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UNIT TITLE: CHEMISTRY IN EVERYDAY LIFE

AUTHORS: Elena Hernández and Miquel Àngel Fuentes

CLASS/AGE: 4th ESO

SUBJECTS, LANGUAGES and/or TEACHERS INVOLVED: ENGLISH + SCIENCE (SUPPORT)

NUMBER OF LESSONS: 12 (+ resource bank)

COE LEVEL: A2

INTRODUCTION TO THE TASK

• We are surrounded by chemistry, but many people are not aware of that fact. By the end of this unit, you and your group will be able to explain to everybody how our everyday life is conditioned by chemistry and to which extent it is important in our lives

SUBJECT-MATTER OBJECTIVE/S / GOALS / COMPETENCES

By the end of the unit, students will be able to ...

- explain the presence of chemistry in their everyday lives.
- give your opinion about the use of chemical substances in daily products.
- discuss whether chemistry is just involved in manufactured products or not.
- outline some phenomena of our everyday lives from a scientific perspective.
- find and exchange information on the chemical explanation of some everyday facts.

SUBJECT MATTER CONTENTS:

MAIN TARGET KNOWLEDGE

- The presence of chemistry in food through the use of additives.
- The presence of chemistry in medicine through natural and manufactured remedies.
- The presence of chemistry in personal care products through its impact on our body.
- The presence of chemistry in housekeeping products and the dangers they involve.
- Be able to identify chemical hazard labels.
- The advantages and disadvantages of the presence of chemistry in our everyday life.

SUBJECT MATTER CONTENTS:

MAIN TARGET SKILLS

- Be able to explain how certain chemical reactions from everyday life work.
- Surf the Internet to find specific information.
- Develop a critical approach towards the presence of chemicals in our everyday life.
- Present a topic orally in public.
- Develop abilities to lower the anxiety that an oral presentation supposes.
- Contrast colloquial and formal registers and using them appropriately in e-mails.

CONTENT OBLIGATORY LANGUAGE:

DISCOURSE GENRE (TEXT TYPE): TO UNDERSTAND

- Understand instructions.
- Read labels.
- Understand explanatory texts.
- Scanning and skimming for information.

TO GENERATE

- Interacting and swapping information.
- Producing an explanation.
- Giving opinion and justifying it.
- Argue a point of view using formal register.
- Electronic texts.

CONTENT OBLIGATORY LANGUAGE:

TOPIC SPECIFIC

Chemistry, chemophobia, additives, preservatives, personal care products, household cleaning products, chemical hazards, allergic reaction, E numbers, flavour, controversy, environmentally concerned groups, toxic, blood analysis, to treat, disinfectants, ammonia, bleach.

ACADEMIC DOMAIN SPECIFIC

- If I did not have X, I would use Y instead.
- In order to
- I am writing to inform you about...
- Therefore,
- I look forward to hearing from you soon.

SOCIAL & CULTURAL VALUES // PERSONAL & EMOTIONAL DEVELOPMENT

- The fostering of cooperative learning.
- The dangers of certain products from our everyday life.
- The importance of the environment in our world.
- Collaborative work.

SUMMATIVE ASSESSMENT

TASK:

- Writing electronic texts: formal email and blog
- Making an oral presentation, with the use of a poster as visual support.
- Info-swapping.
- Synthesis game.

SUMMATIVE ASSESSMENT ASSESSMENT CRITERIA:

- Teacher's assessment will take into account self-assessment and peer evaluation.
- Participating actively in class: making public contributions, making peripheral contributions.

RESOURCES

- Computer, Internet connection, beamer, whiteboard. Science teachers (CLIL)
- ICT: MS Office (Excel, Word and PowerPoint), Moodle, Google Docs, Wordle, Word search generator, Blog, Youtube.
- For the synthesis game: boards, counters and coins.

CREDITS

- Materials for SESSION 2: Montserrat Argemí and Ester Caffarel.
- Photographs from *Flickr* (www.flickr.com) among other sources.
- Videos hosted in Youtube (www.youtube.com): -accessed on May 2010-
 - Video in session 2: by *Federchimica*.
 - Video in blog task 1: by 180 Amsterdam for MTV Switch.
 - Video in session 6: The Unsustainables by Sustainlane.
 - Video in blog task 2: by *The Plastic Pollution Coalition*.
 - Video in resource bank: by *Dr Helen Fisher for Chemistry.com*
- Fonts from *Dafont* (www.dafont.com).
- Advertisement in session 2 by SunFX (www.sunfx.com.au).
- Icons used in the experts activity from *Emotlife* (www.emotlife.com)

COMMENTS

- This document was created by the authors of 'Chemistry in Everyday life' Unit and it is meant for teacher's education purposes only, it being designed and piloted within UAB TED Master's Degree in the academic year 2009-2010.
- This document has been elaborated with images available on the Internet. Some of the images appearing may have copyright notices and usage restrictions.
- It is paramount to present and contextualise the unit goals and the main activities that will be carried out on the first session.
- The spontaneous interventions of the Science teachers, clarifying doubts from students and pointing out certain interesting aspects from the content, are precious and represent an exploitable and motivational part of the content lessons.
- This is more of a Content-based unit than a CLIL unit, which builds on and revises disciplinary science content that students covered during their previous years. The unit was implemented in the English class.
- All the Assessment material is meant to be shared with students, so they identify what is being evaluated and how. Self assessment and peer assessment is taken into account in the final mark.

