

# PLASTICS

## 1. Introduction - Academic vocabulary: Use the verbs in the gaps.

method	occurring	eventually	compounds	environment	disposal
properties		significant	items	react	infinite

Plastics are everywhere. While you're reading this article, there are probably numerous plastic <sup>1</sup>\_\_\_\_\_ within your reach (your computer, your pen, your phone). A plastic is any material that can be shaped or molded into any form - some are naturally <sup>2</sup>\_\_\_\_\_, but most are man-made.

Plastics are made from oil. Oil is a carbon-rich raw material, and plastics are large carbon-containing <sup>3</sup>\_\_\_\_\_. They're large molecules called polymers, which are composed of repeating units of shorter carbon-containing compounds called monomers. Chemists combine various types of monomers in many different arrangements to make an almost <sup>4</sup>\_\_\_\_\_ variety of plastics with different chemical <sup>5</sup>\_\_\_\_\_. Most plastic is chemically inert and will not <sup>6</sup>\_\_\_\_\_ chemically with other substances - you can store alcohol, soap, water, acid or gasoline in a plastic container without dissolving the container itself. Plastic can be molded into an almost endless variety of shapes, so you can find it in toys, cups, bottles, utensils, wiring, cars, even in bubble gum. Plastics have revolutionized the world.

Because plastic doesn't react chemically with most other substances, it doesn't decay. Therefore, plastic <sup>7</sup>\_\_\_\_\_ poses a difficult and <sup>8</sup>\_\_\_\_\_ environmental problem. Plastic hangs around in the <sup>9</sup>\_\_\_\_\_ for centuries, so recycling is the best <sup>10</sup>\_\_\_\_\_ of disposal. However, new technologies are being developed to make plastic from biological substances like corn oil. These types of plastics would be biodegradable and better for the environment.

Before the invention of plastic, the only substances that could be molded were clays (pottery) and glass. Hardened clay and glass were used for storage, but they were heavy and brittle. Some natural substances, like tree gums and rubber, were sticky and moldable. Rubber wasn't very useful for storage because it <sup>11</sup>\_\_\_\_\_ lost its ability to bounce back into shape and became sticky when heated.

<http://science.howstuffworks.com/plastic.htm>

## 2. Speaking skills: In pairs, discuss the questions below.

- What products are commonly made of plastics – what are their properties? (give reasons why the plastics are now used).
- Do you prefer to drink wine / beer from glass or from plastic ? Why?
- Do you buy bottled water? Why – why not?
- Is it safe to microwave ready-made food in plastic containers?
- Do you know any disadvantages or problems related to using plastics? Do you think using plastics can be harmful (dangerous) for humans, animals or the environment? How?
- Animals eat plastic bags – nonsense or truth?
- What happens with the tsunami debris in the ocean ?
- What are plastics made from? Is there any problem with this resource?
- What can we do with plastic waste? Do you sort out waste?

ADVANTAGES	DISADVANTAGES
<i>One advantage of</i>	<i>Major disadvantage of...is</i>
<i>Another point in favour of X is</i>	<i>Another point against X is</i>

### Giving reasons:

<i>There are many reasons why</i>	<i>First of all</i>
<i>The first reason why ... is ...</i>	<i>Secondly</i>
	<i>Furthermore ... / What is more</i>

## Listening (Voice of America): NEW FINDINGS ABOUT A CHEMICAL IN PLASTICS<sup>2</sup>

### Vocabulary:

unsafe level (in the urine) (adj+n)	nebezpečná hladina chemikálie (v moči)
within the limits (prep+n)	v rámci limitů
twice as likely	dvakrát více pravděpodobný
swallow (v)	spolknout
cause of these conditions (n+n)	příčina těchto stavů
safety research (adj+n)	výzkum bezpečnosti
Findings must be reproduced.	Výsledky zkoumání musí být zopakovány.

### 1. Listen to the news article and answer these questions:

- What products may contain Bisphenol A?
- How can people be exposed to BPA?
- What diseases may be caused by this chemical?
- How many people participated in the study?
- Who was the leader of the research?  
Where was he from?
- Where was the study published?

