new series

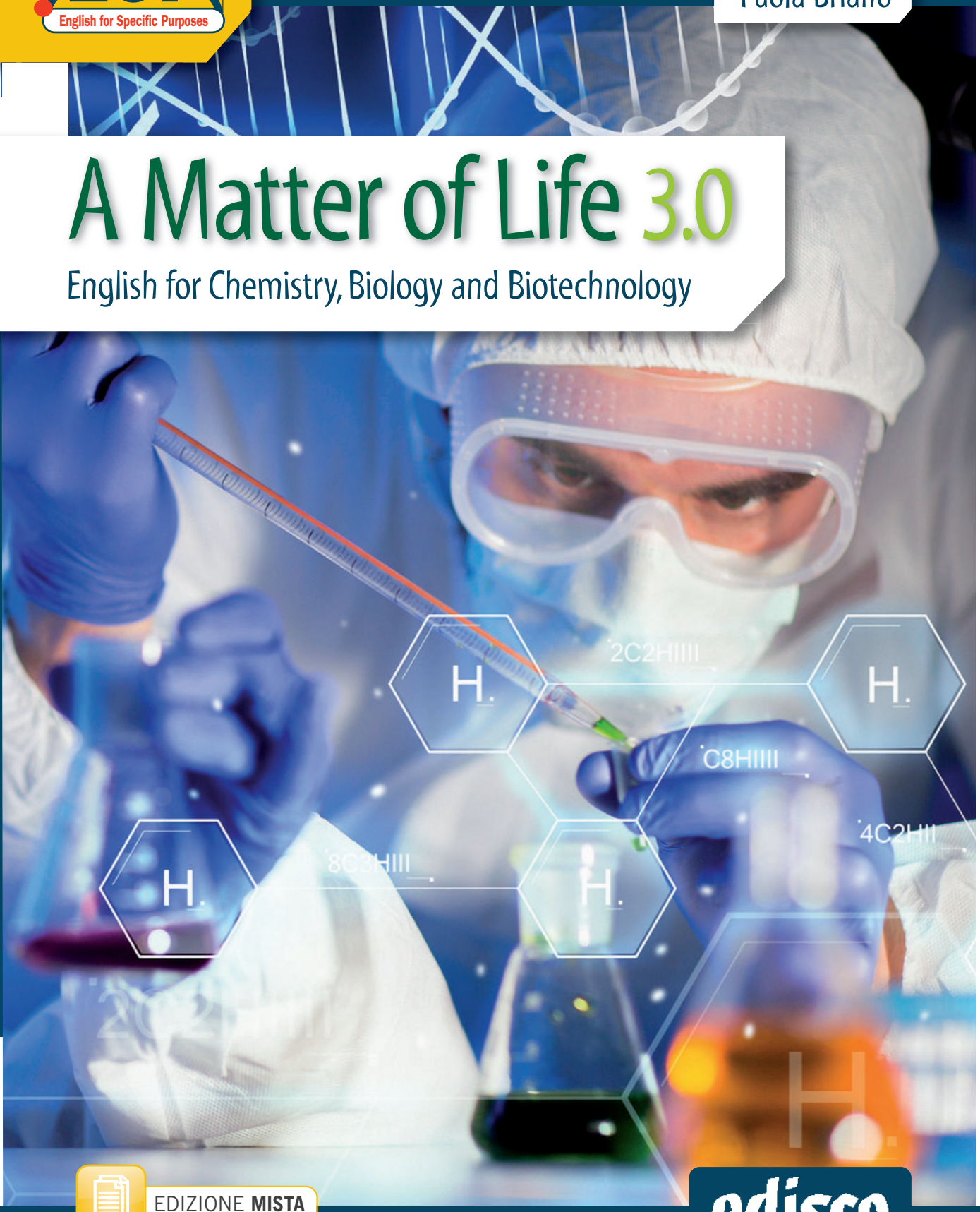
ESP

English for Specific Purposes

Paola Briano

A Matter of Life 3.0

English for Chemistry, Biology and Biotechnology



EDIZIONE **MISTA**
+ LIBRO **DIGITALE**

edisco

Paola Briano

A MATTER OF LIFE 3.0

English for Chemistry, Biology and Biotechnology

edisco

A Matter of Life 3.0

Realizzazione editoriale:
– Progetto e consulenza: Raffaele Polichetti
– Revisione linguistica: Annabel Pope
– Direzione grafica: Manuela Piacenti
– Progetto e impaginazione: Graphic Center Group
– Disegni: Mauro Borgarello
– Revisione testi: Lunella Luzi
– Registrazione audio: Ivano Atzori

In linea con le disposizioni di legge e le indicazioni ministeriali, si attesta che l'opera è realizzata in "forma MISTA", cartacea e digitale. L'Editore mette a disposizione gratuitamente sul proprio sito diverse risorse didattiche online: materiali extra per attività di approfondimento e di esercitazione in parte ad accesso libero e in parte riservati al docente.

L'opera è altresì disponibile in edizione DIGITALE per gli studenti diversamente abili e i loro docenti. L'Editore mette a disposizione degli studenti non vedenti, ipovedenti, disabili motori o con disturbi specifici di apprendimento i file pdf in cui sono memorizzate le pagine di questo libro. Il formato del file permette l'ingrandimento dei caratteri del testo e la lettura mediante software screen reader.

10128 Torino – Via Pastrengo, 28
Tel. 011.547880 – Fax 011.5175396
e-mail: info@edisco.it • sito web: www.edisco.it

Le immagini del testo (disegni e fotografie) che rappresentano nomi, marchi o prodotti commerciali hanno un valore puramente didattico di esemplificazione. L'autore e l'editore non intendono cioè sostenere che i prodotti fotografati siano migliori o peggiori di altri, né indirettamente consigliarne o sconsigliarne l'acquisto. Peraltro non esiste alcun rapporto di nessun genere con i relativi produttori: Nomi e marchi sono generalmente depositati o registrati dalle rispettive case produttrici.

L'Editore è a disposizione degli aventi diritto con i quali non gli è stato possibile comunicare, nonché per eventuali omissioni e inesattezze nella citazione delle fonti dei brani, illustrazioni e fotografie riprodotti nel presente volume.

Stampato per conto della Casa editrice presso
Stamperia Artistica Nazionale, Trofarello (TO), Italia

Printed in Italy

Ristampe
5 4 3 2 1 0 2023 2022 2021 2020 2019 2018

PRESENTAZIONE

L'ARGOMENTO

A Matter of Life 3.0 è rivolto in particolare agli studenti dei corsi a indirizzo chimico, biochimico, biologico, microbiologico, alimentare, ambientale e biotecnologico e, in generale, a coloro che hanno l'esigenza di utilizzare la lingua inglese come strumento di studio e/o di lavoro in questi settori.
Il testo è inoltre particolarmente utile alle classi che partecipano al CLIL (*Content and Language Integrated Learning*) – obbligatorio nell'ultimo anno dei licei e istituti tecnici – una metodologia che prevede l'insegnamento di contenuti in lingua straniera e che favorisce sia l'acquisizione di contenuti disciplinari sia l'apprendimento della lingua straniera.
Grazie alla ricchezza del materiale proposto, ***A Matter of Life 3.0*** – concepito per promuovere un apprendimento attivo basato sui contenuti (*content-based learning*) – offre la possibilità di scegliere gli argomenti sia in base ai programmi delle materie tecnico-scientifiche di indirizzo, sia in base agli interessi e al livello di competenza linguistica degli studenti.
I contenuti sono stati ordinati secondo criteri di graduale complessità concettuale e linguistica e vengono esplorati utilizzando le quattro abilità in modo omogeneo e integrato. I brani offrono un assortimento di stili, registri e livelli di difficoltà.

GLI OBIETTIVI

A Matter of Life 3.0 si propone di:

- far acquisire le competenze necessarie per comprendere testi che presentano termini, espressioni, strutture sintattiche e modalità discorsive specifiche del linguaggio scientifico e tecnico settoriale;
- migliorare la capacità di ricezione e produzione, orale e scritta;
- arricchire il patrimonio lessicale;
- consolidare abitudini grammaticali corrette e approfondire alcune strutture;
- stimolare l'interesse e la partecipazione attiva degli studenti, dando spazio alla loro esperienza personale e a problematiche di attualità;
- contribuire a sviluppare sensibilità per il rispetto e la protezione dell'ambiente con suggerimenti per comportamenti '*eco-friendly*'.

LA STRUTTURA

A Matter of Life 3.0 è diviso in sei Moduli, ognuno dei quali è ripartito in quattro sezioni:

1. **ELEMENTS** (**Contents Section**) – Divisa in **Unità**, contiene testi e attività che riguardano i contenuti specifici della specializzazione già affrontati in L1. Ogni Unità è suddivisa in brevi **Capitoli** per favorire non solo uno studio più parcellizzato, ma anche la scelta antologica da parte dell'insegnante.
   I testi vengono affrontati in modo graduale, attraverso esercizi di *warm-up*, esplorazione del lessico tecnico, comprensione scritta e/o orale, globale e specifica.
   Brevi '**box**' permettono di ampliare le conoscenze sugli argomenti:

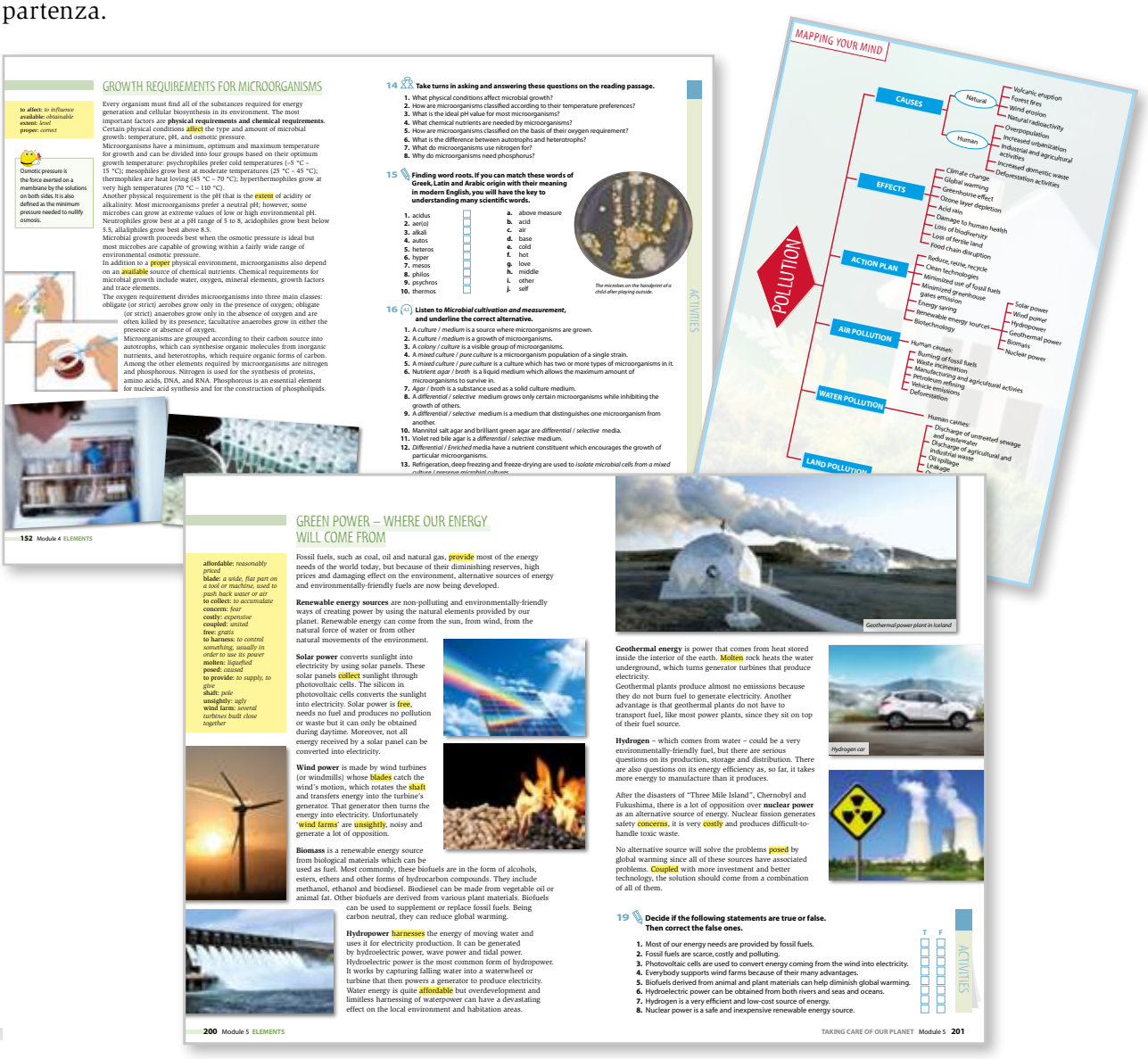

per approfondimenti generali;


per analisi di fatti e dati.


per curiosità e stranezze;


per brevi messaggi da 140 caratteri tradizionali fino a 280 caratteri dell'ultima modalità espansa di Twitter.