THE KEY COMPETENCES IN THE UNIT*

(*according to the nomenclature and grouping in Catalonia: Generalitat de Catalunya - Decret 143/2007)

TRANSVERSAL COMPETENCES

Communicative:

Linguistic and audiovisual communication

- Interacting and swapping information.
- Producing an explanation.
- Giving opinion and justifying it.
- Argue a point of view using formal register.
- Present a topic orally in public.
- Differentiating between colloquial and formal registers and using them appropriately.

Cultural and artistic competence

• Creating a poster and using it as visual support for an explanation.

Methodological:

Data processing and digital competence

- Electronic texts (e-mails, blogs).
- Surf the Internet to find specific information.
- Using the school's Moodle.

Learning to learn

- The fostering of cooperative learning.
- Scanning and skimming for information.
- Develop abilities to lower the anxiety that an oral presentation supposes.

Personal:

Autonomy and personal initiative

- Scanning and skimming for information.
- Working in a cooperative and flexible way.
- Fostering of the dialog and negotiation.
- Develop abilities to lower the anxiety that an oral presentation supposes.
- Present a topic orally in public.
 - _____

COMPETENCES FOR CO-EXISTENCE AND LIVING IN THE WORLD

Competence in knowledge and interaction with the physical world

- Understand instructions.
- Understand explanatory texts.
- Be able to explain how certain chemical reactions from everyday life work.
- Be able to identify chemical hazard labels.
- The advantages and disadvantages of the presence of chemistry in our everyday life.
- Develop a critical approach towards the presence of chemicals in our everyday life.

Social and civic competence

- The dangers of certain products from our everyday life.
- The importance of the environment in our world.
- Collaborative work.
- Differentiating between colloquial and formal registers and using them appropriately.

• Argue a point of view using formal register.

Chemistry in everyday life Mute slideshow



What do you see in the slide? How is it connected to chemistry?

Slide 1	Slide 2
Slide 3	Slide 4
Slide 5	Slide 6
Slide 7	Slide 8
Slide 9	Slide 10

Video: Life without Chemistry



http://www.youtube.com/watch?v=Q3Tt2EM4e-U

1- Think about all the products that you use every morning when you wake up. How many of them do you think involve chemistry? Think of as many as possible!

2- Write down all the products that appear in the video and are chemically created. There are many!

3- Now that you have seen the video, think about what you would do if you had not any of the products that are chemically created.

You can use this structure! *If I did not have, I would use instead.* For instance: *If I did not have an alarm clock, I would use a rooster to wake up instead!*

4- Is chemistry good or bad according to the video?









During the last decades, some tragic episodes of contamination or illnesses have been attributed to the usage of some chemical products. This has driven some people to the assumption that "chemicals" are bad and harmful, while "natural" things are good and healthy. This fear towards "chemicals" has been named *chemophobia*.

1- What do you think this advertisement is about?

2- Compare the video and the advertisement. Who is behind each of them? Which is their purpose?

3- What is your personal opinion?



Blog task 1



Task posted at http://chemistryprojectsantquirze.blogspot.com/





"It doesn't really matter what it is or what it does or why it stinks or what it means as long as it is green..." ~♪

As you have noticed, this song mentions the word "green" a lot of times! What do you think this word means in this context? Is it related to chemistry?

Is "chemical" the contrary of "natural"? What do you think?

Share your opinion! :)

Remember to write your name in the comment !!!



Chemistry in everyday life: Word search



Search the following words below:

additives eyeliner lipstick dopamine corrosive

- bicarbonate pollution sulfur dioxide freezing
- pheromone nicotine carcinogenic light bleach
- flavour deodorant toothpaste aspirin asphalt





Chemistry in Diet



1. List 10 food items that contain food additives.

2. Match each additive to its effect on food:



3. Provide two examples of food items which contain the following:

food coloring:

flavour enhancer:

flavour:

sweetener:

preservatives:



Chemistry in Personal care products



- **1.** Interview your partner about the personal care and cosmetic products that he or she has used today.
- **2.** Relate these products to the chemical composition.

1. Deodorant	2. Shampoo	3. Toothpaste	
4. Shaving gel	5. Mouthwash	6. Talcum powder	

()	It is generally made by Sodium lauryl sulfate, a preservative and fragrance.
[]	It contains Aluminium chloride, and other aluminium compounds are the most widely used antiperspirants.
()	It is composed of a Magnesium Silicate, commonly used as an astringent.
()	It uses fluoride to protect against tooth decay. It can include menthol, hydrogen peroxide, and fluoride.
	It commonly consists of a mixture of oil, soaps, surfactants, and water or alcohol, carefully controlled to ensure proper pH and consistency.
	It contains active ingredients such as fluoride or xylitol. Sodium fluoride (NaF) is the most common one.

3. Fill in the gaps of the text with the words from the box.

works	dose	in order to	acidity	exfoliant	skin care
Glycolic acid	is generally use	ed as a natura	ıl skin	and moist	urizer in many
pr	oducts such as o	creams, lotions,	etc. Glycolic ac	id a	as an exfoliating
because of its high but easy solubility. As a large can be dangerous,					
the glycolic acid dose in any cream must be very small make sure no damage is					
done to skin.					



