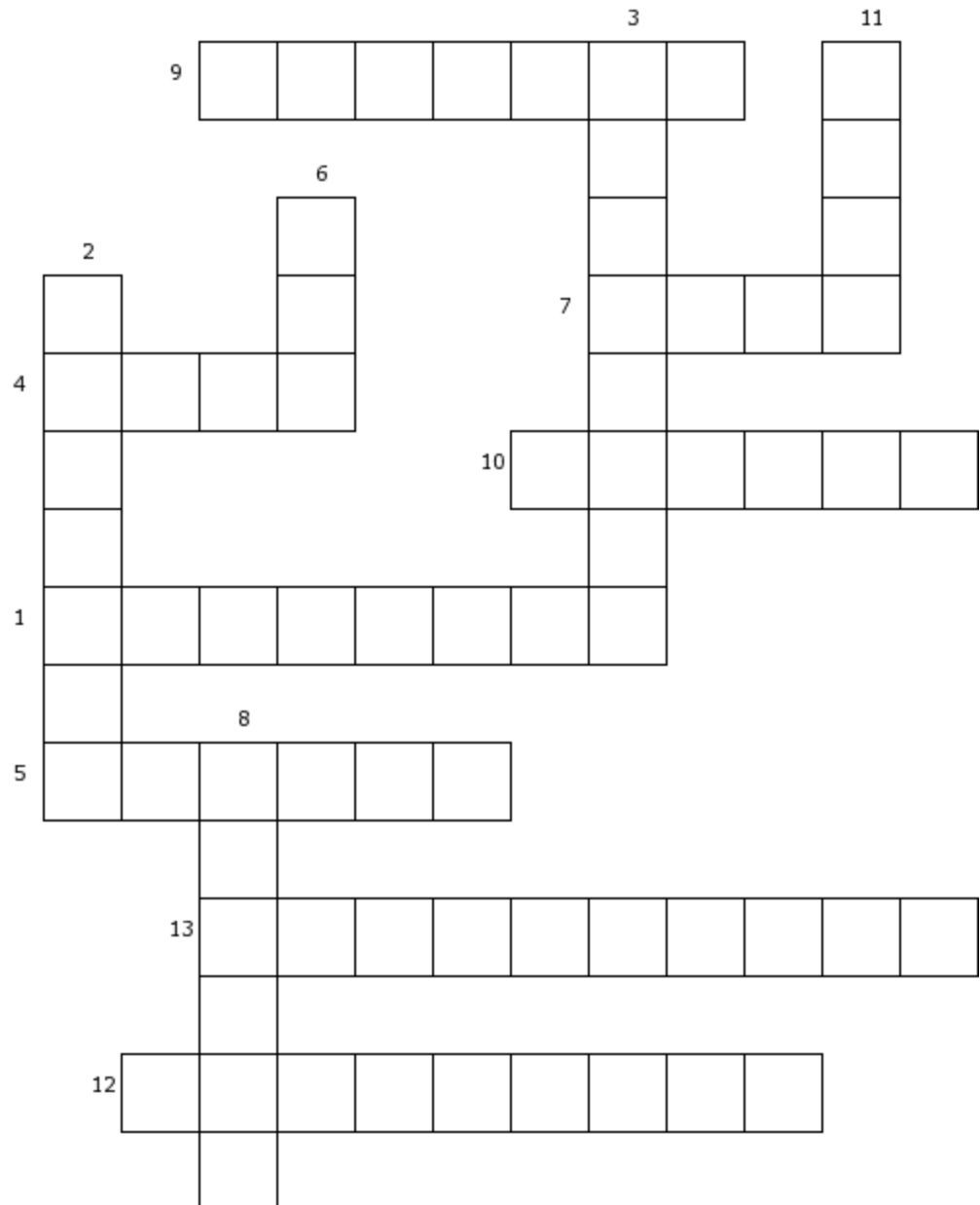
The fact that atoms and molecules are three-dimensional makes **up / it** difficult to use a **single / simple** technique for indicating **orbitals / orbits** and bonds. An **orbital / orbit** is the area of the **space / espace** where the electron is **walking / turning** round.

A hydrogen bond is the **attractive / repulsive** interaction of **a / an** hydrogen atom with an electronegative atom, such as **nytrogen / nitrogen**, oxygen or fluorine. Electronegative means that **that / which** element has a great **tendency / tendence** to attract the electrons of a chemical bond.