Un ricco **apparato iconografico** – spesso con funzioni esplicative e non solo esornative – correda i brani di lettura, per ognuno dei quali è previsto un esauriente **glossario**.
Al termine di ogni Modulo è presente una **mappa concettuale** (***Mapping your mind***), strumento utile per rappresentare la rete di relazioni tra i vari argomenti del Modulo, a partire da quello di partenza.



2 **ATOMS** – Comprende due parti: ***Vocabulary***, con specifiche attività per il consolidamento del lessico tecnico incontrato nel Modulo, e ***Grammar***, che propone il rinforzo delle strutture morfosintattiche più ricorrenti nel linguaggio tecnico.

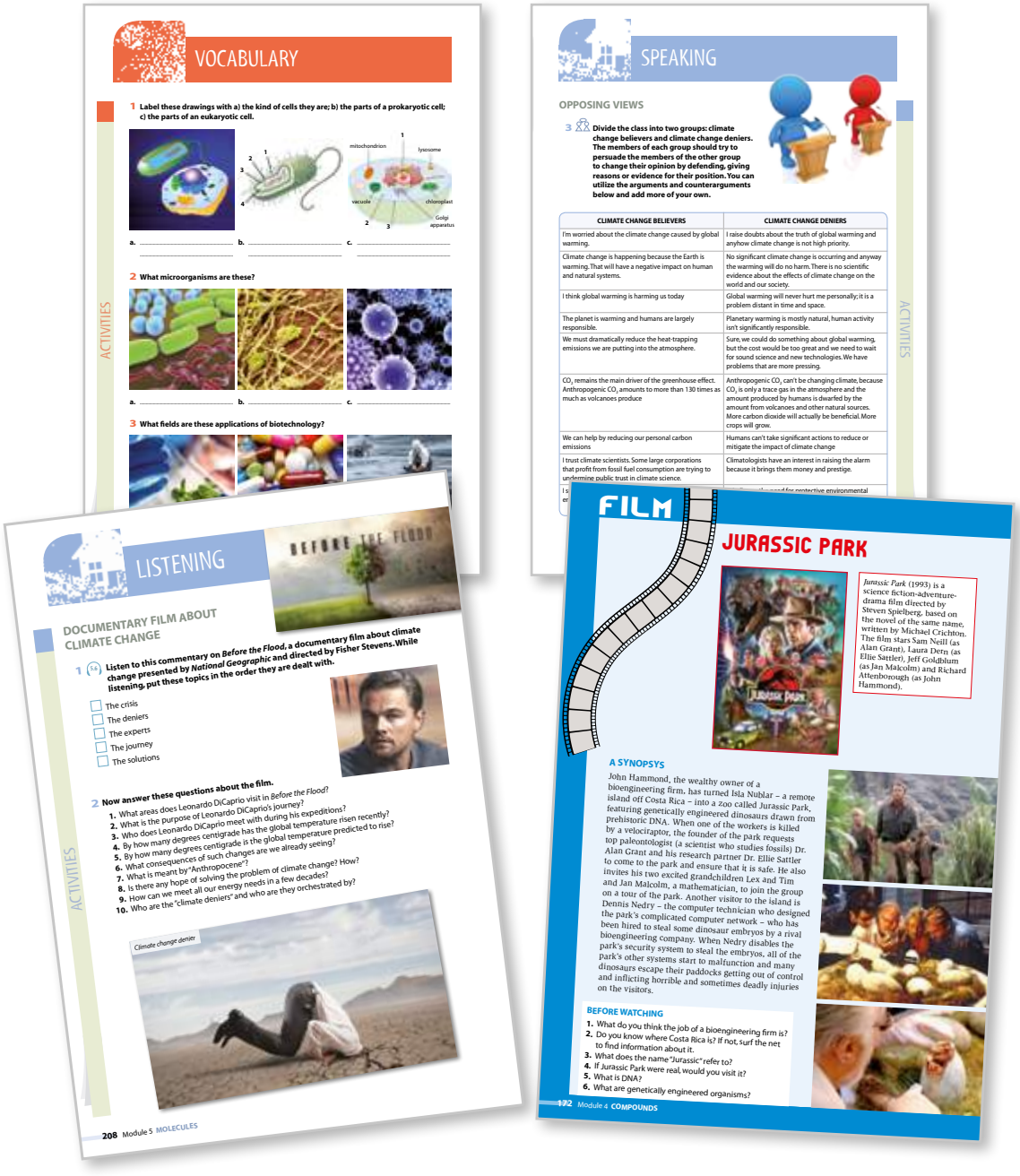
3 **MOLECULES** – Offre testi e attività di consolidamento dei contenuti appresi per sviluppare le attività di ***Listening***, ***Speaking*** e ***Writing***.

4 **COMPOUNDS** – Propone ***clip*** **di opere cinematografiche** che offrono spunti di riflessione e svago su aspetti contenutistici e linguistici del Modulo.

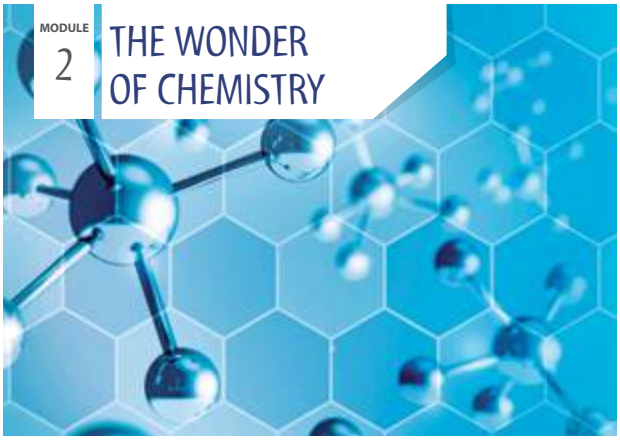
La **TEACHER'S GUIDE**, che affianca il testo dello studente, propone note didattiche, *audioscripts* delle attività di ascolto, la soluzione degli esercizi e prove di verifica formative per ogni singola Unità e sommative per ogni Modulo.

ONLINE RESOURCES

Le ONLINE RESOURCES, disponibili sul sito www.edisco.it propongono i file audio formato MP3 con la registrazione delle attività di ascolto e numerosi materiali (letture e video) per attività di approfondimento e di esercitazione.



CONTENTS



MODULE 2

THE WONDER OF CHEMISTRY

MODULE 3

THE CHEMISTRIES OF LIFE

MODULE 4

MICROBES: FRIENDS AND FOES

MODULE 5

TAKING CARE OF OUR PLANET

MODULE 6

FOOD WORLD

ELEMENTS

ATOMS

MOLECULES

COMPOUNDS

APPENDIX

GLOSSARY

ONLINE RESOURCES

5 TAKING CARE OF OUR PLANET

6 FOOD WORLD

VIDEOS

1. **Common laboratory equipment** (9'22")
   https://www.youtube.com/watch?v=U5N2uxHNzxg
2. **What's matter?** Crash course for kids (3'3")
   https://www.youtube.com/watch?v=ELchwUIlWa8
3. **Biomolecules** (8'12")
   https://www.youtube.com/watch?v=YO244P1e9QM
4. **What is a Microbe?** (3'38")
   https://www.youtube.com/watch?v=qi1MgmaQM0Q
5. **Environmental issues** (7'22")
   https://www.youtube.com/watch?v=p1KxC-S7QgA
6. **7 Myths you still believe about "healthy eating"** (6'24")
   https://www.youtube.com/watch?v=7QW7DxJa398

MODULE

2

THE WONDER OF CHEMISTRY

ELEMENTS

1 Matter matters

- The substance of the universe
- What everything centres around
- The shelf where elements are organized
- How matter can change
- Pure substances and pure materials

2 A subject worth exploring

- The 'major' branches of Chemistry
- The 'minor' branches of Chemistry
- Chemical analysis
- Today's chemical industry

ATOMS

Vocabulary

Grammar • Articles – Indefinites – Comparison

MOLECULES

Listening • A Chemistry lesson

Speaking • Be an ambassador for Chemistry

Writing • Note-taking

Mapping your mind • Matter

COMPOUNDS

Film • *Young Frankenstein*

> *Science is fun. Science is curiosity. We all have natural curiosity. Science is a process of investigating. It's posing questions and coming up with a method. It's delving in.*
>
> Sally Ride

Sally Ride (1951-2012) was the first American woman to fly in space. In 1983, her historic flight on the space shuttle Challenger made her a symbol of the ability of women to break barriers and a hero to generations of adventurous young girls. After retiring from NASA, she became a physics professor at the University of California, San Diego, and an award-winning writer of science books for children.

WHY STUDY THIS MODULE?

In this Module you will examine the composition and the properties of matter, which makes up what we are made of and everything we are surrounded by. Chemistry studies matter, therefore, it is a subject worth exploring to understand how everything works a little better. Knowing the basics of Chemistry is essential since, no matter who we are or what we do, we use chemicals – we eat them, we wear them, the medicines we take are chemicals and the products we use in daily life all consist of chemicals.

MATTER MATTERS 1

THE SUBSTANCE OF THE UNIVERSE

Everything that has mass and takes up space is **matter**; however, there are some things that do not consist of matter. All substances consist of matter but any type of energy or any abstract concept is something that is not matter.

The basic chemical building blocks of matter are **elements**. A chemical element is a material which cannot be broken down or changed into another substance using chemical means.

Four states of matter can be observed in everyday life: solid, liquid, gas and plasma. Each of these states is also known as a phase. The different states of matter have different physical properties.

A **solid** has a rigid shape and a fixed volume. The particles of a solid cannot move and are already so tightly packed together that increasing pressure will not compress the solid to a smaller volume.

A **liquid** has a fixed volume but no rigid shape and it takes the shape of its container. Its particles are close together and can move. Liquids, like solids, cannot be compressed. They diffuse quite easily but not as easily as a gas. Another property common to liquids is surface tension, a force of attraction that keeps molecules together causing tension.

A **gas** is a form of matter that has no definite volume or shape. Its volume is very sensitive to temperature and pressure. Gases have low density and diffuse easily. If unconfined, the particles of a gas will spread out indefinitely; if confined, the gas will expand to fill its container.

The characteristics of **plasmas** are significantly different from those of ordinary gases, so that plasmas are considered a distinct fourth state of matter. Plasma consists of highly charged particles with extremely high kinetic energy. While plasma is not a common state of matter on Earth (but may be the most common state of matter in the universe), man-made plasmas are everywhere.

Many other states of matter are known to exist only in extreme environments – such as BEC (Bose-Einstein Condensates), referred to as 'the fifth state of matter'– and scientists will probably discover more states as they continue to explore the Universe.

When specific physical conditions – such as temperature, pressure, and other physical forces – change, matter can move from one phase to another:

- solids may melt into liquids (fusion / melting)
- solids may sublimate into gases (sublimation)
- liquids may vaporise into gases (vaporisation / boiling)
- liquids may freeze into solids (freezing)
- gases may condense into liquids (condensation)
- gases may deposit into solids (deposition).