Chemistry in medicine



1. Write down some medicines that you always have at home and explain their use.

2. Fill in the gaps of the grid with the words from the box:

bicarbonate of soda Enos salts magnesium sulfate used as a laxative acetylsalicylic acid	{	ascorbic acid		hydrogen peroxide	
used as a laxative acetylsalicylic acid		bicarbonate of soda	Enos salts	magnesium sulfate	
		used as a laxati	ve	acetylsalicylic acid)

Common Name	Scientific Name	Use
(1)	sodium citrate	Antacid and reliever of
		bloatedness.
Ensom Salts	(2)	For topical application in
Lpsom Saits	(2)	treating aches and pains.
Milk of Magnesia	magnesium hydroxide	
		(3)
		Treatment of pain,
Aspirin	(4)	reduction of high
		temperatures.
		Antiseptic that helps
(5)	sodium bicarbonate	prevent infections
		occurring.
Porovido	(6)	Used as a disinfectant and
Feloxide		antiseptic.
Vitamin C	(7)	Essential for the body.
		Prevents scurvy.



Chemistry in household cleaning products



1. Fill in the grid with the information from the jigsaw:

IMAGE	NAME IN CATALAN	NAME IN ENGLISH	DEFINITION
	C Corrosiu		
		E Explosive	Substances and preparations which may explode under the effect of flame or which are very sensitive to shocks or friction.
			These chemicals catch fire in contact with air and with liquid having a flashpoint below 21°Clike ethanol
	F+ Extremadament inflamable		Liquid substances and preparations that catch fire in contact with substances with a flashpoint between 21°C and 55°C.
	O Comburent		Substances capable of burning other substances, facilitating the combustion and preventing the extinction of the fire.
	T Tòxic	T Toxic	
T+			Substances and preparations which through inhalation, ingestion or skin penetration may cause severe health problems and even death.
			Substances and preparations which through inhalation, ingestion or skin penetration may cause temporary health problems or allergic reactions.
			Substances and preparations which can cause an inflammatory reaction when in immediate, prolonged or repeated contact with skin or mucous membranes.
	N Perillós pel medi ambient		



Household Cleaning Products Chemical hazards jigsaw



Instructions:

A set of cutouts is given to each pair of students for them to arrange (4 minutes approx).

Once they finish, the teacher go through the results eliciting the results from the whole group.

Students have to fill in the grid in the handout with the correct information.

IMAGE	NAME IN CATALAN	NAME IN ENGLISH	DEFINITION
	C Corrosiu	C Corrosive	These chemicals cause destruction of tissues and inert materials.
	E Explosiu	E Explosive	Substances and preparations which may explode under the effect of flame or which are very sensitive to shocks or friction.



	F Inflamable	F Highly flammable	These chemicals catch fire in contact with air and with liquid having a flashpoint below 21°C. -like ethanol
F+	F+ Extremadament inflamable	F+ Extremely flammable	Liquid substances and preparations that catch fire in contact with substances with a flashpoint between 21°C and 55°C.
	O Comburent	O Oxidizing	Substances capable of burning other substances, facilitating the combustion and preventing the extinction of the fire.
	T Tòxic	T Toxic	Substances and preparations which through inhalation, ingestion or skin penetration may cause acute or chronic health problems.



T+	T+ Altament tòxic	T+ Very toxic	Substances and preparations which through inhalation, ingestion or skin penetration may cause severe health problems and even death.
	Xn Nociu	Xn Harmful	Substances and preparations which through inhalation, ingestion or skin penetration may cause temporary health problems or allergic reactions.
	Xi Irritant	Xi Irritant	Substances and preparations which can cause an inflammatory reaction when in immediate, prolonged or repeated contact with skin or mucous membranes.
	N Perillós pel medi ambient	N Dangerous for the environment	The contact of these substances with environment can damage the ecosystem in short or long term.



Schoolgirl Suffers Severe Allergic Reaction to L'Oreal Hair Dye



Today the Daily Mail reported a story about Carla Harris, a 15 year old schoolgirl who suffered a potent allergic reaction to L'Oreal Recital hair dye, causing her head to swell up to twice its normal size, leaving the teenager in agony for several days.

Despite conducting a patch test prior to using the product, Carla still had a severe reaction after using the L'Oreal hair dye and was admitted into hospital and treated with antihistamines and steroids.

Carla and her mother Lynn have called for the banning of *paraphenylenediamine* (PPD), the toxic chemical that doctors suggested caused the problem.

Two-thirds of hair dyes contain PPD, which was banned from use in hairdyes in the 20th century in Germany, France and Sweden, because concerns arose about its harmful effects.

I can sympathise, when I was 16 years old after a number of years using hair dyes without adverse reactions, I applied a semi-permanent hair dye which caused over a third of my hair to fall out.



Schoolgirl Suffers Allergic Reaction to Hair Dye

Unfortunately it never grew back and in subsequent years more of hair fell out. I just put it down to me being sensitive but my mother told a woman at her workplace about my unfortunate incident with the hair dye and she explained that her daughter had used the very same hair dye and all of her hair had fallen out.

It wasn't until many years later that I began to research the toxicity of ingredients used in cosmetics and other beauty products.

Schoolgirl Suffers Severe Allergic Reaction to L'Oreal Hair Dye \mid toxicbeauty.co.uk

http://toxicbeauty.co.uk/blog/2009/04/16/schoolgirl-suffers-severe-allergic-reaction-to-l%e2%80%99oreal-hairdye/#more-508

April 16, 2009 by DawnM



Some questions about the article...