Intermolecular / Intramolecular hydrogen bonding is **responsable / responsible** for the high **boiling / evaporating** point of water in comparison with other similar compounds.

The **spacial / special** arrange of atoms in three dimensions is called crystal **network / lattice**. The science which studies the **arrange / arrangement** of atoms in solids is **cristallography / crystallography**.

3) CROSSWORDS



Write in English:

1) CROMO

2) SILICIO

3) TALIO

4) HIERRO

5) NÍQUEL

6) ESTAÑO

7) PLOMO

8) COBRE

9) BISMUTO

10) PLATA

11) ORO

12) BERILIO

13) FÓSFORO

4) COLUMNS

Match both columns:

A	Covalent	H	Vertical column
B	Period	I	There is a cloud orbiting all the atoms
C	Electron	J	Electrostatic attraction
D	Metallic	K	Shared pairs of electrons
E	Van der Waals	L	The main actor in chemical bonds
F	Group	M	Horizontal row
G	Ionic	N	Weak attractions

5) PHRASE ORDER

Arrange these sentences:

a) on the on the the are or table, Depending properties ones others. location

.....

b) bond. is strongest bond chemical Covalent the

.....

c) is the in its hardest because Diamond covalent substance bond. world the of

.....

d) an its substance lattice When down. ionic crystal dissolved, is breaks

.....

e) did the all first already table elements. The not have discovered periodic

.....

6) QUESTIONS

a) Identify chemical elements around you: your house, your school, the streets...

b) What's the use of iron.

c) What's the use of lead.

UNIT 6: FORMULATION AND NOMENCLATURE

1) FILL IN THE BLANKS

needles balloons microprocessors combustions research panels crowns halogen
treatment photovoltaic purification race oxidation matches cutlery paste coins
dispensers nails screens safes batteries bulb diving jewellery wires combustible
nuclear pencils repeaters thermometers bulbs rackets razors

Some uses of the elements are as follows:

Hydrogen is a for rockets, helium is used in for kids, lithium in alloys for the space industry, beryllium in little springs in watches, boron for tennis, carbon for, nitrogen in cryogenic surgery, oxygen in and in gas cylinders for scuba, fluorine in teeth, neon in neon lights, sodium in street lights, magnesium in bicycles, aluminium in light alloys, silicon in in computers, phosphorus in, sulphur in liquid for hair perm, chlorine in water, argon in light, potassium in fertilizers, calcium in plaster, scandium in materials for the space industry, titanium in for bone surgery, vanadium in tools, chromium to prevent metal oxidation, manganese in, iron in nails and tools, cobalt in shaving, nickel in, copper in, zinc to prevent in metals, gallium in some thermometers, germanium in lenses, arsenic in pellets, selenium in electricity meters, bromine in films, krypton in flash lights in cameras, rubidium in photoelectric cells, strontium in fireworks, yttrium in color TV, zirconium in bullets, niobium in magnets, molybdenum in engines for rockets, technetium as radioactive source in medical, ruthenium in eyes, rhodium in telephone, palladium in teeth, silver in, cadmium in screw plating, indium in solar, tin in tubes for musical organs, antimony in cash, tellurium in rubber vulcanization, iodine in lamps, xenon in projectors, caesium in cells, barium in spark plugs, lanthanum in lenses for cameras, hafnium in submarines, tantalum in electronic condensers, tungsten in filaments for lights, rhenium in electrodes, osmium in fountain pens, iridium in hypodermic, platinum in crucibles (a type of laboratory containers), gold in, mercury in barometers and, thallium in insecticides, lead in car, bismuth in sprinklers and an endless number of applications...