The passage you are going to read starts by saying, "*Everything that has mass and takes up space is matter; however, there are some things that do not consist of matter*". In groups, decide whether the following things are *'matter'* or *'non-matter'*. **Write M for matter and NM for non-matter in the boxes below.**

air	☐
clouds	☐
energy	☐
gravity	☐
heat	☐
iron	☐
love	☐
Mars	☐
microwaves	☐
a person	☐
rainbow	☐
reflections	☐
a rock	☐
sound	☐
a spider	☐
the Sun	☐
sunlight	☐
time	☐
a tree	☐
water	☐

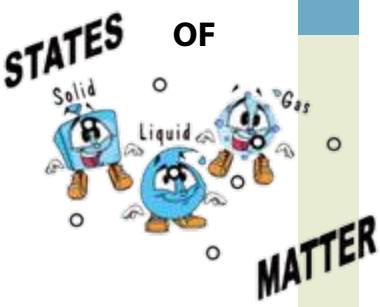
ONLINE RESOURCES

- **Everything in and around us**

1 Choose the suitable subject to complete the phrases below, then join them together and give a short oral report of the reading passage.

Chemical elements • Each phase of matter • Gases • Heating or cooling • Liquids • Matter • Natural plasmas • Solids • The phases of matter

1. ..... is everything that you can touch, see, feel or smell.
2. ..... make up all matter.
3. ..... has its own chemical and physical properties.
4. ..... are solids, liquids, gases, and plasmas.
5. ..... have a definite shape and volume. They maintain their shape.
6. ..... have a definite volume, but no defined shape. They take the shape of any container they are in.
7. ..... do not have a definite shape or volume.
8. ..... are not found very often.



to break (broke-broken) down: *to separate*
building block: *constituent*
fixed: *definite*
increasing: *growing*
kinetic: *dynamic*
man-made: *synthetic*
mean: *method, manner*
packed together: *compact*
referred to as: *called*
to spread (spread-spread) out: *to extend*
to take (took-taken) up: *to occupy*
tightly: *closely, strongly*

2 Underline the correct alternative.

1. A solid has a a) *definite* b) *indefinite* shape and volume.
2. A liquid has a definite volume, but a) *can* b) *cannot* change shape.
3. The shape and volume of a gas a) *can* b) *cannot* change.
4. Depending on temperature and pressure, matter a) *can* b) *cannot* transit from one state to another.
5. Melting occurs when a substance changes from a a) *liquid* b) *solid* to a a) *liquid* b) *solid*.
6. Boiling happens when a substance changes from a a) *gas* b) *liquid* to a a) *gas* b) *liquid*.
7. Condensation takes place when a gas changes to a a) *solid* b) *liquid*.
8. Freezing occurs when a liquid changes to a a) *solid* b) *liquid*.

Did you know?
1. You have all three states of **matter** inside of you.
2. You can drink any liquid.
3. Anything you eat is **matter**.
4. The molecules of a gas work in the same way hot liquid does.
5. The molecules of a solid work in the same way cold water does.

3 Which phase of matter are these substances? Write them in the appropriate column then compare your choices with your partner's.

air • auroras • blood • butter • comet tails • dry ice • gasoline • gold • helium • lightening • milk • oil • oxygen • ozone • sand • stars • the Sun • water vapour • wine • wood

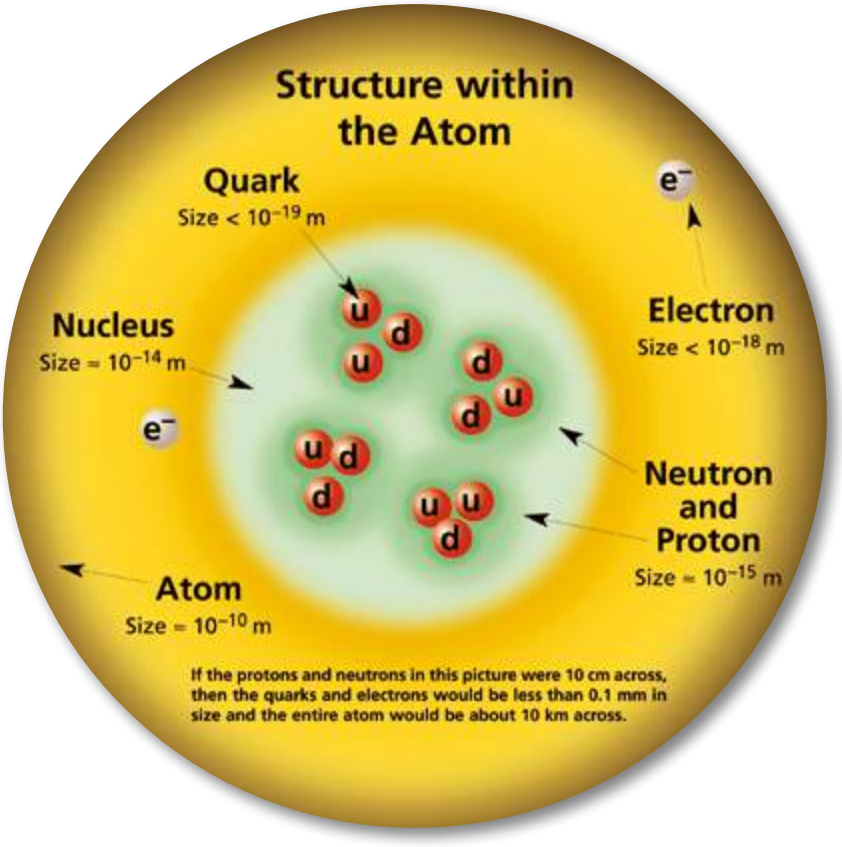
SOLIDS	LIQUIDS	GASES	PLASMAS

WHAT EVERYTHING CENTRES AROUND

arrangement: *placement, layout*
bonded: *attached*
to break (broke-broken) down: *to separate*
to equal: *to be the same as*
to hold (held-held): *to keep*
inner: *internal*
joined: *united*
main: *chief, principal*
ratio: *proportion*
to share: *to have in common*
since: *because*
to spin (spun-spun): *to rotate*
to transfer: *to move*

The optimist sees the glass half full.
The pessimist sees the glass half empty.
The chemist sees the glass completely full, half in the liquid state and half in the vapour state.

Q: Why isn't energy made of matter?
A: It doesn't matter.



All matter in the natural world is composed of one or more fundamental substances called **elements**. An element is a pure substance that cannot be created or broken down by ordinary chemical means. Each element's name can be replaced by a one- or two-letter symbol.

An atom is the smallest quantity of an element that retains the unique properties of that element. Atoms are made up of even smaller subatomic particles, three types of which are important: the **proton**, **neutron** and **electron**.

Protons and neutrons are made of varieties of a still smaller particle called the quark. Quarks are made up of, and interact with, smaller subatomic particles.

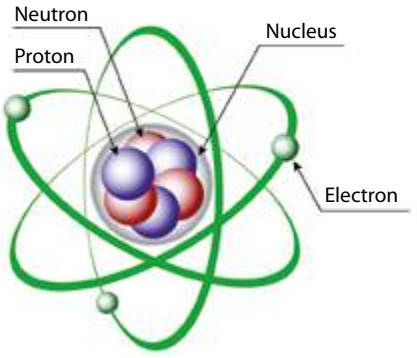
An atom does not need to have all three particles, but will always contain at least protons.

An atom has an inner core called a **nucleus**, which is where the protons and neutrons are located. An atom's protons and electrons carry electrical charges. The number of positively charged protons and non-charged (neutral) neutrons gives mass to the atom, and the number of each in the nucleus of the atom determine the element.

The number of negatively charged electrons that 'spin' around the nucleus equals the number of protons.

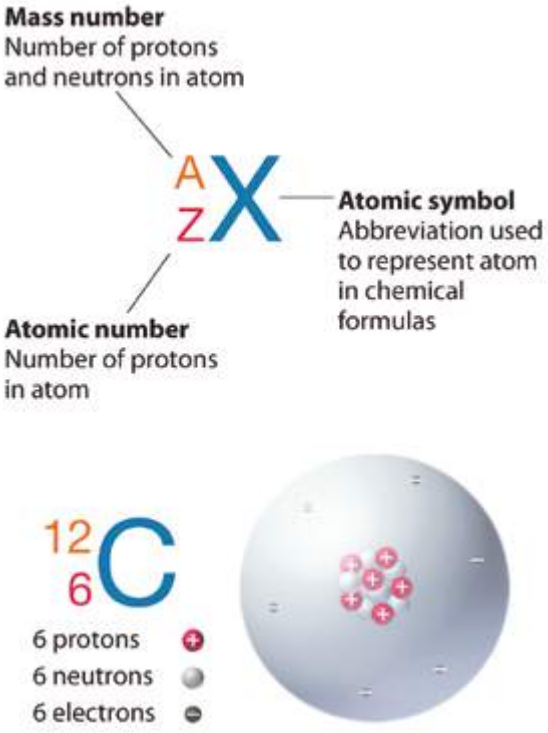
Atoms can lose or gain electrons. When they do, they form charged particles called ions. Cations have fewer electrons and have a positive charge. Anions have extra electrons that create a negative charge.

Atom structure

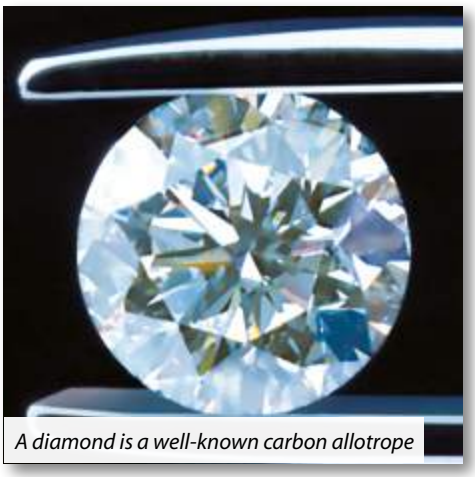


A schematic view of an atom structure

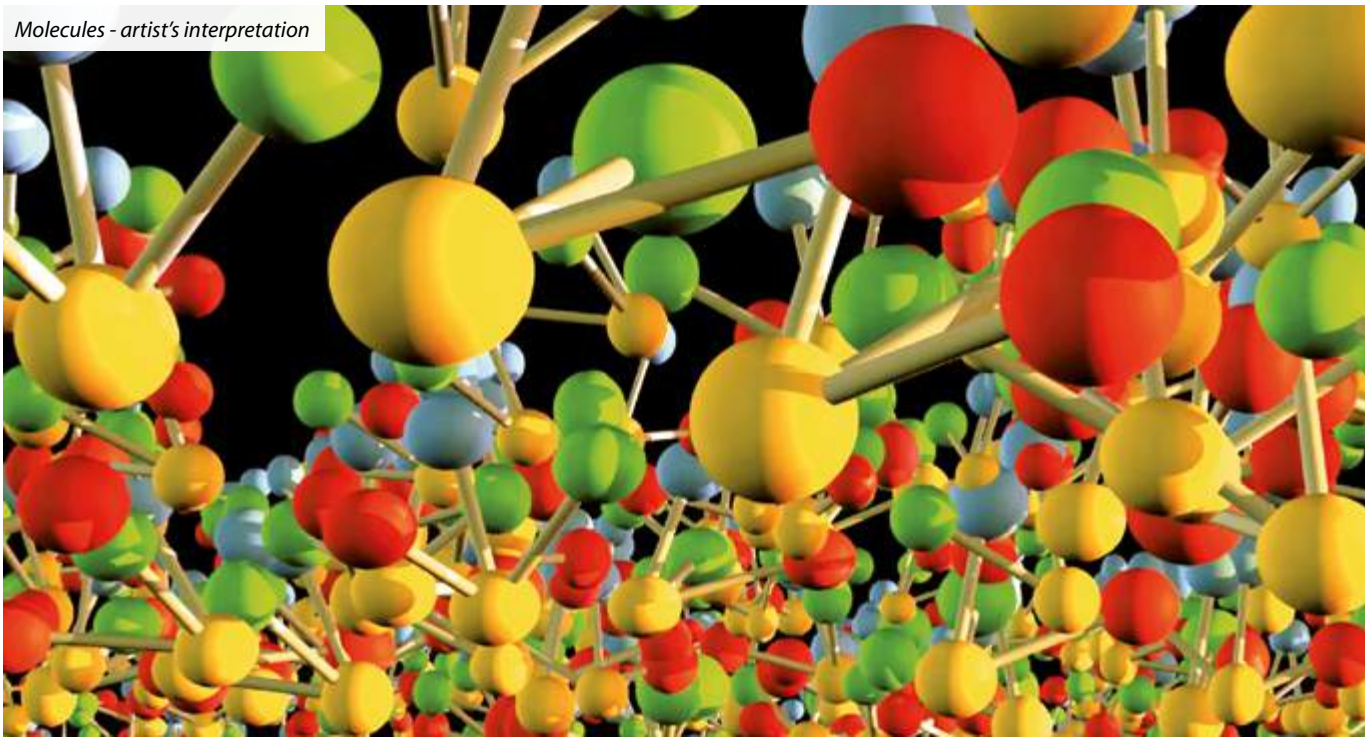
The **atomic number**, which is the number of protons in the nucleus of the atom, identifies the element and, since an atom usually has the same number of electrons as protons, it identifies the usual number of electrons as well.
An element's **mass number** is the sum of the number of protons and neutrons in its nucleus. Certain elements can exist in two or more different forms. These forms are called **allotropes** in which the element's atoms are bonded together in a different manner.
An **isotope** is one of the different forms of an element, distinguished from one another by different numbers of neutrons.
Isomers are molecules that have the same chemical formula, but a different arrangement of atoms.
Two main forces hold atoms together: the **electric force**, which holds the electrons in orbit around the nucleus, and the **nuclear force**, which holds the protons and neutrons together within the nucleus.
Matter can exist in the form of a pure element, but combinations of elements are more common.
A **molecule** is the smallest particle in a chemical element or compound that has the chemical properties of that **element** or **compound**. Molecules are made up of atoms that are held together by chemical bonds.
A compound is a substance composed of two or more elements joined by chemical bonds. Generally, compounds are considered a subclass of molecules.
A chemical formula is a concise way of showing the elements contained in a molecule/compound and their ratio.
The atoms in a compound are chemically joined together by strong forces called chemical bonds. An ionic bond is formed when an electron transfers from one atom to another. A covalent bond is formed when two atoms share one or more electrons.