1. What happened to Carla Harris?

2. What is the problem with *para-phenylenediamine* (PPD)?

3. What happened to the author of the text when she was 16 years old?

4. What do you think these words mean according to the text?

To swell up:		
a) to turn abnormally red	b) expand abnormally	c) to shrink abnormally
Patch test:		
a) a test to determine allergic sensitivity	b) a price reduction	c) a test to determine colour
To ban:		
a) to promote something	b) to cancel something	c) to prohibit something
To concern:		
a) to remember something	b) to believe	c) to worry
To symphatise:		
a) to make someone happy	b) to laugh a lot	c) to understand somebody's feelings
Sensitive:		
a) delicate	b) sensible	c) rough



5. Do you think that this article aims just to *inform*? Or is it to **persuade**?



- 6. What is the message of the article?
- 7. Who do you think the author is writing to?
- **8.** If something similar happened to you, would you be that concerned on the topic?







To: Smokey.Irons@yummy-preservers.co.uk

CC:

BCC:

Subject: Proposal for the improvement of your products

Х-----

Dear Mr Irons,

*-----

I am writing to inform you about the dangers of chemistry in our environment. I am a anti-chemicals activist concerned about the future of our planet.

*-----

One of my most recent studies has discovered the problems that a certain chemical substance present in plastic bottles, named bisphenol-A (BPA), is very dangerous for both our body and our environment.

⊁-----

The exposure to BPA, used in food and beverage containers, is directly associated with increases of heart disease and diabetes in humans.

Ж-----

Therefore, I would like to support the ban of this chemical substance in the making of your product containers.

*-----

I would be grateful if you considered this proposal and I look forward to hearing from you soon.

⊁-----

Yours sincerely, Margaret Green



A formal e-mail



To: Smokey.Irons@yummy-preservers.co.uk

CC:

BCC:

Subject: Proposal for the improvement of your products

Dear Mr Irons,

I am writing to inform you about the dangers of chemistry in our environment. I am a anti-chemicals activist concerned about the future of our planet.

One of my most recent studies has discovered the problems that a certain chemical substance present in plastic bottles, named bisphenol-A (BPA), is very dangerous for both our body and our environment.

The exposure to BPA, used in food and beverage containers, is directly associated with increases of heart disease and diabetes in humans.

Therefore, I would like to support the ban of this chemical substance in the making of your product containers.

I would be grateful if you considered this proposal and I look forward to hearing from you soon.

Yours sincerely, Margaret Green



V Tips for writing a formal e-mail



DOs	DON'Ts
 Use an informative subject line that says what the email is about. Write the most important information first. Write short and comprehensible sentences. Use paragraphs to keep the email clear and easy to understand. 	 ☑ Write "Hello!" as your subject line. ☑ Write about irrelevant issues. ☑ Use CAPITAL LETTERS to write whole words. It is considered shouting!!! ☑ Use abbreviations like "I'm" or "I've". ☑ Use smileys. For example :-) or (^_^).

Some useful phrases to state facts and express your opinion...



Stating (scientific) facts...

Researches point out that… Actually, In fact,

As a matter of fact, Results show that... For this reason,

Stating your opinion...

In my opinion, I think that... As far as I am concerned, *I believe that... It seems reasonable that... Personally,*

Adding information Apart from this/that, Furthermore, Besides,

Moreover, In addition,

Giving examples For example,

Rephrasing In other words,

Beginning a composition To begin with,

For instance,

That is to say,

Ending a composition *In conclusion,*

To sum up,

Firstly,



Listening: Plastic pollution



Listen and fill in the gaps of the text. You have a clue next to each gap to help you find the word.



Plastic fragments contaminate even the most (1)...... (*far away*) locations on (2)...... (*our planet*), and harmful chemicals leached by plastics are present in the (3)...... (*blood flow*) and (4)...... (*cells*) of almost every one of us.

(9)..... (*misuse*) of throwaway plastics, such as bottles, containers, bags, and packaging, has spiraled out of control.



Recycling is not a sustainable solution. The reality is that most of our plastic is land filled, down cycled or exported to other countries. And tragically, millions of tons of plastic are (10)...... (*residue*) our oceans.



Businesses and governments need to take responsibility for new ways to design, (11)...... (*get back*) and dispose of plastics.

societies away from the (13)..... (*something that you just use once*) habits that (14)..... (*make lethal*) our oceans and land, eliminate our consumption of throwaway plastics, and begin embracing a culture of sustainability.

Blog task 2



Task posted at http://chemistryprojectsantquirze.blogspot.com/



World Oceans Day Statement on Plastic Pollution

Do you know where our plastic goes?

Did you know that our oceans are filling up with plastic pollution?

Listen to the following presentation by Charles Moore, an oceanographer who pioneered the study of plastic debris, the Strategic Council on Plastic Pollution convened at the Google Campus in Mountain View, California on June 4, 2009.

What is your opinion on this problem? What is the best solution?

Remember to write your name in the comment!



The chemistry around us: Oral presentations



Now it's your turn to explain how chemistry is involved in our everyday lives!!

In pairs or groups of three, you will be given one of these 6 topics:



Once you are given a topic, you and your partner(s) will have to tell the rest of the class about these phenomena <u>from a scientific</u>

perspective.

Some instructions:

- Each presentation will last 5 minutes approximately.
- Each member of the group must talk.
- You will be given a set of useful links to help you prepare your presentation in the Moodle.
- Prepare a poster together to illustrate your explanation.
- All the key words from the list given for each topic must appear.