### 2. Now listen to the middle part and fill in the gaps (1.03 – 1.50)

**The scientists are studying the chemical BPA (Bisphenol A), which is used to make hard, polycarbonate plastics.**

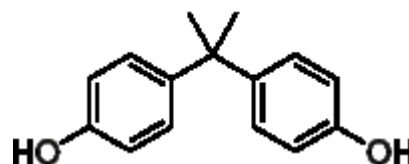
Researchers divided almost one thousand five hundred American adults into four groups based on BPA ..... **in their urine**. All the **levels** were **within the limits** ..... safe by the United States Food and Drug Administration. Yet the ..... found that the highest group was more than **twice as likely** as the ..... group to have heart disease or diabetes, or both.

The Food and Drug Administration and chemical ..... officials said the study does not show that bisphenol A ..... the diseases.

### 3. Speaking. Work in pairs. Summarize the main points of the news article.



Canadian Environment Minister John Baird, left, and Health Minister Tony Clement hand out baby bottles that are free of BPA. In April, Mister Clement announced Canada's plans to limit use of the chemical.



**Bisphenol A**

## Reading: PLASTICS FROM ORANGES<sup>3</sup>

Vocabulary: Do you know these expressions?

catalyst (n) – katalyzátor	readily abundant (adv+adj) – snadno dostupný
pump CO <sub>2</sub> in the atmosphere (v+n) – vhnět CO <sub>2</sub> do atmosféry	investigate (v) – zkoumat, vyšetřovat
derivative (n) – derivát	petroleum / crude oil (n) – ropa
building block (adj+n) – stavební jednotka	greenhouse gas (adj+n) – skleníkový plyn
carbon-based compound (adj+n) – sloučenina na bázi uhlíku	emit (v) – vysílat, vyzařovat
disposable products (adj+n) – produkty na jedno použití	fossil fuels (adj+n) – fosilní paliva
renewable resources (adj+n) – obnovitelné zdroje	

### 1. Read the text quickly. What is the main topic of the text?

- Creation of a new polymer
- Using carbon dioxide
- Research into household cleaners
- Disposable plastic products

PLASTICS FROM ORANGES <sup>4</sup> (BBC News)			
<u>Cornell University researchers created a novel polymer using CO<sub>2</sub>, an oil present in orange peel and a catalyst that speeds the reaction along.</u>	1	This polymer has many of the characteristics of polystyrene, which is used in numerous disposable plastic products.	8
<u>The team hopes CO<sub>2</sub> could one day be collected for making plastics instead of being pumped into the atmosphere.</u>	2	"Almost every plastic out there, from the polyester in clothing to the plastics used for food packaging and electronics, goes back to the use of petroleum as a building block," said Professor Coates. "If you can get away from using oil and instead use readily abundant, renewable and cheap resources, then that's something we need to investigate."	9
Details of the research were published in the Journal of the American Chemical Society.	3		
<u>Plastics are polymers, long-chained carbon-based (organic) molecules.</u>	4		
Limonene is a carbon-based compound that makes up about 95% of the oil in orange peel and is used to give household cleaners their citrus smell.	5	What's exciting about this work is that from completely renewable resources, we were able to make a plastic with very nice qualities."	10
Geoffrey Coates, a professor of chemistry at Cornell in Ithaca, US, and colleagues used a derivative of this oil called limonene oxide as one of the building blocks for their polymer.	6	<u>Coates' team is interested in using carbon dioxide as an alternative building block for polymers in industry. The gas could be isolated and used to produce plastics such as polylimonene carbonate.</u>	11
<u>The researchers used a helper molecule, or catalyst, to get the limonene oxide to react with CO<sub>2</sub> and form a new polymer called polylimonene carbonate.</u>	7	CO <sub>2</sub> is the principal greenhouse gas caused by human activities, and is emitted by fossil fuel burning.	12

**2. Complete the table below. Ask a question for each item in the table and answer it.**

	<b>Question:</b>	<b>Answer:</b>
Researchers Based at (Place):		
Research Reported in (Magazine):		
Research Led by (Scientist):		
Name of New Plastic:		

**3. Now decide if these sentences are true or false. If it is false, say what is true.**

- a) The scientists used CO<sub>2</sub>, an oil present in orange peel and a catalyst to produce the new plastic. T/F  
 .....  
 b) Limonene makes up 95% of the new plastic. T/F  
 .....  
 c) Polylimonene carbonate gives household cleaners their citrus smell. T/F  
 .....  
 d) The new polymer is similar to PVC. T/F  
 .....  
 e) The building block of most plastics is petrol. T/F  
 .....  
 f) The new plastic is made of renewable resources. T/F  
 .....  
 g) CO<sub>2</sub> is emitted during deforestation. T/F  
 .....