Atomic and mass number


A diamond is a well-known carbon allotrope

Molecules - artist's interpretation

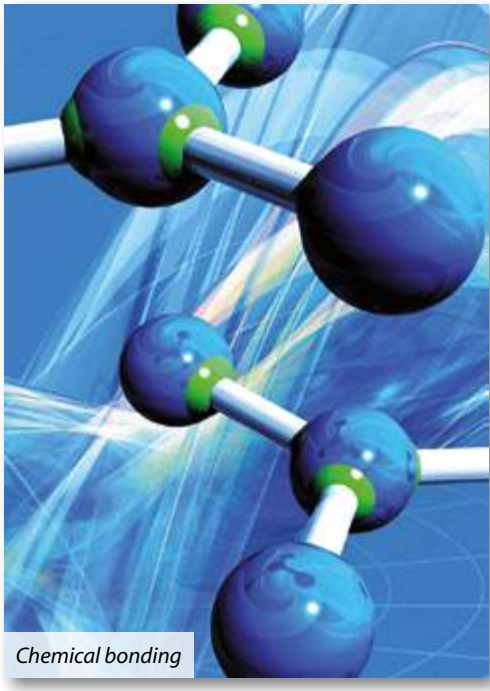


ACTIVITIES

4 **Join the *Heads* and *Tails* to make an outline of the reading passage.**

Heads

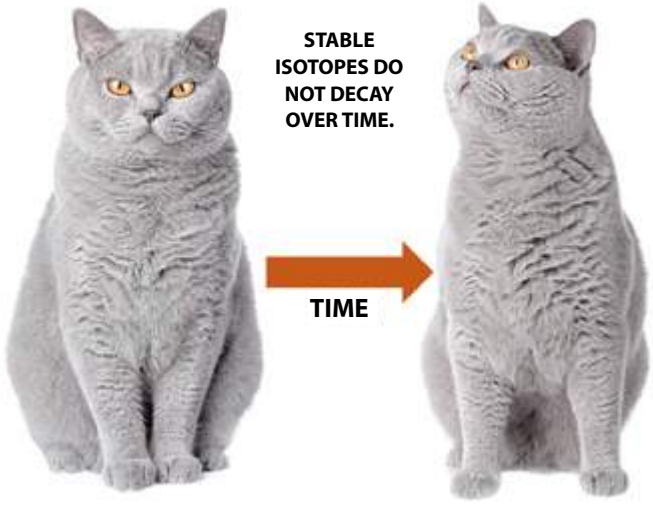
1. Matter is made up of ☐
2. Each element is a pure substance, made up of ☐
3. Atoms contain ☐
4. Electrons are ☐
5. Protons have ☐
6. Neutrons do not have ☐
7. The protons and neutrons are located ☐
8. The electrons orbit ☐
9. The number of electrons in an atom is ☐
10. Allotropes are ☐
11. The atomic number of an element is ☐
12. The mass number of an element is ☐
13. A molecule is ☐
14. A compound is ☐
15. A chemical bond is ☐



Chemical bonding

Tails

a. a combination of two or more atoms from the same or from different elements.
b. a combination of two or more chemically bonded elements.
c. a positive charge.
d. an attraction between atoms that enables the formation of compounds.
e. an electrical charge.
f. around the outside of the nucleus.
g. different forms of the same chemical element.
h. in the nucleus at the centre of the atom.
i. negatively charged particles.
j. one or more of about 100 naturally-occurring elements.
k. only one type of atom.
l. the number of protons its atom contains.
m. the same as the number of protons, so atoms are electrically neutral overall.
n. the total number of protons and neutrons its atom contains.
o. three sub-atomic particles: protons, neutrons, and electrons.



ONLINE RESOURCES

- **Elements and compounds: symbols and formulae**

5 *What am I?* Choose from

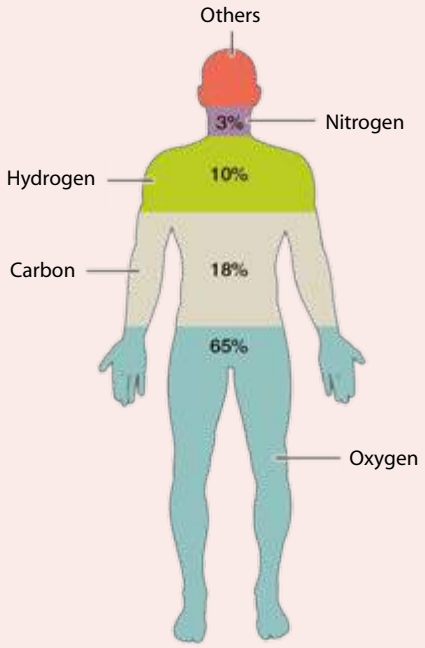
allotrope • atom • electron • ion • isomer • isotope • molecule • neutron • nucleus • proton

1. I'm the smallest component of an element having the chemical properties of the element. I'm a/an .....
2. I'm a positively charged subatomic particle. I'm a/an .....
3. I'm a particle in the atomic nucleus and have no electrical charge. I'm a/an .....
4. I'm a negatively charged subatomic particle. I'm a/an .....
5. I'm the centre of the atom, I contain protons and neutrons. I'm a .....
6. I'm an electrically charged atom. I'm a/an .....
7. I'm one of two or more existing forms of an element. I'm a/an .....
8. I'm one of the forms of a chemical element having the same number of protons but different numbers of neutrons in the nucleus. I'm a/an .....
9. I'm a molecule with the same molecular formula as another molecule but with a different chemical structure. I'm a/an .....
10. I'm the smallest particle of a chemical element or compound that has the chemical properties of that element or compound. I'm a/an .....

Subatomic particles

Protons and neutrons are made up of elementary particles called quarks, and the electron is only one member of a class of elementary particles that also includes the muon and the neutrino. More unusual subatomic particles – such as the positron, the antimatter counterpart of the electron – have been detected and characterised in cosmic-ray interactions in the Earth's atmosphere. The field of subatomic particles has expanded dramatically with the construction of powerful particle accelerators to study the high-energy collisions of electrons, protons, and other particles with matter. More than 200 subatomic particles have been detected – most of them highly unstable, existing for less than a millionth of a second – as a result of collisions produced in cosmic-ray reactions or particle-accelerator experiments.

Elements of the human body



Element	Symbol	Percentage in Body
Oxygen	O	65.0
Carbon	C	18.5
Hydrogen	H	9.5
Nitrogen	N	3.2
Calcium	Ca	1.5
Phosphorus	P	1.0
Potassium	K	0.4
Sulfur	S	0.3
Sodium	Na	0.2
Chlorine	Cl	0.2
Magnesium	Mg	0.1
Trace elements include boron (B), chromium (Cr), cobalt (Co), copper (Cu), fluorine (F), iodine (I), iron (Fe), manganese (Mn), molybdenum (Mo), selenium (Se), silicon (Si), tin (Sn), vanadium (V), and zinc (Zn).		less than 1.0

The main elements that compose the human body are shown from the most abundant to the least abundant.

THE SHELF WHERE ELEMENTS ARE ORGANIZED

according to: *on the basis of*
appearance: *form*
to arrange: *to organize*
to exhibit: *to show*
feature: *characteristic*
increasing: *growing*
latter: *second mentioned*
lined up: *aligned*
man-made: *artificial*
to occur: *to be found*
outer: *external*
several: *numerous*
to share: *to have in common*
tool: *instrument*
while: *whereas, in contrast*
within: *in*

The **Periodic Table** is a chart which arranges the chemical elements in a useful and logical manner. Elements are listed in *order* of increasing atomic number, lined up so that elements which exhibit similar properties are arranged in the same *row* or column as each other.
The Periodic Table is one of the most useful tools of Chemistry and other sciences. Russian Dmitri Mendeleev was the first scientist to create the periodic table from which the modern table is derived. The main difference between the modern periodic table and Mendeleev's one is that the latter arranged the elements in order of increasing atomic weight, while the modern table orders the elements by increasing atomic number.
The IUPAC (International Union of Pure Applied Chemistry) revises the periodic table *as* new data become available.
There are about 100 elements on the periodic table that occur in nature. All of the other elements are man-made.
The present periodic table has *room* for 119 elements, although a few elements await verification of their discovery. Scientists are working on creating and verifying element 120, which will change the appearance of the table.
Each element in the periodic table is identified by a chemical symbol.
The elements are classified according to the following features:

- **Atomic Number**: the number of protons in the nucleus;
- **Atomic Mass**: the sum of the number of protons plus neutrons in the nucleus;
- **Group**: groups are columns or multiple columns in the periodic table. Elements within a group share several common chemical and physical properties and often have the same outer electron *arrangement*.
- **Period**: periods are the rows from *left* to right in the period table. Elements in a *period* have the same number of energy *shells*.

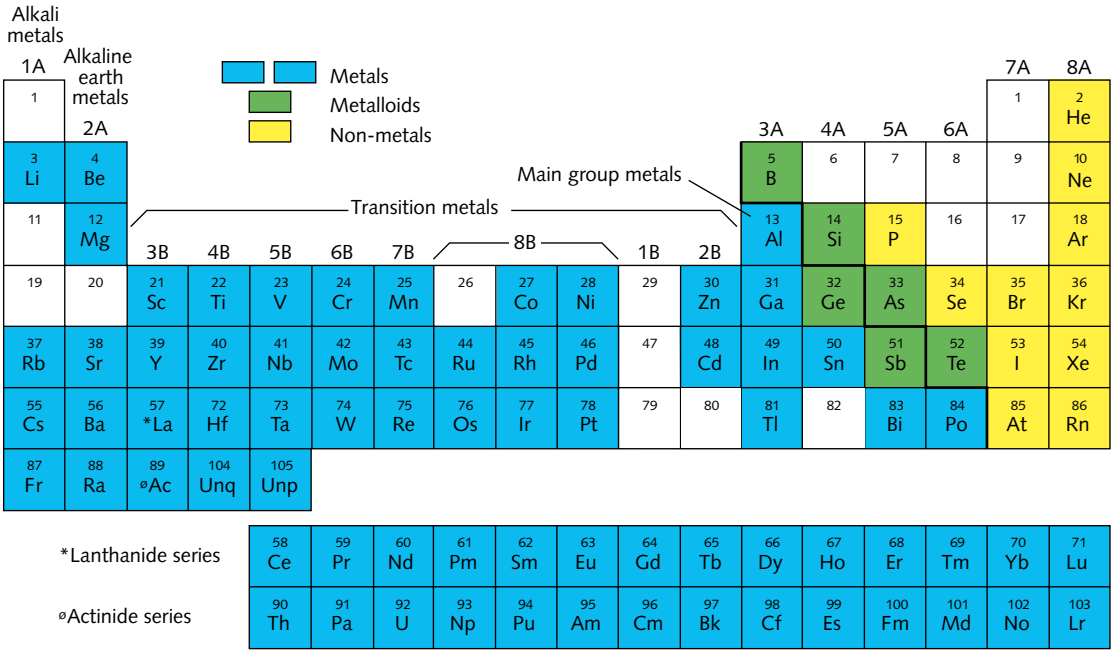
The elements can be divided into three categories that have characteristic properties: metals, non-metals and semimetals, or metalloids. Metals are generally shiny, malleable, ductile and good conductors of heat and electricity; non-metals are dull and poor conductors, and semimetals, or metalloids, have the properties of metals and non-metals, depending on the conditions. Most elements are metals.