STRUCTURE:



Follow these questions in order to prepare your oral presentations:

- 1. What is the question you are going to answer?
- 2. Why is it important to answer this question? Give examples from everyday life!
- 3. Which is the chemical reaction you are going to talk about?
- 4. How is chemistry involved in this topic?
- 5. Add your personal conclusion.

LIST OF KEY WORDS:

1. Why is the sky b	lue?					
Key words: wavelengths scatter	wider narrower spectr Rayleigh scattering molecules					
2. How do soaps cl	ean?					
Key words: hydrophilic surfactant	hydrophobic emulsification	head molecules	grease			
3. Why does salt m	elt ice?					
Key words: melting point Fahrenheit	freezing point de-icing agent	temperature molecules	solute			
4. Why cutting onio	on makes us cry?					
Key words: sulfur lachrymal glands	tear ducts reflex tears	irritating amino acid su	sulfuric acid Ilfoxides			
5. Why do cut appl	es, pears, bananas and po	otatoes turn brow	wn?			
Key words: enzyme oxidation	pH lemon juice	surface oxidase	polyphenol preservative			
6. Why is smoking harmful for our body?						
<i>Key words:</i> nicotine carbon monoxide	addictive smoker	dopamine non-smoker	tar carcinogenic			

Resources for the Oral presentation to upload in the Moodle (accessed on May 2010):



1. Why is the sky blue?

http://www.youtube.com/watch?v=u4hw-aXiQmc http://www.silviamar.com/Documents/sky.htm http://www.sciencemadesimple.com/sky_blue.html http://spaceplace.nasa.gov/en/kids/misrsky/misr_sky.shtml

2. How do soaps clean?

http://candleandsoap.about.com/od/soapmakingbasics/ss/howsoapcleans 6.htm http://www.silviamar.com/Documents/soap.htm http://wiki.answers.com/Q/How does soap work to clean things http://chemistry.about.com/od/howthingswork/f/detergentfag.htm

3. Why does salt melt ice?

http://antoine.frostburg.edu/chem/senese/101/solutions/faq/why-salt-meltsice.shtml http://science.howstuffworks.com/road-salt.htm http://wiki.answers.com/Q/Why_does_salt_melt_snow_and_ice http://chemistry.about.com/b/2010/01/28/why-does-salt-melt-ice.htm http://www.highlightskids.com/Science/ScienceQuestions/h1sciQsaltMelt.asp

4. Why cutting onion makes us cry?

http://chemistry.about.com/od/chemistryfaqs/f/onionscry.htm http://www.silviamar.com/Documents/onion.htm http://wiki.answers.com/Q/Why do onions make you cry http://recipes.howstuffworks.com/question539.htm

5. Why do cut apples, pears, bananas and potatoes turn brown?

<u>http://chemistry.about.com/od/chemistryfaqs/f/brownapplefaq.htm</u> <u>http://chemistry.about.com/od/demonstrationsexperiments/ss/appleenzyme.htm</u> <u>http://www.chymist.com/Apple%20browning.pdf</u>

6. Why is smoking harmful for our body?

<u>http://www.youngwomenshealth.org/smokeinfo.html</u> <u>http://www.quit-smoking-stop.com/harmful-chemicals-in-cigarettes.html</u> <u>http://www.silviamar.com/Documents/smoking.htm</u> <u>http://www.medicalnewstoday.com/articles/10566.php</u>



How much do you know about chemistry?



Rate:

Rate:

Rate:

Rate:

Rate:

Rate:

Listen to your classmates and answer 5 of these questions (you need not to answer the topic your presentation is about).

• Why is the sky blue?

NEW WORDS:

• How do soaps clean?

NEW WORDS:

• Why does salt melt ice?

NEW WORDS:

• Why cutting onions makes us cry?

NEW WORDS:

• Why do cut apples, pears, bananas and potatoes turn brown?

NEW WORDS:

• Why is smoking harmful for our body?

NEW WORDS:





chemistry in diet

Food additives are substances added to food to preserve **flavour** or improve its taste

and appearance. Some additives have been used for centuries; for example, salting, as with bacon, **preserving** sweets or using sulfur dioxide as in some wines.



With the advent of processed foods in the second half of the 20th century, many more additives have been introduced, of both natural and artificial origin. This has led to **legislation** in many countries regulating their use.



To regulate these additives, each additive is assigned a unique number, termed as "**E numbers**", which is used in Europe for all approved additives. **E numbers** are all prefixed by "E", but countries outside Europe use only the number.

There is **controversy** associated with the risks and benefits of **food additives**. Some artificial food additives have been linked with cancer, digestive problems, and diseases like heart disease or obesity.

Even "natural" additives may be harmful in certain quantities (table salt, for example) or because of allergic reactions in certain individuals. However, the right use of **food additives** does not have to be harmful for us since our body is composed of chemical elements as well.



chemistry in personal care

Personal care is the industry which manufactures consumer products used for beautification and in personal hygiene. **Personal care products** may include fragrances, lotions, shampoos, soaps, toothpastes, and sunscreen. Nowadays, the focus of many **environmentally concerned groups** is to decrease the amount of chemicals used in personal care products.







colored products intended to alter the user's appearance.