2) THE RIGHT OPTION

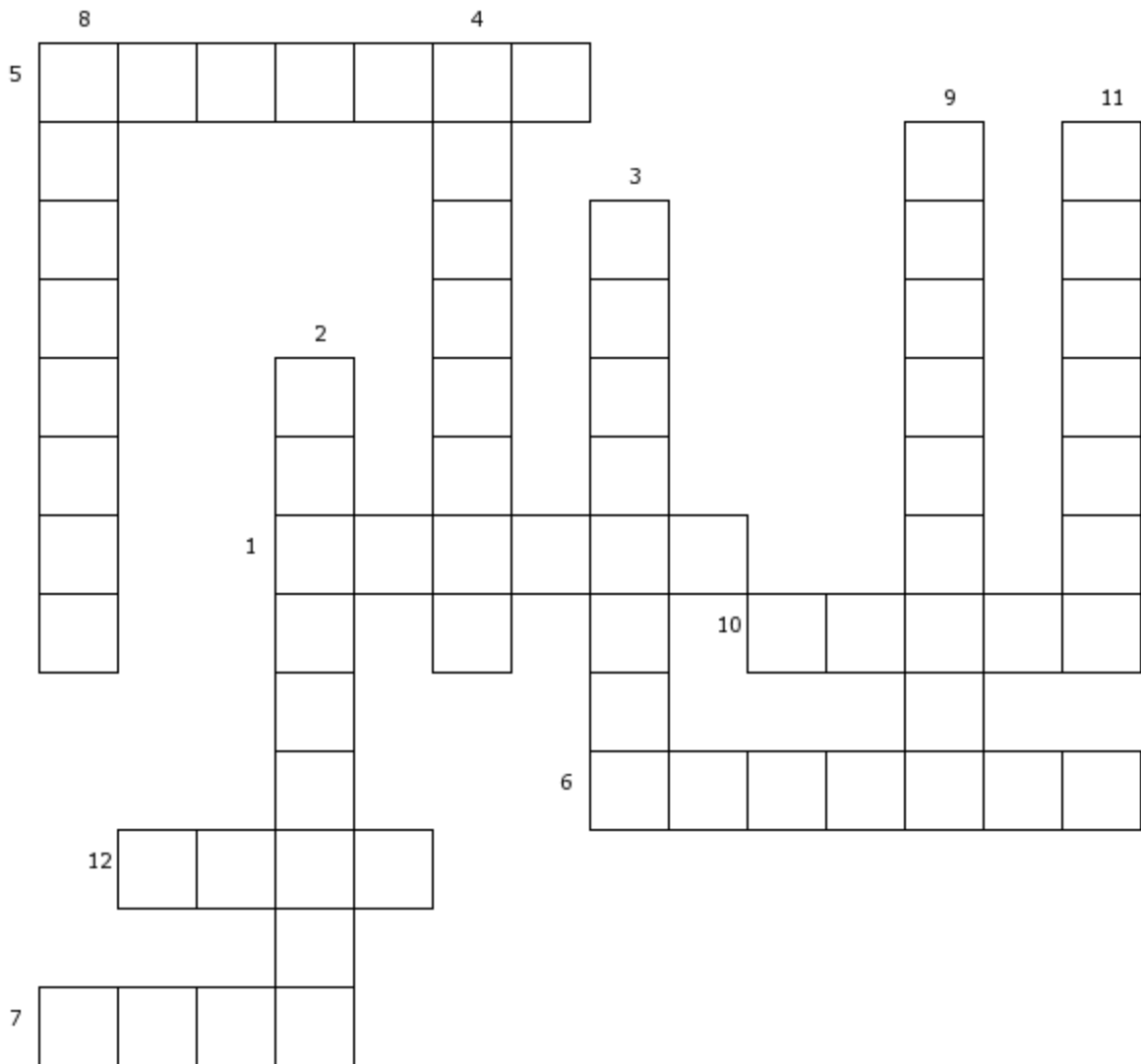
There are **thousand / millions** of chemical substances. They can be classified into: elements, compounds, homogeneous mixtures and heterogeneous mixtures.

Another classification is based **in / on** their composition and, considering this, substances may be organic compounds (**silicon / carbon** based) or inorganic compounds (**non-silicon / non-carbon** based). Though there are some five elements in organic compounds and **beyond / over** one hundred elements in inorganic chemistry, the difference between the number of both kinds of compounds is huge: half a million for inorganic ones and over ten millions for organic ones. This great difference is **done / due** to the fact that the atom of carbon is able to join to other atoms of carbon forming long **carbonated / carbonate** chains. This **feature / characteristic** is unique in carbon and only two or three elements more have a similar but not equal **characteristic / characteristic**.

Both organic and inorganic compounds are surrounding us but organic ones are **ubiquous / predominant**: plastics, wood, clothes, combustibles, fabrics... Even ourselves are made of organic substances: proteins, sugars, **oils / fats**, vitamins and nucleic acids.

There are some clear differences between both types of compounds: organic compounds have low **frozen / freezing** and **boiling / boiled** points and density, they are soft, they are usually liquids or gases and **burnable / flammable**.