Facts and figures about the Periodic Table

1. The table has served chemistry students since 1869, when it was created by Russian Dmitri Mendeleev.
2. At the time, Mendeleev knew 63 elements only.
3. When argon was discovered in 1894, it didn't fit into any of Mendeleev's columns, so he denied its existence, as he did for helium, neon, krypton, xenon and radon.
4. In 1902 he acknowledged he had not anticipated the existence of these elements – the noble gases – which now constitute the entire *eighth* group of the table.
5. At the time of this writing, the most recent version of the periodic table was approved on 8 January 2016.

6 CLASS CHALLENGE. See who is the quickest at matching these elements with the symbols below and then at putting the symbols back into their correct position in the periodic table: calcium, carbon, chlorine, copper, fluorine, gold, hydrogen, iron, lead, mercury, nitrogen, oxygen, potassium, silver, sodium, sulphur.

1. Ag	**5.** Cl	**9.** H	**13.** Na .....
2. Au	**6.** Cu	**10.** Hg	**14.** O .....
3. C	**7.** F	**11.** K	**15.** Pb .....
4. Ca	**8.** Fe	**12.** N	**16.** S .....



7 Underline the correct alternative.

1. Elements in the periodic table are arranged by **a.** *atomic number* **b.** *atomic weight*.
2. **a.** *Horizontal* **b.** *Vertical* families share similar chemical properties.
3. **a.** *Dmitri Mendeleev* **b.** *Isaac Newton* devised the first periodic table similar to the one we use today.
4. Mendeleev's periodic table arranged the elements by **a.** *atomic number* **b.** *atomic weight*.
5. The Periodic Table is periodically revised by **a.** *ACS* **b.** *IUPAC*.
6. The modern periodic table contains approximately **a.** *100* **b.** *120* elements.
7. The square for each element in the periodic table **a.** *lists* **b.** *does not include* the atomic number, atomic weight, name, and symbol for each element.
8. The vertical columns of the periodic table are known as **a.** *groups* **b.** *periods*.
9. The horizontal rows of the periodic table are known as **a.** *groups* **b.** *periods*.
10. In general, **a.** *metals* **b.** *non-metals* are shiny and strong.
11. In general, **a.** *metals* **b.** *non-metals* are brittle and dull in appearance.
12. In general, metals have **a.** *high* **b.** *low* electrical and thermal conductivities.
13. In general, non-metals have **a.** *high* **b.** *low* electrical and thermal conductivities.
14. **a.** *Metalloids* **b.** *Transition metals* have properties of both metals and non-metals.
15. The majority of the elements in the periodic table are **a.** *metals* **b.** *non-metals*.

If you want to find the **number of neutrons in an atom**, just subtract the atomic number from the mass number.

ACTIVITIES

ACTIVITIES

8 Choose the suitable meaning for these words, which are in italics in the passage, then compare your choices with your partner's.

1. order	☐	command	☐	sequence
2. row	☐	angry argument	☐	line
3. as	☐	like	☐	when
4. room	☐	chamber	☐	space
5. arrangement	☐	agreement	☐	composition
6. left	☐	abandoned	☐	left-hand
7. period	☐	full stop	☐	horizontal line
8. shells	☐	areas surrounding the nucleus	☐	bullets

9 Use the words in the box to complete the definitions below:

atomic number • chemical property • electron • groups • periods • physical property

1. The horizontal rows of the periodic table are called .....

2. The vertical rows of the periodic table are called .....

3. An ..... is the negatively charged subatomic particle found in the space about the nucleus.

4. The ..... is the number of protons in the nucleus of an atom of an element.

5. A ..... is a characteristic which can be recognized without changing a substance chemically.

6. A ..... is a characteristic depending on the way a substance reacts with other substances.

10 *Fun for Chemists*. Complete these riddles choosing from the Formulae Bank.

Formulae Bank: **2Na • CsI • H_2O cubed • Na • NO • OK**

1. **Q**: What show do Caesium and Iodine love watching together? – **A**: .....

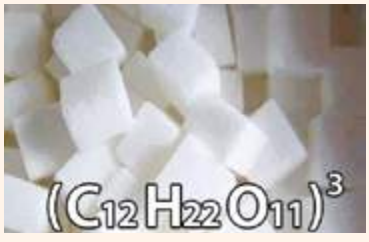
2. **Q**: Did you hear Oxygen tried to ask Nitrogen out? – **A**: Yeah, but she said ..... A week later Oxygen and Potassium went out. This time it went .....!

3. **Q**: Anyone knows any jokes about Sodium? – **A**: .....!

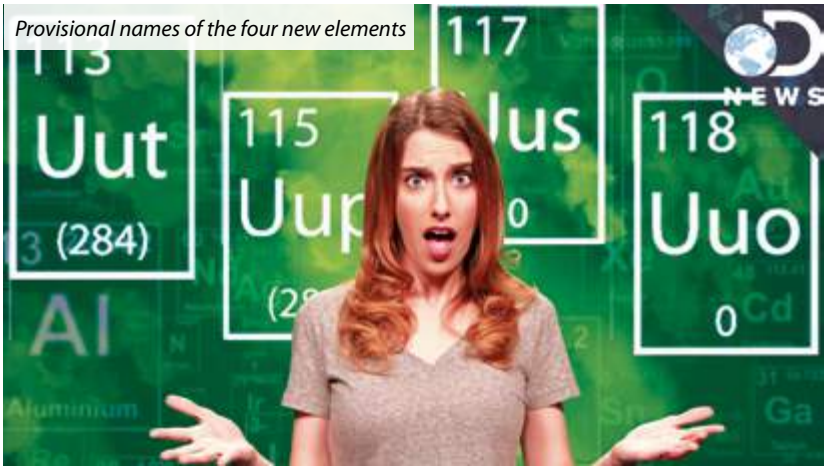
4. **Q**: If H_2O is the formula for water, what is the formula for ice? – **A**: .....

5. **Q**: What do you call a fish made of two Sodium atoms? – **A**: .....

– Carbon is known to form up to 10 million different compounds
– Francium is the rarest element on the Earth.
– The only letter not in the Periodic Table is 'J'.
– Although there is helium on the Earth, it was first discovered by observing the Sun.



ONLINE RESOURCES
• Some Periodic Table highlights



Provisional names of the four new elements

11 2.1 **Listen to the recording and decide whether these statements are true or false. Then, working in pairs or groups, correct the wrong statements.**

Groups in the Periodic Table

	T	F
1. Hydrogen belongs to the family of the alkali metals.	☐	☐
2. Sodium and potassium are very reactive metals.	☐	☐
3. Fluorine and chlorine are halogens.	☐	☐
4. Sodium chloride derives from the combination of an alkali with another element.	☐	☐
5. Noble gases are very reactive.	☐	☐
6. Neon and argon are inert gases.	☐	☐
7. The Actinide series are also called Rare-Earth elements.	☐	☐

The four newest elements on the Periodic Table have been named

In January 2016, officials announced that four new elements had earned a permanent spot on the periodic table, with elements 113, 115, 117 and 118 enriching the seventh row.

Teams of researchers from the US, Russia and Japan have all been recognized with the discovery of these new elements, so they have been given the naming rights. IUPAC provided the discoverers with guidelines to assist them in creating the names. These names keep with the longstanding tradition of being named after a mythological concept or character (including an astronomical object), a mineral or similar substance, a place or geographical region, a property of the element or a scientist. And of course, they must end in "-ium," "-ine," or "-on" depending on the grouping of elements they belong to. IUPAC also prefers the names translate easily across major languages.

The new names are: Nihonium (Nh) – derived from "Nippon", a Japanese word for Japan; Moscovium (Mc) – which honours the Russian capital city, Moscow; Tennessine (Ts) – named after the American State of Tennessee, known for its pioneering research in chemistry; and Oganesson (Og) – named after Russian physicist Yuri Oganessian. This is only the second time a new element has been named for a living scientist.

Unlike the classics, such as gold, iron and aluminium, these new elements are not found in nature. They are synthetic elements that can only be created in the lab and they decay very fast after synthesis.

ACTIVITIES

HOW MATTER CAN CHANGE

to affect: *to influence*
behaviour: *conduct*
to decrease: *to reduce*
gained: *acquired*
to increase: *to augment*
to involve: *to contain, to include*
lost: *gone, dropped*
to lower: *to reduce*
to occur: *to happen, to take place*
rearranged: *moved, reordered*
specimen: *sample*
to speed (sped-sped) up: *to accelerate*
such as: *like for example*
to undergo (underwent-undergone): *to go through*
used up: *consumed*

A **chemical reaction**, or chemical change, is a process in which the reactants (the starting materials) have different physical and chemical properties from the products (the newly formed substances). During chemical reactions, atoms are rearranged but they are not lost nor gained. The speed at which a chemical reaction occurs is called chemical reaction rate. Chemical reaction rates increase or decrease according to factors including temperature, pressure and light.

Activation energy is the external energy that has to be added in order for a chemical reaction to occur. A **catalyst** lowers the activation energy so it speeds up the reaction. It is not used up during the reaction, and is chemically unchanged after the reaction has finished.

The changes that take place in substances may be physical or chemical. Physical changes only change the appearance of a substance, i.e. they affect the physical properties of a substance, not its chemical composition. They can be caused by physical actions, such as changing temperature or pressure. Chemical changes cause a substance to change into a new substance with a new chemical formula, i.e. they affect the chemical properties of a substance.

Matter has physical and chemical properties. A **physical property** is a characteristic that may be observed and measured without changing the chemical identity of the specimen. Physical properties include density, melting point, boiling point, freezing point, colour and smell. A **chemical property** is a characteristic or behaviour of a substance that may be observed when it undergoes a chemical change or reaction. Chemical properties include characteristics such as pH, flammability, heat of combustion, toxicity, etc.

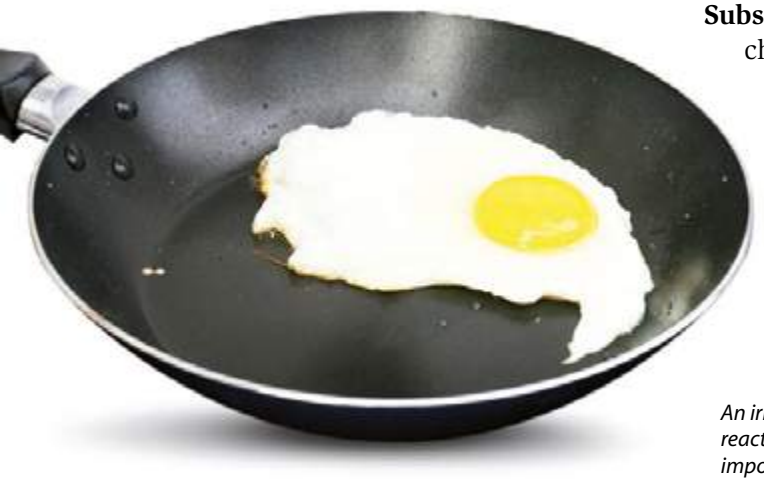
A chemical equation is a symbolic representation of a **chemical reaction**, which involves the molecular or atomic formulas of reactants and products. There are several different types of chemical reactions and more than one way of classifying them. Here are some common reaction types.

Combination or **Synthesis Reactions** are chemical changes in which two or more elements/compounds combine to form a more complex product (a compound).

Decomposition Reactions are chemical changes where one compound decomposes or breaks down into two or more simpler products (elements).

Substitution or **Single-Replacement Reactions** are chemical changes where an uncombined element replaces a less reactive element in a compound, creating a new compound and a single element.