However, **COSMETICS** are not something new for us. The first archaeological evidence of cosmetics usage is found in Ancient Egypt around 4000 BC. The Ancient Greeks and Romans also used cosmetics. The Romans and Ancient Egyptians, not realizing their **dangerous properties**, used cosmetics containing mercury and white lead, which are very dangerous for the body.

Criticism of cosmetics has come from a variety of sources including feminists, animal rights activists, and public interest groups. There is a growing awareness and preference for cosmetics that are without any supposedly **toxic ingredients**, especially those derived from petroleum. Even though many cosmetic products are regulated, there are still health concerns regarding the presence of harmful chemicals within these products.





chemistry in medicine

A **pharmaceutical drug** also referred to as **medicine**, can be defined as any chemical substance intended for use in the medical diagnosis, treatment, or prevention of disease.

Chemistry is a huge part of medicine, both in diagnostic and treatment. Chemistry departments in hospital medical laboratories analyze blood for proteins, sugars, and other metabolic and inorganic substances. **Blood analyses** test the amount of potassium and sodium in our blood.



However, the presence of chemistry in medicine is nothing new. Using plants and plant substances **to treat** all kinds of diseases and medical conditions is believed to date back to **prehistoric medicine**.



The presence of chemistry is so connected to medicine that some substances have received a common name in our everyday life, while scientists refer to them according to their **scientific name**. For example, this is the case of "**Vitamin C**", which its scientific name is "**ascorbic acid**". Ascorbic acid is

essential for the body and prevents us from getting illnesses such as **SCUrvy**, which used to be a very common illness among sailors in the past.

Other examples would be **"Enos salts**", which its scientific name is **"sodium citrate**", best known for working as an antacid and **"Bicarbonate of soda**", which its scientific name is **"sodium bicarbonate**".

chemistry in housekeeping



Various **household cleaning products** have been developed to facilitate the removal of dust and dirt, for surface maintenance, and for disinfection. Products are available in powder, liquid or spray form. The basic ingredients determine the type of **cleaning tasks** for which they are suitable.

Household cleaning products provide hygiene benefits but are also associated with **health risks** for the users.

Alkaline chemicals are good for cleaning grease and mud stains. **Acids** are good for stains of mustard, coffee, tea, and alcoholic beverages. **Disinfectants** stop smell and stains caused by bacteria.



When multiple chemicals are applied to the same surface, the chemicals may interact and become dangerous. An example of this is the mixing of **ammonia**-based cleaners (or acid-based cleaners) and **bleach**, which could cause death through the inhalation of its toxic fumes.

Other modes of exposure to potentially harmful household cleaning chemicals include absorption through the skin, accidental ingestion, and accidental splashing into the eyes.

There is a growing consumer and governmental interest in **natural cleaning products**. The use of **nontoxic household chemicals** is growing as consumers become more informed of the health effects of many household chemicals.



Expert text 1 B



chemistry in diet

Food additives are substances added to food. They preserve **flavour** or improve the taste and appearance. Some additives have been used for centuries. For example: **preserving** sweets, using salt to preserve bacon or using sulfur dioxide to preserve wines.



Processed food was introduced in the second half of the 20th century. Many more additives of natural and artificial origin have also been introduced. This has led to **legislation** in many countries. This legislation regulates their use.



To regulate these additives, each additive is assigned a unique number named "**E number**". This is used in Europe for all approved additives. **E numbers** are all prefixed by "E", but countries outside Europe use only the number.

There is **controversy** with the risks and benefits of **food additives**. Some artificial food additives have been linked with cancer, digestive problems, and diseases like heart disease or obesity.

Even "natural" additives may be harmful in certain quantities (table salt, for example) or because of allergic reactions in certain individuals. However, the right use of **food additives** does not have to be harmful for us since our body is composed of chemical elements as well.





Expert text 2 B

chemistry in personal care

Personal care is the industry that produces consumer products used for beautification and in personal hygiene. **Personal care products** may include fragrances, lotions, shampoos, soaps, toothpaste, and sunscreen. Nowadays, the focus of many **environmentally concerned groups** is to decrease the amount of chemicals used in personal care products.



Cosmetics are substances used to enhance the appearance or odor of the human body. A subset of cosmetics is called "**Make-up**". This basically refers to colored products intended to alter the user's appearance.



However, **cosmetics** are not something new for us. The first archaeological evidence of cosmetics usage is found in Ancient Egypt around 4000 BC. The Ancient Greeks and Romans also used cosmetics. The Romans and Ancient Egyptians, not realizing their **dangerous properties**, used cosmetics containing mercury and white lead. These are very dangerous for the body.

Criticism of cosmetics has come from a variety

of sources including feminists and animal rights activists. Many people is worried about this and prefer cosmetics that are made without any supposedly **loxic ingredients**. Even though many cosmetic products are regulated, many people still worries about the presence of harmful chemicals in these products.





Expert text 3 B

chemistry in medicine

A **pharmaceutical drug** also referred to as **medicine**, can be defined as any chemical substance used in the medical diagnosis, treatment, or prevention of disease.

Chemistry is a huge part of medicine. Medical laboratories in hospitals analyze blood for proteins, sugars, and other substances. **Blood analyses** test the amount of potassium and sodium in our blood.



However, the presence of chemistry in medicine

is nothing new. Using plants and plant substances **to treat** all kinds of diseases and medical conditions is believed to date back to **prehistoric medicine**.