**4. Read the text again. Find the English equivalents of the expressions below:**

- |  |                                   |
|--|-----------------------------------|
| a) katalyzátor urychlí reakci              | d) mít zájem využít oxid uhličitý |
| b) dlouhé řetězce molekul                  | e) velmi pěkné vlastnosti         |
| c) četné výrobky z plastů na jedno použití | f) nejdůležitější skleníkový plyn |
|  | g) způsobený činností člověka     |

**5. Grammar: Use these verbs to complete the sentences.**

*collect    make    use 2x    publish*

1. Researchers created a novel polymer \_\_\_\_\_ CO<sub>2</sub>, an oil present in orange peel, and a catalyst.
2. The team hopes CO<sub>2</sub> could one day \_\_\_\_\_ for making plastics.
3. Details of the research \_\_\_\_\_ in the Journal of the American Chemical Society.
4. Limonene \_\_\_\_\_ to give household cleaners their citrus smell.
5. We were able \_\_\_\_\_ a plastic with very nice qualities.

## 6. Speaking.

Work in pairs. Without looking at the text, summarize the main points of the article.

Limonene is an oil in orange peel and can be used to make polymers...

### HOMEWORK: Grammar Revision

past simple – minulý čas prostý	past continuous – minulý čas průběhový
I /we/ he/she/it <u>lived</u> you/they in London. <b>Negative:</b> <u>didn't live</u>  <b>Question:</b> Where <u>did</u> we/you/they <u>live</u> ? he/she/it	I <u>was</u> He/she/it <u>working</u> . <b>Negative:</b> <u>was not (wasn't)</u>  We/you/they <u>were</u> <u>working</u> . <u>weren't</u> <b>Question:</b> Where was I <u>working</u> ? were we/you/they was he/she/it
- <u>odehrálo se a skončilo v minulosti</u> Ptáme se: <i>When? Kdy?</i> <b>typické výrazy:</b> <i>yesterday, last week, in 1998</i> I got up early yesterday. Sam went to the USA last year. When I was young, I had a cat.	- <u>děj probíhal v přesně určeném okamžiku v minulosti</u> <i>at 10 o'clock last night, this time yesterday</i> At 10 o'clock last night I was playing tennis. <b>- dočasné situace</b> We were living with friends because our new flat wasn't ready. <b>- právě probíhající děj byl něčím přerušen</b> We were having supper when the phone rang. I was standing at the traffic lights when the accident happened.
- <u>slovesa vyjadřující stav, modální slovesa</u> like, believe, think, mean, can, need, want ...	

#### A. Complete the sentences:

- 1) Tom burnt his hand while he *was cooking dinner*.
- 2) The doorbell rang while I .....
- 3) We saw an accident while we .....
- 4) Mary fell asleep while she .....
- 5) The television was on but nobody .....

#### B. Choose the right tense – past simple or past continuous.

- 1) Jane *was waiting* (wait) for me when I *arrived* (arrive).
- 2) What .....(you/do) this time yesterday? I was asleep.
- 3) How fast .....(you/drive) when the accident .....(happen)?
- 4) John ..... (take) a photograph of me while I .....(not / look).
- 5) We were in a very difficult position. We ..... (not/know) what to do.
- 6) I haven't seen Alan for ages. When I last .....(see) him, he  
..... (try) to find a job in London.
- 7) I ..... (walk) along the street when suddenly I .....(hear)  
footsteps behind me. Somebody ..... (follow) me. I was frightened and I  
.....(start) to run.
- 8) When I was young, I ..... (want) to be a bus driver.
- 9) ..... (you/go) out last night? No, I was too tired.
- 10) A car ..... (stop) and the man ..... (get) out.
- 11) At 8 o'clock yesterday evening I ..... (have) dinner with some friends.

Sources: <sup>4</sup> Available at <http://news.bbc.co.uk/1/hi/sci/tech/4191737.stm>.

<sup>3</sup> Based on *Plastics from Oranges* - Handout by Mária Sabolová

<sup>2</sup> Available at <http://www.voanews.com/specialenglish/2008-09-24-voa1.cfm>