Double-Replacement Reactions, also called **Double-Displacement Reactions**, are chemical changes where two compounds exchange bonds or ions in order to form different compounds.



An irreversible reaction: it is impossible to 'unfry' an egg!

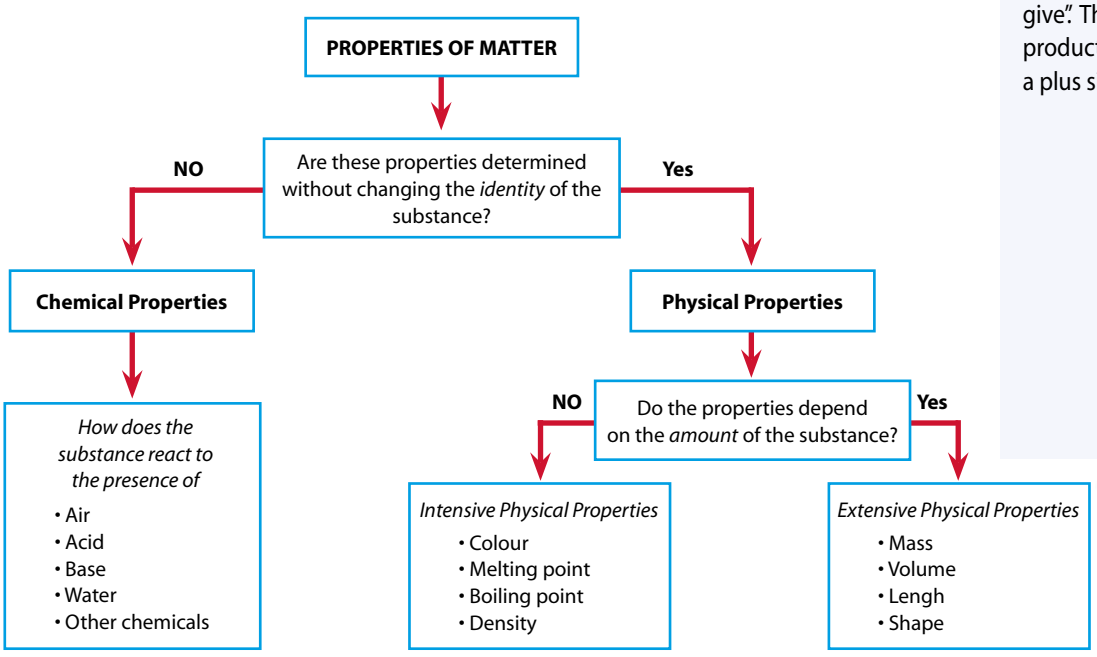
ONLINE RESOURCES

- **The essence of chemistry**
- **How fast?**

Acid Base Reactions, also called **Neutralisation Reactions**, involve the reaction between an acid and a base, which combine to give salt and water.
Combustion Reactions are redox[1] reactions in which a combustible material combines with an oxidizer to form oxidized products and generate heat (exothermic reaction). In a combustion reaction, oxygen usually combines with another compound to form carbon dioxide and water.
In a redox reaction, elements experience a change in oxidation number. They may involve the transfer of electrons between chemical species.
Precipitation Reactions are aqueous reactions that involve the formation of a solid precipitate.

How to read a chemical reaction

In a chemical equation, the formulae of the reactants and of the products are used. The reactants and products are connected by an arrow which may be read as "to yield/to form/to give". The reactants and the products are connected by a plus sign.



ACTIVITIES

12 **The passage you have just read mentions physical and chemical changes and properties. Since you probably already know a lot about these concepts, can you place these conditions under the correct heading? Then check your choices with your classmates'.**

boiling point • boiling water • breaking a bottle • burning wood • chopping wood • colour • cooking an egg • crushing a can • density • digesting food • dissolving sugar and water • explosion of fireworks • flammability • freezing point • heat of combustion • melting an ice cube • odour • oxidation • pH • photosynthesis • reactivity with water • rusting of iron • toxicity • viscosity

PHYSICAL CHANGES	CHEMICAL CHANGES	PHYSICAL PROPERTIES	CHEMICAL PROPERTIES

1. redox: short for reduction–oxidation (reaction).

13 Which of these words can be used instead of the words in italics in this abstract of the first part of the reading passage?

change • consumed • extinguished • generate • handling • 'ingredients' • jointly • manifest • material • observing • preserved • produced (2) • symbolised • velocity

A chemical reaction is a *process* (1) involving the transformation of a *substance* (2) (or substances) into another. Mass is *conserved* (3) in a chemical reaction. No atoms are *created* (4) or *destroyed* (5). The reactants are the *starting materials* (6) for a chemical reaction. The substances that react *together* (7) in the reactions are called the reactants; the substances that are *formed* (8) are called the products. Chemical reactions vary in *speed* (9). Catalysts speed up reactions without being *used up* (10). Physical changes do not *produce* (11) a new substance whereas chemical changes produce a new substance. Physical properties can be observed by *viewing* (12) or *touching* (13) a sample. Chemical properties become *evident* (14) when the material undergoes a chemical reaction. Chemical reactions can be *represented* (15) using equations.

14 Take turns in asking and answering these questions about the second part of the reading passage. Then talk about the main types of chemical reactions.

What happens in…

1. … combination reactions?
2. … decomposition reactions?
3. … substitution or single-replacement reactions?
4. … double-replacement reactions?
5. … acid base reactions?
6. … combustion reactions?
7. … oxidation-reduction reactions?
8. … precipitation reactions?

Artistic chemistry

Van Gogh made an indelible impression on modern culture with his art, but scientists in Belgium have discovered that some of his most famous works may be chemically altering over time.
The team examined Van Gogh's "Wheat stack under a cloudy sky" and "Sunflowers", one of Van Gogh's most famous works. Using spectromicroscopic methods, the researchers found that the yellow pigment lead chromate, located within the petals, is gradually changing colour under sunlight, darkening over time.

15 (2.2) **Listen to the recording and complete the passage *Combustion Reactions* with the missing words.**

Combustion reactions

Combustion is another name for (1) ..... It is an example of an exothermic (2) ....., a reaction that (3) ..... energy to the surroundings. This is mostly thermal energy, but (4) ..... energy and (5) ..... energy are also released. Some other reactions are endothermic reactions – they (6) .... energy from their surroundings.
(7) ....., (8) ..... and natural (9) ..... are fuels that are widely used. They contain (10) ....., which are compounds of hydrogen and carbon only. When the (11) ..... burns, its hydrocarbons react with oxygen.
Combustion is an example of a type of reaction called (12) ..... In an oxidation reaction, a substance gains (13) ..... While reacting with oxygen in the air in oxidation reactions, (14) ..... produce metal oxides and (15) ..... produce non-metal oxides.
Some (16) ..... break down when (17) ....., forming two or more (18) ..... from one (19) ..... This type of reaction is called thermal (20) ..... It is an example of an (21) ..... reaction. Different (22) ..... are needed to catalyse different reactions.
The exhaust systems of (23) ..... are fitted with catalytic (24) ....., which help reduce the release of (25) ..... gases from the exhaust (26) ..... The reactions in catalytic converters (27) ..... carbon monoxide – which is toxic – into (28) ..... dioxide and change (29) ..... oxides – which cause (30) .... – into nitrogen and oxygen.

PURE SUBSTANCES AND IMPURE MATERIALS

as: *since, because*
closer: *more precise*
evenly: *uniformly*
glance: *look*
ratio: *proportion*
spread out: *distributed*
to stand (stood-stood): *to remain immobile*
thoroughly: *completely*

Understanding mixtures

The key to understanding mixtures is that you can separate the substance into other substances physically, while you cannot do so with a compound.

In science, a **pure substance** contains only one element or compound. Impure materials may be mixtures of elements, mixtures of compounds, or mixtures of elements and compounds.

Elements

- consist of only one type of atom;
- can exist as either atoms or molecules;
- cannot be broken down into a simpler type of matter by either physical or chemical means.

Compounds

- consist of atoms of two or more different elements chemically joined together;
- always contain the same ratio of their component atoms;
- have fixed properties that are different from their component elements as a new substance is formed when the constituents are chemically combined;
- can only be separated into their elements by chemical means.

Mixtures

- consist of two or more different elements and/or compounds joined together physically, not chemically;
- have constituents which are present in varying ratios;
- do not have fixed properties;
- form no new substance and each substance in the mixture keeps its own properties;
- can be separated into their constituent parts by physical means.

Mixtures are absolutely everywhere. They may be made by dissolution of a solute in a solvent, or by diffusion, in which particles of different substances mix together.

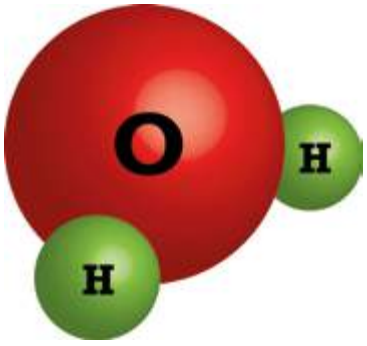
There are different types of mixtures.

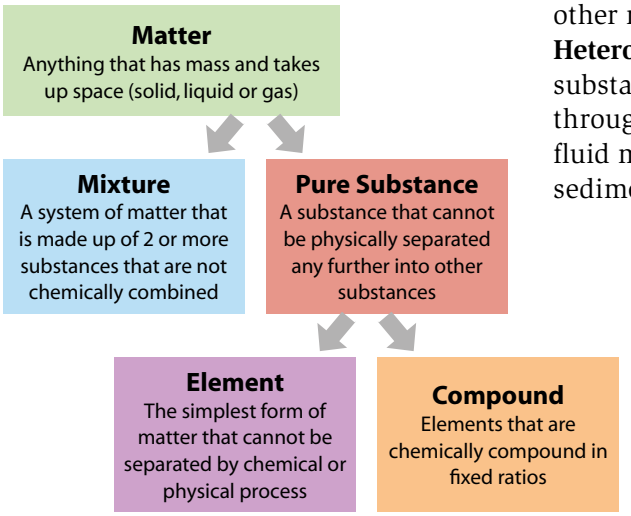
Homogeneous Mixtures – in which the two or more substances that form the mixture are evenly distributed throughout the mixture. Solutions are a special type of homogeneous mixtures in which one substance (the solute) is evenly spread out and thoroughly mixed in another substance (the solvent). They are the best mixed of all mixtures. Alloys are usually homogeneous mixtures in which the main element (or elements) are metal(s). Amalgams are special types of alloys that combine mercury and other metals.

Heterogeneous Mixtures – in which the two or more substances that form the mixture are not evenly distributed throughout the mixture. Suspensions are heterogeneous fluid mixtures containing solid particles large enough for sedimentation. The solid particles may be separated from the liquid by leaving it to stand or by filtration. Colloids are heterogeneous mixtures in which one substance is microscopically dispersed evenly throughout another substance. Emulsions are special colloids which have a mixture of oils and waters.

Some mixtures that appear homogeneous at first glance are heterogeneous upon closer inspection. Examples include blood and sand.

An example of compound: water





16 **Based on your experience, can you say which of these are elements, compounds, homogeneous or heterogeneous mixtures, solutions, suspensions, colloids and alloys? Write them in the correct column, then compare your choices in groups.**

aluminium foil • brass • bronze • cereal and milk • copper wire • dishwashing liquid • fruit salad • gasoline • gold • ice cubes in a drink • ice tea • mayonnaise • milk • salad dressing • salt • sand in water • sea water • snow globe • stainless steel • sugar • vinegar • vodka • water • whip cream

ELEMENT	COMPOUND	HOMOGENEOUS MIXTURE	HETEROGENEOUS MIXTURE	SOLUTION	SUSPENSION	COLLOID	ALLOY

17 **Use the prepositions/adverbs in the box to complete the summary of the reading passage.**

by • down • from • in • into • of • throughout • up

An element is as a pure substance made (1) ..... (2) ..... one type (3) ..... atom or molecule. An element cannot be broken (4) ..... (5) ..... simpler substances or transformed (6) ..... a chemical reaction. A compound is a pure substance made (7) ..... (8) ..... two or more types (9) ..... elements (atoms) chemically combined (10) ..... a fixed proportion. It can be further subdivided (11) ..... simpler substances (12) ..... chemical means only.