The presence of chemistry is so connected to medicine that some substances have received a common name in our everyday life, while scientists refer to them according to their **Scientific name**. For example, this is the case of

"Vitamin C", which its scientific name is "ascorbic acid". Ascorbic acid is essential for the body and prevents us from getting illnesses such as

SCURVY, a very common illness among sailors in the past.

Other examples would be **"Enos salts**", which its scientific name is **"sodium citrate**", a very common antacid and "**Bicarbonate of soda**", which its scientific name is **"sodium bicarbonate**".





Expert text 4 B

chemistry in housekeeping



Various **household cleaning products** have been developed to facilitate the removal of dust and dirt, for surface maintenance, and for disinfection. Products are available in powder, liquid or spray form. The basic ingredients determine the type of **cleaning tasks** for

which they are good for.

Household cleaning products provide hygiene benefits but are also associated with health risks for the users. Alkaline chemicals are good for cleaning grease and mud stains. Acids are good for stains of mustard, coffee, tea, and alcoholic beverages. Disinfectants stop smell and stains caused by bacteria.





When multiple chemicals are applied to the same surface, the chemicals may **interact** and become dangerous. An example of this is the mixing of **ammonia**-based cleaners (or acid-based cleaners) and **bleach**, which could cause death through the inhalation of its toxic fumes.

Other dangers of household cleaning chemicals include absorption through the skin, accidental ingestion, and accidental splashing into the eyes.

Many people prefer **natural** cleaning products. These contain **nontoxic** household chemicals. These are preferred because consumers are becoming more informed of the health effects of many household chemicals.



CHEMISTRY IN ACTION COMPETITION Experts group instructions



STEP 1: Find new partners

Four students sit together. They form a team. They choose an icon. Each icon represents a topic.

STEP 2: Find new partners

Students with the same icon join in groups.

STEP 3: Become an expert



Together **read** and **understand** your topic's text.

Together **learn** the content and try to **memorize** as much as you can.

Practice saying the content out loud. **Ask your partner** if they have any question or doubt!

Give your text to your teacher and go back to your place.

STEP 4: Teach and learn

Students come back to their home teams



The objective is that **all of you** learn the information contained **in all 4** texts. You can **take notes.**

Teach to your teammates all that you have learned.

Listen and learn all that your teammates have learned.

STEP 4: The competition!

Your teacher will test **you and your team** to make sure that you have been working hard!







Are you true experts?



Can you and your group answer these questions?

What are cosmetics? Give some examples.

Who used cosmetics in the past?

Add another question.

*-----

What are the 'E numbers'?

Give some examples of natural food additives and artificial food additives.

Add another question.

Х-----

Which substances in our body are analysed in blood analyses?

What is the way to prevent scurvy? What do you need to eat?

Add another question.

Х-----

What are some risks of household cleaning products?

Which are the advantages of using natural household cleaning products?

Add another question.



Name:

4.

the quiz

- **Choose the correct statement: personal care (1 point)** a) Only feminist organizations have criticised the use of toxic products in cosmetics.
- b) Only animal rights activists have criticised the use of toxic products in cosmetics.

Spanish Ancient Italy Greeks Romans Ancient China English

c) Both feminists and animal rights activists have criticised the use of toxic products in cosmetics.

5. Match the common name of these substances to their scientific name: (1 point)



6. Choose the correct statement: (1 point)

Ancient Egypt

- a) Blood analyses check the amount of uranium and mercury in your blood.
- b) Blood analyses check the amount of lithium and zinc in your blood.
- c) Blood analyses check the amount of sodium and potassium in your blood.

7. Is this statement true or false? (1 point)

"Acids are good for stains of mustard, coffee, tea, and alcoholic beverages."

TRUE

8. Finish the following statement: (2 points)

If we mix bleach and ammonia...



FALSE

Name:



1 Choose the correct statement: (1 point)

a) E numbers are only used in Europe.

b) E numbers are used all over the world but outside Europe they do not use the "E".c) E numbers are used all over the world. They use the "E" outside Europe, too.

2. Is this statement true or false? (1 point)

"Additives from natural products can never be harmful for our body."

 TRUE
 FALSE

 3.
 Fill in the gaps of the text with some of the words from the box: (2 points)

 "The first archaeological evidence of cosmetics usage is found in around

4000 BC. Theandand also used cosmetics."

Ancient Egypt Spanish Ancient Italy Greeks Romans Ancient China English

4. Choose the correct statement: (1 point)

- a) Only feminist organizations have criticised the use of toxic products in cosmetics.
- b) Only animal rights activists have criticised the use of toxic products in cosmetics.
- c) Both feminists and animal rights activists have criticised the use of toxic products in cosmetics.

5. Match the common name of these substances to their scientific name: (1 point)



6. Choose the correct statement: (1 point)

- a) Blood analyses check the amount of uranium and mercury in your blood.
- b) Blood analyses check the amount of lithium and zinc in your blood.
- c) Blood analyses check the amount of sodium and potassium in your blood.

7. Is this statement true or false? (1 point)

"Some artificial food additives have been linked with cancer and heart disease."

TRUE

8. Finish the following statement: (1 point)

In order to treat all kinds of diseases, in Prehistoric medicine they used...

9. Write down 5 items that are considered personal care products: (1 point)



FALSE

Chemistry in everyday life: slideshow 2

Do you remember these photos? How are they connected to chemistry?