3) CROSSWORDS



Write in English:

1) BINARIO

3) FLUORURO

5) VALENCIA

7) SAL

9) HIDRÓXIDO

11) HIDRURO

2) SUBÍNDICE

4) COMPUESTO

6) ELEMENTO

8) VOLÁTIL

10) ÓXIDO

12) ÁCIDO

4) COLUMNS

Match both columns:

A	Nitrogen	H	The basis of the organic compounds
B	Hydrogen	I	Needed to create a electrical current in nerves
C	Tin	J	The most abundant element in the air
D	Silver	K	Oxidation preservation
E	Sodium	L	The second most abundant element in the air
F	Carbon	M	The smallest element
G	Oxygen	N	The best electricity conductor

5) PHRASE ORDER

Arrange these sentences:

a) is no used. almost traditional The longer nomenclature

.....

b) be in cation written formula. first must The the

.....

c) Subscript valence be and must confused. not

.....

d) of exchanged. the must valences elements The be

.....

e) are elements found usually Rare Earth. on together

.....

6) QUESTIONS

a) Why do you think formulas are needed in Chemistry?

b) Explain how the densest materials are in the Earth's core.

c) What are the elements present in the air, the water and the soil?

UNIT 7: CHEMICAL REACTIONS

1) FILL IN THE BLANKS

like as products either role help disposition reactants release dissolving input heat
metallic bonds conditions solution state involve

A chemical reaction is the process in which some chemical substances (the) change their molecular and atomic and transform into other chemical substances (the). This evolution from the initial to the final also means an absorption or a of energy.

Reactions can be spontaneous or non-spontaneous, depending on the In the first case, the reaction occurs without any external In the second case, the reaction needs an of energy to take place, mainly in the form of, light or electricity.

In an atomic level, chemical reactions the breaking of some chemical and the formation of new ones. The particles which play the main in chemical reactions are the electrons, because they are the ones which form chemical bonds: covalent, ionic or

Some dissolutions look chemical reactions but they are not. They have some indications similar to reactions, like energy release but there is no chemical transformation but physical dissolution is a physical process. Remember that dissolution is a synonym of and is a synonym of molecular heterogeneous mixture.