A mixture is a combination (13) ..... elements or compounds not chemically joined together. It can be further subdivided (14) ..... simpler substances (15) ..... physical means. Each substance keeps its own properties and can be separated (16) ..... the mixture.

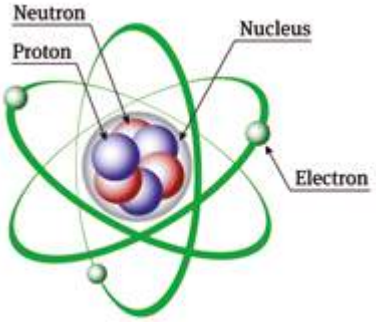
The constituents (17) ..... a homogenous mixture are uniformly mixed (18) ..... the mixture. The constituents (19) ..... a heterogeneous mixture are not uniformly mixed (20) ..... the mixture. (21) ..... a solution, the solute is the dissolved substance; the solvent is the substance doing the dissolving. A suspension is a mixture (22) ..... liquids with particles (23) ..... a solid which may not dissolve (24) ..... the liquid. A colloid is a mixture (25) ..... which one substance (26) ..... microscopically dispersed insoluble particles is suspended (27) ..... another substance. Basically alloys are a mixture (28) ..... two or more metals.

VOCABULARY

ACTIVITIES

1 What are these? Complete the captions

a. Molecules in the three main states of matter: ....., ..., ...



b. Structure of the .....

c. .....of the elements.

2 Which branches of Chemistry do these pictures refer to? Choose among: Biochemistry, Organic and Inorganic Chemistry.

a. .....

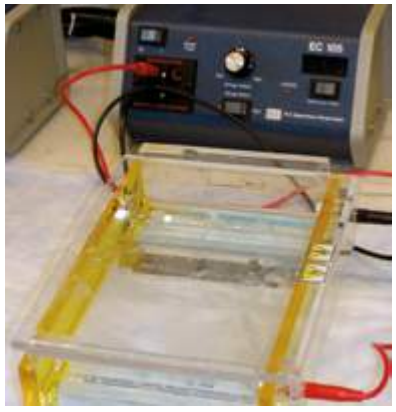
b. .....

c. .....

3 What is this apparatus used for? Choose from the following: Chromatography, Gel Electrophoresis, Titration.

a. .....

b. .....



c. .....

4 Try to unscramble these words used in Chemistry.

1. TOAM .....
2. IDLSO .....
3. IIUDQL .....
4. SGA .....
5. DAIC .....
6. ASEB .....
7. LMUOCELE .....
8. ELNTMEE .....
9. CUOPOMDN .....
10. IECSMHT .....

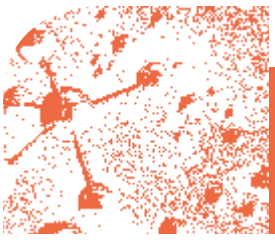
5 Complete the sentences using one of these verbs:

feel • hear • listen • look • see • smell • sound • taste • touch • watch

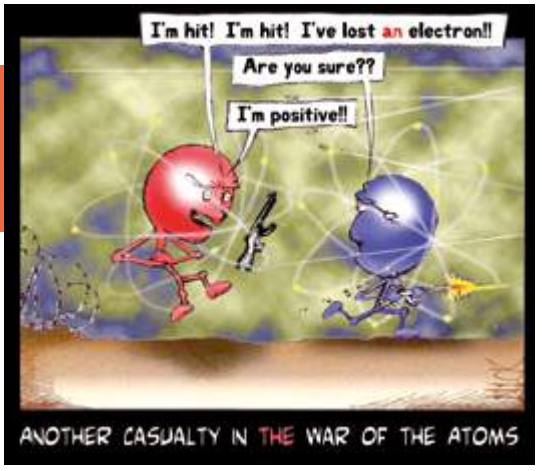
1. ..... at the blackboard, please!
2. I can't ..... anything, turn up the volume, please!
3. Can you ..... the sea from your window?
4. Don't ..... the pot, it's hot!
5. I usually ..... TV after dinner.
6. Mmm, I ..... coffee! Is it ready?
7. Would you like to ..... the cake I've made?
8. ..... my forehead, I'm afraid I've got a temperature.
9. ..... carefully to what he's saying!
10. Can you hear that? It ..... like the neighbour is playing his bass tuba again!

6 Which of the containers listed below would you use to hold liquids, solids and gases? Tick the appropriate column(s).

CONTAINER	SOLIDS	LIQUIDS	GASES
barrel			
bomb			
bottle			
box			
bucket			
can			
carton			
cylinder			
drum			
packet			
tank			
tin			



GRAMMAR



ARTICLES

Remember that the definite article *the* is used before nouns when the noun is specific or particular, whereas the indefinite article *a/an* refers to an indefinite noun. Using *a* or *an* depends on the sound that begins the next word.

7 **Use *a/an/the* or *no article* to complete the sentences.**

1. ..... organic chemistry is ..... study of ..... chemistry of ..... life.
2. ..... analytical chemistry is one of ..... branches of ..... chemistry.
3. ..... wide range of techniques is used to separate ..... chemical compounds.
4. ..... cellulose composes ..... cell walls of ..... plants.
5. ..... lipids are insoluble in ..... water.
6. ..... carbohydrates are produced in ..... green plants by ..... photosynthesis.
7. ..... bacteria are important agents in ..... cycles of matter.
8. ..... fungi include ..... moulds and ..... yeasts.
9. ..... cholesterol is ..... starting material for ..... production of ..... hormones.
10. ..... DNA stores ..... info about ..... sequence of amino acids in ..... body's proteins.
11. ..... pollution is created mainly by ..... human action.
12. I need ..... test tube, can you get me one, please?

INDEFINITES

Some and its compounds (+ *body/one/thing/where*) are normally used in affirmative sentences or when making an offer or a request. *Any* and its compounds are used in interrogative sentences. When they are used in affirmative sentences, there is a different meaning ('*no matter who/what*'). *No* and its compounds can be used instead of *not any* in negative sentences.

8 **Underline the correct alternative.**

1. *Some/any/no* lab worker must wear protective clothing.
2. *Somebody/anybody/nobody* should be allowed to pollute the environment.
3. I'm sorry but there's *something/anything/nothing* I can do to help you.
4. Bacteria can grow *somewhere/anywhere/nowhere*.
5. *Some/any/no* amino acids are essential to human life.
6. This experiment is very easy; *somebody/anybody/nobody* can do it.
7. There's *something/anything/nothing* I don't understand, I'll ask the teacher.
8. I had to talk to the teacher but she's *somewhere/anywhere/nowhere* to be seen.
9. Is *somebody/anybody/nobody* interested in deepening this topic?
10. I can't find my goggles *somewhere/anywhere/nowhere*. I must have left them *somewhere/anywhere/ nowhere* in the lab.

ACTIVITIES

COMPARISON

Remember that comparative forms show the difference between two things and superlatives are used when comparing three or more things.
Most one-syllable and some two-syllable adjectives form comparative and superlatives with *-er* (*than*) and (*the*) *-est* respectively. The final consonant doubles if preceded by a consonant. Two syllable adjectives ending in *-y* remove the *-y* and add *-ier* and *-iest*. Most two and all three- or more syllable adjectives place *more* and *the most* before the adjective.
There are also some irregular adjectives: *good/well* (*better*, *the best*), b*ad/badly* (*worse*, *the worst*), *far* (*farther*, *the farthest*), *little* (*less*, *the least*), *much/many* (*more*, *the most*).

9 **Give *comparative* and *superlative forms* of these adjectives.**

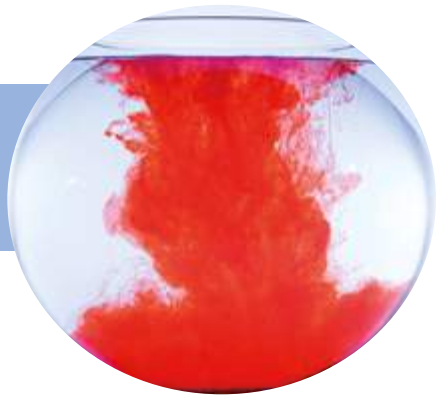
1. crucial	.....	.....	**7.** new	.....	.....
2. difficult	.....	.....	**8.** accurate	.....	.....
3. easy	.....	.....	**9.** big	.....	.....
4. high	.....	.....	**10.** fast	.....	.....
5. insignificant	.....	.....	**11.** small	.....	.....
6. low	.....	.....	**12.** wide	.....	.....

10 **Use *comparative* or *superlative forms* of the adjectives/adverbs in brackets to complete the sentences.**

1. Methane is (simple) ..... alkane.
2. Benzene is one of (well) ..... known aromatic hydrocarbons.
3. Cellulose is (common) ..... organic compound on Earth.
4. Carbohydrates are (abundant) ..... biomolecules.
5. Flavour enhancers make food taste (good) .....
6. Nucleic acids are (small) ..... organic chemicals in our body.
7. Micro-organisms are (old) ..... form of life on Earth.
8. Eukaryotic cells are (large) ..... and (complex) ..... than prokaryotic cells.
9. E. coli is (useful) ..... microbe in biotechnology.
10. The (good) ..... way to prevent pollution is not to throw harmful substances into the environment.
11. Acid rain is one of (important) ..... environmental problems.
12. Industrial production methods employing enzymes are (safe) ..... and environmentally (friendly) ..... than other methods.
13. Refrigeration and freezing are (popular) ..... forms of food preservation.
14. HACCP id (effective) ..... method of controlling foodborne disease.
15. Laboratory work is (exciting) ..... than class lessons.

ACTIVITIES

LISTENING



A CHEMISTRY LESSON

1 2.6 **You are going to listen to a lesson in which a Chemistry teacher revises the main ideas about chemical substances. While listening, fill in the blanks in the passage using the words in the box.**

atoms (2) • bases • change • compounds • electrons (2) • elements • formula • inorganic • liquid • matter • metals • metalloids • mixtures • molecule • negative • neutrons • no • non-metals (2) • nucleus • organic • oxygen • positive • protons • salts • solutions • suspensions • symbol • water

Chemistry deals with (1) ..... It studies the composition of substances, their action and the chemical changes they undergo.

Matter is made up of pure substances called (2) ....., which are identified by a name and represented by a chemical (3) ..... consisting of one or two letters. Elements are divided into (4) ..... (which are good conductors of electricity), (5) ..... (which are poor conductors of electricity), and (6) .....

Chemical elements are made up of (7) ..... An atom is the smallest particle into which an element can be subdivided without losing its characteristic properties.

The atom, too, is divisible into smaller particles: (8) ....., (9) ..... and (10) ..... The atom is divided into two regions: the (11) ....., or centre, in which the protons and neutrons are located, and a surrounding "orbit" or "cloud" or "shell", in which the (12) ..... move continuously. Protons and electrons carry one unit of (13) ..... and (14) ..... electrical charge respectively, while the neutron carries (15) ..... charge.

When two or more atoms are bonded together by electron sharing, they form a (16) .....

Chemical (17) ..... are made up of atoms of different elements combined. Their properties are often different from those of the elements that make them up. In fact, a chemical (18) ..... takes place when atoms of different elements combine to form a molecule. For example, two gases combined may form a (19) .....

Compounds may be (20) ..... or (21) ..... Inorganic compounds are divided into five groups: oxides – which are combinations of (22) ..... with metals; anhydrides – which are combinations of oxygen with (23) .....; acids – which are combinations of an anhydride with (24) .....; (25) ..... – which are combinations of oxides with water; and (26) ..... – which are combinations of a metal with a non-metal.

A chemical (27) ..... represents a molecule of an element or of a compound. It is made up of one or more symbols for the element or elements present in the molecule and subscripts showing the number of (28) ..... of each element present in the molecule.

Liquid or solid substances dissolved into other substances form (29) ..... Substances distributed but not dissolved into other substances form (30) ..... (31) ..... contain different substances which are neither chemically united nor uniformly distributed.

ACTIVITIES

SPEAKING

BE AN AMBASSADOR FOR CHEMISTRY!

1 **Divide the class into two groups: *Chemistry Convinced Fans* and *Chemistry Doubtful Fans*. The *Convinced Fans* should find reasons to persuade the *Doubtful Fans* to appreciate the science and the many benefits it provides society with. The latter put forward their point of view by highlighting the drawbacks of Chemistry.**

These hints might help the Chemistry Convinced Fans.