Slide 1	Slide 2
Slide 3	Slide 4
Slide 5	Slide 6
Slide 7	Slide 8
Slide 9	Slide 10



Synthesis Game



How much do you know about **Chemistry?**

RULES OF THE GAME

- For 4 players. 2 teams formed by 2 players each.
- The teams sit one in front of the other.
- Every time their turn arrives, they throw a coin. If it is heads, you ٠ move 2 squares forward. If it is tails, you advance 1 square forward.







- When you advance, your opponent draws a card from the deck and asks you a question. If you get it right, you advance 1 extra square! (if you don't, you remain in the same square until your next turn)
- Next, it's the other team's turn!

Good luck!!





QUESTIONS for the Synthesis game

Sulfur dioxide has been used as a additive in wines for centuries. TRUE	In light, wider wavelengths are blue while shorter wavelengths are red. FALSE: In light, wider wavelengths are red while shorter wavelengths are blue.	Bicarbonate of soda is the common name of `sodium bicarbonate'. TRUE
'Hydrophilic' means 'attracted to water and 'hydrophobic' means 'repelled by water'. FALSE: 'Hydrophobic' means 'attracted to water and 'hydrophilic' means 'repelled by water'.	The higher the concentration of salt, the greater the freezing point depression.	The gas released when cutting onions reacts with your eye liquid and produces ascorbic acid. FALSE: it produces sulfuric acid
Tobacco and tobacco smoke contains more than 60 carcinogenic compounds. TRUE	When smokers catch a cold, they are more likely than non-smokers to have a cough that lasts a long time. They are also more likely to get bronchitis and pneumonia. TRUE	Some deodorants have sodium bicarbonate as an ingredient. FALSE: Sodium bicarbonate is a weak base and does no harm to skin.
A food additive that makes food sweeter (SWEETENER)	A food additive that enhances or adds colour (COLOUR ENHANCER)	What does 'Chemophobia' mean? (TO BE AFRAID OF CHEMICALS)



What is an 'E-number'? (A NUMBER THAT LEGISLATION GIVES TO EACH ADDITIVE)	A subset of cosmetics which refers primarily to coloured products intended to alter user's appearance. (MAKE-UP)	An acid reduces the pH on the surface of the fruit. Can you give a common example? (LEMON JUICE)		
A personal care product that is generally made by Sodium lauryl sulfate, a preservative and fragrance. (SHAMPOO)	These chemicals cause destruction of tissues and inert materials. (CORROSIVE)	In order to treat all kinds of diseases, in Prehistoric medicine they used (plants)		
Which kinds of products stop smell and clean stains caused by bacteria? a) disinfectant b) acids c) alkalies (bases)	Aspirin contains a) acetylsalicylic acid b) hydrochloric acid c) glycolic acid	Blood analyses test the amount of these substances in our blood. ylic acid b) lithium and zinc c) mercury and uranium		
Vitamin C is the common name used for a) ascorbic acid b) acetylsalicylic acid	Which kind of chemicals are good for cleaning grease and mud stains? a) acids b) alkalies (bases)	What is a 'patch test'? a) a test to determine colour. b) a price reduction. c) a test to determine allergic sensitivity		



The first archaeological evidence of cosmetic usage is found in Ancient Egypt	What is the common name of 'sodium citrate'?	Which kinds of chemicals are good for stains of mustard, coffee, tea and alcoholic		
around a) 1,000 AC b) 4,000 BC c) 60,000 BC	 a) toothpaste b) epsom salts c) milk of magnesia d) Enos salts e) bicarbonate of soda 	beverages? a) acids b) alkalies (bases)		



Chemistry in everyday life: Feedback

This document is anonymous and its only aim is to make us improve and become better teachers in the future. You don't need to answer in English.

We sincerely thank you for your collaboration! $\textcircled{\odot}$

Which part did you like best? Why? Which part was the most interesting for you? And the most boring? Which part do you remember the most from this unit? Is there something you would have liked to know more about? Rate the unit from 1 to 10



The chemistry of love



1. Rate how much you agree with these statements from a 1 to 10 scale:

"Love is	100%	chemi	stry."								
I disagree	1	2	3	4	5	6	7	8	9	10	I agree
"Love d	oesn't l	nave a	nything	to do v	with ch	emistry	·."				
I disagree	1	2	3	4	5	6	7	8	9	10	I agree
"Differe beloved	nt part ."	s of th	e brain	are trig	gered	in front	of a fr	iend an	id in fro	ont of th	e
I disagree	1	2	3	4	5	6	7	8	9	10	I agree
"When i cocaine	n love, ."	our bi	rain beł	naves ir	n simila	r aspec	ts as if	it was	addicte	ed to	
I disagree	1	2	3	4	5	6	7	8	9	10	I agree
"Pheron to some	nones a eone."	are hor	mones	that ar	e invol [,]	ved eve	ery time	e we fee	el sexua	ally attr	acted
I disagree	1	2	3	4	5	6	7	8	9	10	I agree

2. Match the following monoamines with their effect on the brain:

Dopamine	It controls impulses, unruly passions, obsessive behavior, aiding the sense of "being in control".
Phenylethylamine	It is commonly associated with the pleasure system of the brain, providing feelings of enjoyment and reinforcement.
Serotonin	It induces euphoria in your brain. It boosts the amount of natural adrenaline produced by the brain.
Norepinephrine	It contributes to that "being on top of the world" feeling that attraction produces, and gives you the energy to stay up day and night.