2) THE RIGHT OPTION

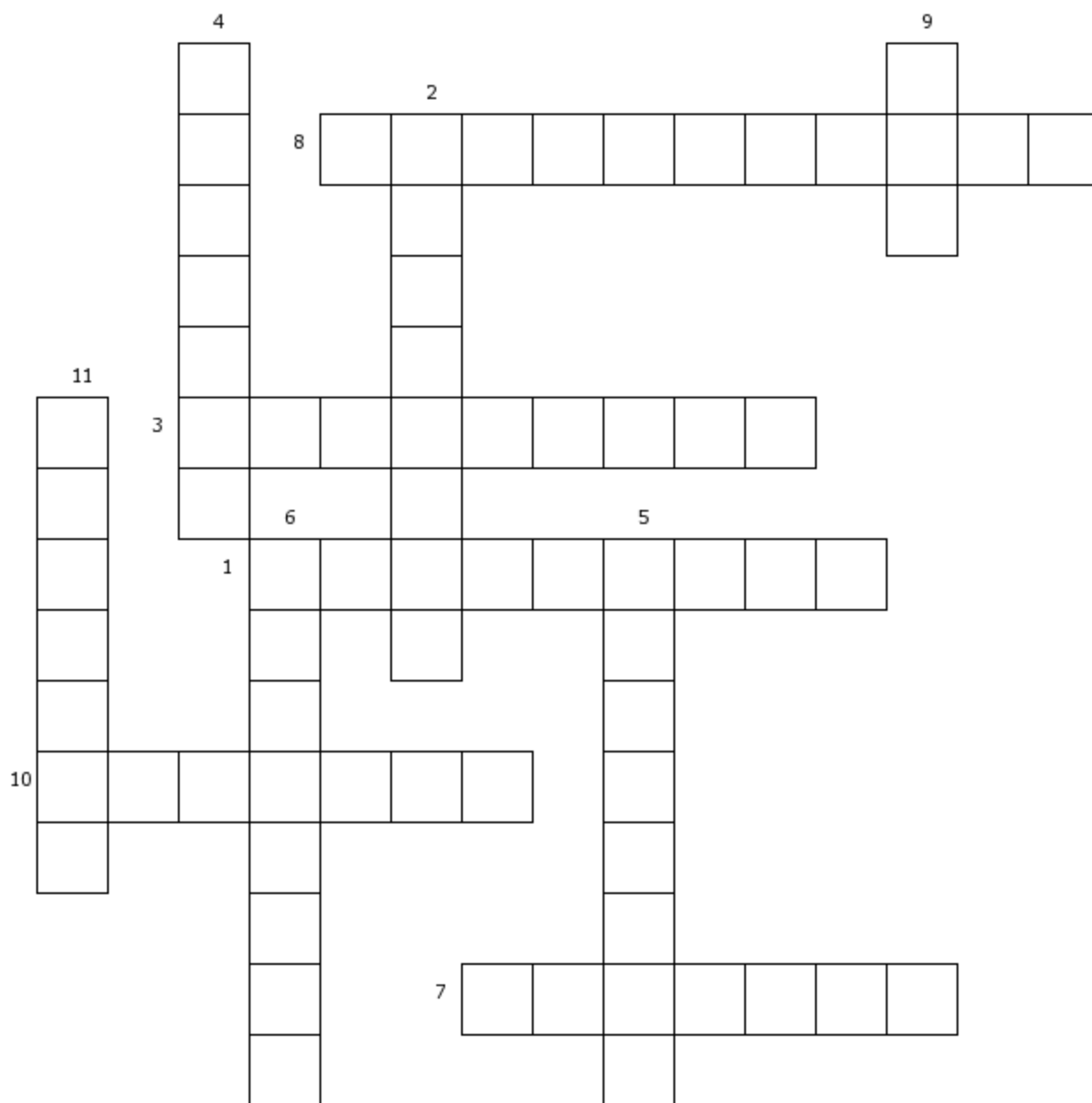
There are chemical reactions all around **we / us** and even inside **ours / us**. Outside us: the oxidation of a nail or a ship, the **fotosynthesis / photosynthesis** (obtaining oxygen from carbon dioxide, water and solar beams), bread toasting for breakfast, **bateries / batteries** working, effervescent pills in water, the color change in an apple when it is cut, a water heater that uses a combustible gas, cement hardening, heating up a steak, glue hardening, a car engine working... Inside our organisms, continuous chemical reactions are happening: moving a muscle, **hitting / beating** our hearts, breathing and even thinking and falling **in / out** love are determined by one or more **complex / complicate** chemical reactions.

A chemical reaction always happens with an energy release or an energy **absortion / absorption**. In the first case, the reaction is said to be exothermic and in the second case, endothermic. Endothermic reactions usually happen by heating **over / up**.

Chemical reactions may be considered by two different points of view: Thermodynamics and **Kinetics / Kynetics**.

A **catalyst / catalyzer** is a substance which accelerates a chemical reaction without changing the nature of the products. The interest of them in industry is obvious. A catalyst is not consumed by the reaction itself and it is **gained / recovered** at the end of the reaction without chemical transformation in itself.

3) CROSSWORDS



Write in English:

1) RECIPIENTE

3) SÍNTESIS

5) INFLAMACIÓN

7) PRODUCTO

9) LEY

11) AJUSTE

2) REACTIVO

4) DESPRENDER (UN GAS)

6) QUÍMICO (ADJ.)

8) PRECIPITADO

10) QUÍMICO (N.)

4) COLUMNS

Match both columns:

A	Endothermic	H	There is an energy release
B	Atoms	I	It is constant in a chemical reaction
C	Spontaneous	J	It does not have to be constant
D	Bonds	K	There is an energy absorption
E	Volume	L	They can change their partners or not
F	Exothermic	M	It happens without input energy
G	Mass	N	Some are broken and others are formed

5) PHRASE ORDER

Arrange these sentences:

a) the alchemists. transformations Middle chemical studied In Ages, by were

.....

b) A a the oxygen air. is reaction from combustion with

.....

c) reversible time. both happens A in same at reaction the directions

.....

d) of a velocity A reaction. the catalyst chemical increases

.....

e) of into product. deals Chemical final the materials raw engineering transformation a

.....

6) QUESTIONS

a) Why do most chemical reactions occur in a liquid state?

b) Write three chemical reactions which happen near you.

c) What precautions do we have to follow when we make a chemical reaction?