- I'm proud to be a chemist because …
- Chemistry has done more to improve the quality of life than any other science has.
- Most of the advances in materials and products that we benefit from today are a result of chemical research.
- Life expectancy has increased dramatically due to the discoveries of chemists and to products of the chemical and pharmaceutical industries.
- Chemistry helps us understand what makes up our food, our bodies and our surroundings.
- Chemistry is essential to provide safer new materials and sustainable energy sources, reduce waste and eliminate most sources of pollution thus saving the environment,
- The work done by chemists helps agriculture in providing better fertilizers and pesticides.
- Our manipulation of chemicals in a laboratory sounds like fun.

These hints might help the Chemistry Doubtful Fans.

- The science of Chemistry is good, but …
- We've got to keep in mind that what we do with it can harm us.
- The indiscriminate use of chemicals in many areas of human activities has created enormous pollution problems.
- A lot of testing on the long-term effects of new chemicals and new technologies is essential before we put them into use.
- We must remember that introducing a new chemical into the environment can cause disasters, such as the catastrophic effects of harmful substances like DDT and CFCs.
- Accidents in factories or during the transport of chemicals are frequent and can cause enormous damage. We cannot forget the Bophal disaster in India where a pesticide plant released enormous clouds of toxic gas which killed thousands.
- Working with Chemistry may be dangerous since we handle and are exposed to hazardous substances.

WRITING

NOTE-TAKING

1 **Jot down essential definitions for these concepts met in Module 2. Make your notes as brief as possible, use abbreviations or symbols whenever you can and then compare your notes with the textbook readings.**

Atom: .....

Atomic number: .....

Chemical change: .....

Chemical equation: .....

Chemical formula: .....

Chemical reaction: .....

Chemical symbol: .....

Compound: .....

Electron: .....

Element: .....

Gas: .....

Group: .....

Liquid: .....

Matter: .....

Molecule: .....

Neutron: .....

Nucleus: .....

Period: .....

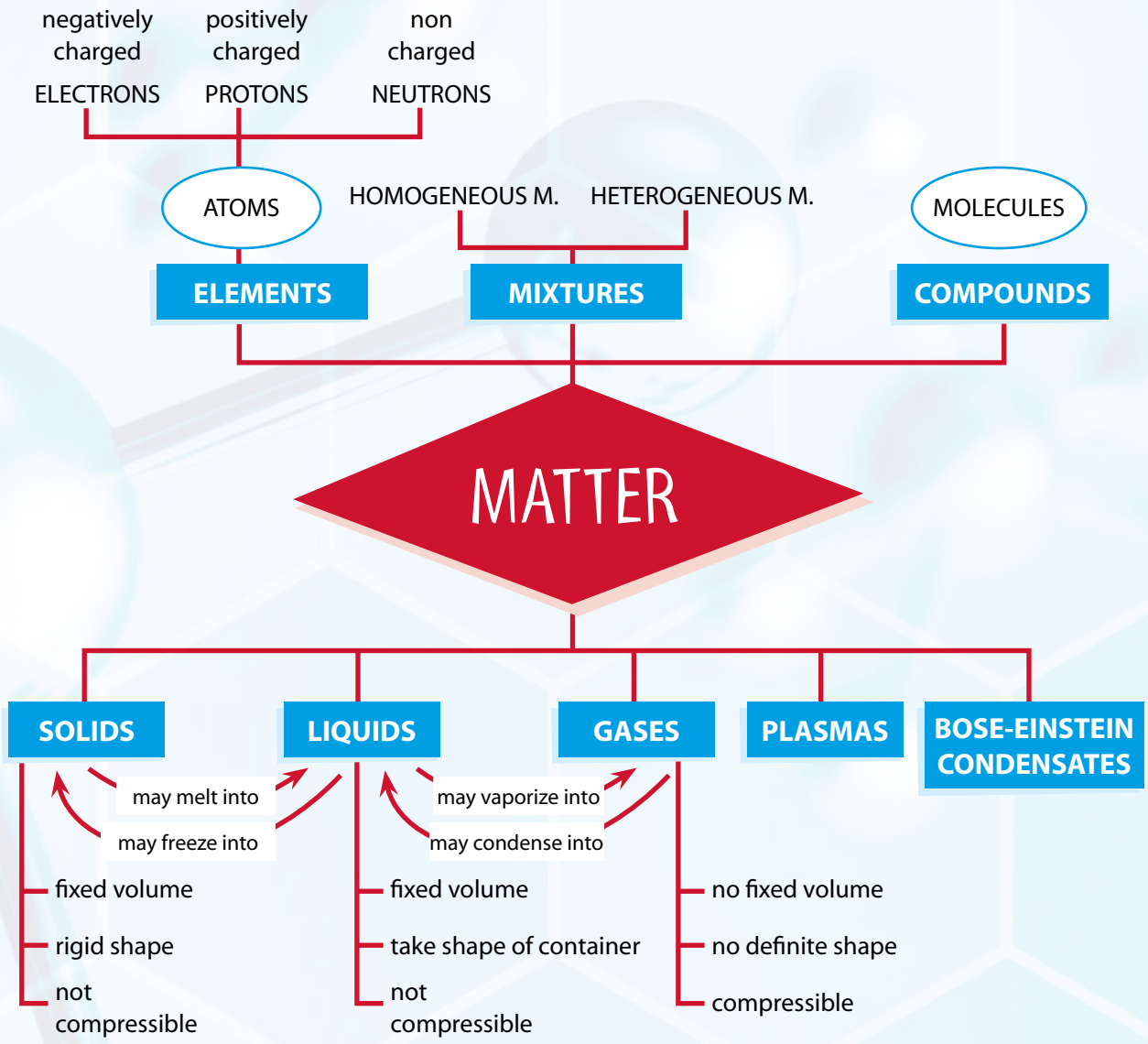
Periodic table: .....

Physical change: .....

Proton: .....

Solid: .....

MAPPING YOUR MIND



FILM

YOUNG FRANKENSTEIN

Young Frankenstein (1974) was written by Gene Wilder and Mel Brooks and directed by Mel Brooks. The film stars Gene Wilder (as Dr. Frankenstein), Peter Boyle (as the Monster), Marty Feldman (as Igor), Teri Garr (as Inga) and Cloris Leachman (as Frau Blucher)

- Included among the "1001 Movies You Must See Before You Die", *Young Frankenstein* has a legion of fans worldwide who laugh at gags, *double entendres*, Marty Feldman's goofiness and Wilder's insanity.
- In honour of the 40th anniversary of *Young Frankenstein*, Mel Brooks had a boulevard named after him in Hollywood. His comment? "People are going to walk all over me!"
- The brain which Igor is sent to steal (and which he drops) is labelled "Hans Delbrück, scientist and saint." There actually was a real-life Hans Delbrück, a professor at the University of Berlin who died in 1929. His son Max was a biochemist who won the Nobel prize for Physiology or Medicine. Brooks chose Hans Delbruk as the name of the genius because it sounded very similar to "Mel Brooks."
- Brook's *Young Frankenstein* is an affectionate homage to the classic *Frankenstein* of the '30s, directed by James Whale, starring Boris Karloff as the monster; the lab equipment used is from the original film.

A SYNOPSYS

In this parody of Mary Wollstonecraft Shelley's gothic tale *Frankenstein*, Dr. Frederick Frankenstein (pronounced "Fronkensteen" at his own insistence), grandson of Victor Frankenstein with whom he does not want to be confused, is a brain surgeon, professor at a New York medical school. When Frederick discovers that he has inherited the old family castle, he takes a train to Transylvania to check it out. At the castle, he meets the bug-eyed, hunch-backed servant Igor, the pretty blonde lab assistant Inga and the mysterious housekeeper Frau Blucher.
Frederick had always dismissed his grandfather's medical experiments as impossible, but he changes his mind after he discovers a book entitled "How I did it" by Victor Frankenstein. In the process of replicating his ancestor's experiments, in the same laboratory where Victor Frankenstein once reanimated a corpse, Frederick digs up the corpse of a criminal who has just been hanged, and intends to replace the brain with that of Hans Delbruck, "scientist and saint". But Igor drops the jar with Delbruck's brain and instead grabs a brain from another jar in the lab. Frederick performs the brain transplant and waits...

BEFORE VIEWING

1. Do you know who Mary Wollstonecraft Shelley was? If not, surf the net to find some information about her.
2. Have you ever read Mary Wollstonecraft Shelley's Frankenstein? If so, how did you like it?
3. Do you know where Transylvania is?

FILM CLIP

1 **Watch the film clip and fill in the script with the following phrases.**

are you all right • excuse me for one minute • is that what you're telling me • I will not be angry • may I speak to you • see who that is • sit down • that brain that you gave me • that was the name • whose brain I did put in

Inga has just injected the monster with a sedative, as he had woken up and tried to strangle Doctor Frankenstein.

Inga: Oh, Frederick, (**1**) .....?
Dr. Frankenstein: Yes. Would you (**2**) ....., dear?
Inga: Of course, Doctor.
Dr. Frankenstein: Igor, (**3**) ..... for a moment?
Igor: Of course.
Dr. Frankenstein: (**4**) ....., won't you?
Igor: Thank you.
Dr. Frankenstein: No, no. Up here.
Igor: Thank you.
Dr. Frankenstein: Now, (**5**) ....., was it Hans Delbruck's?
Igor: No.
Dr. Frankenstein: Good. Would you mind telling me (**6**) .....?
Igor: Then you won't be angry?
Dr. Frankenstein: (**7**) .....
Igor: Abby someone.
Dr. Frankenstein: Abby someone... Abby who?
Igor: Abby Normal.
Dr. Frankenstein: Abby Normal…
Igor: I'm almost sure (**8**) .....
Dr. Frankenstein: Are you saying that I put an abnormal brain into a seven-and-a-half-foot long, fifty-four inch wide gorilla? (**9**) .....
Igor: Quick, quick… Give him the…
Inga: What? Three syllables, yes…
(*loud knocking*)
Dr. Frankenstein: I wonder who that could be at this hour. Inga, quick.
(**10**) .....

QUOTES

Use these quotes from *Young Frankenstein* as debate topics.

- Dr. Frankenstein: If science teaches us anything, it teaches us to accept our failures, as well as our successes, with quiet dignity and grace.
- The Monster: In my loneliness, I decided that if I could not inspire love, which is my deepest hope, I would instead cause fear.

1. Do you share the opinion that science "teaches us to accept our failures, as well as our successes"? Have you ever experienced that personally? If so, how?
2. The Monster says, "In my loneliness, I decided that if I could not inspire love, which is my deepest hope, I would instead cause fear." Do you think that frightening others may be a way to attract attention by someone who is left alone or who is not loved?

A Matter of Life 3.0

A Matter of Life 3.0 è rivolto in particolare agli studenti dei corsi a indirizzo chimico, biochimico, microbiologico, alimentare e biotecnologico e, in generale, a coloro che hanno l'esigenza di utilizzare la lingua inglese come strumento di studio e/o di lavoro in questi settori.

Il testo si propone di:

- far acquisire le competenze necessarie per comprendere testi che presentano termini, espressioni, strutture sintattiche e modalità discorsive specifiche del linguaggio settoriale;
- migliorare le capacità di ricezione e produzione orale e scritta;
- arricchire il patrimonio lessicale;
- consolidare abitudini grammaticali corrette e approfondire alcune strutture;
- stimolare l'interesse e la partecipazione attiva degli studenti, dando spazio alla loro esperienza personale e a problematiche di attualità.

Contenuti Digitali Integrativi

- Numerosi testi per attività di approfondimento e di esercitazione
- Tracce audio in formato mp3
- Schemi e mappe che presentano i concetti chiave di ogni Unità
- Spunti per attività di *listening* e *speaking* tramite video

Per l'insegnante e l'uso in classe

Teacher's Book, disponibile sia in formato cartaceo sia digitale. Contiene:

- suggerimenti per la programmazione per competenze e per una didattica inclusiva;
- spunti per progetti di classe e *real-life tasks*;
- test di verifica di tutti i Moduli e le Unità, in formato editabile, anche per BES;
- materiali per la preparazione dell'Esame di Stato;
- soluzioni di tutti gli esercizi e dei test.

EDIZIONE **MISTA**
+ LIBRO **DIGITALE**