

A million reasons to know  
about hazardous substances





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Baltic Actions for Reduction of Pollution of the Baltic Sea from Priority Hazardous Substances  
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## Have You ever thought...

Where does the water flushed from your kitchen or toilet finally end up?

What lies behind a non-allergenic pillow?

What connection do everyday products, such as shoe soles, perfume or shower curtains have to do with human infertility?

What is in your hand cream that makes it so soft and easily absorbed by the skin?

Were there any questions that you were unable to answer?  
The answers to these questions can be found in this brochure.



## Is your living environment really free from hazardous substances?

Imagine that you are sitting on the sofa in your living room. Take a moment and think – what can you see around you? A nice looking, comfortable living room with furniture, carpets and curtains, a TV and your laptop on the coffee table, with your child's toys on the floor. Now, take another moment to think about what you DO NOT see around you. What lurks within your favourite everyday products – colourful elastic toys, water and dirt repellent carpets and furniture, fire resistant curtains, robust television sets, sturdy laptop cases... etc.?

You may not see them, but they are there – hazardous substances in our everyday living environment.

Every day millions of people, regardless of their age or gender, are exposed to a variety of chemical cocktails and hazardous substances through the products we use that contain these substances. Is it not about time that we began to consider how this affects our health and environment?



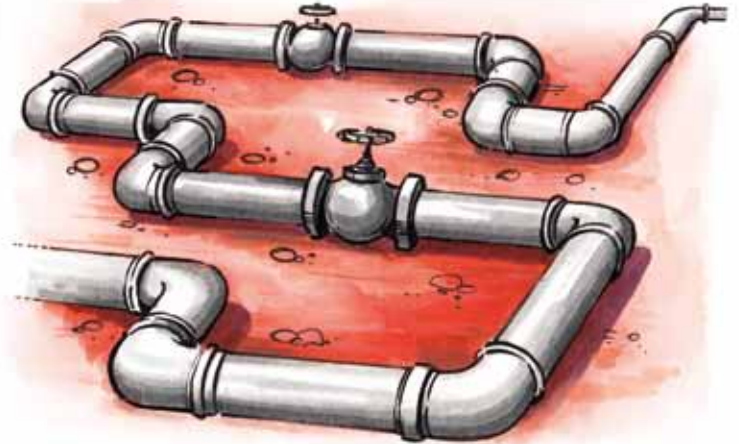
## What are these substances like?

Hazardous substances, once released into the environment, can remain there for a very long time. Many of them do not break down into less harmful chemicals; also, they can travel long distances, such as with discharged wastewater, which is released into rivers and then carried by them. These rivers carry the pollutants to the Baltic Sea and enter our homes and eventually our bodies via the food we eat. Consequently, these hazardous substances contribute to a variety of health problems.

Some are stored in our bodies, such as in fat tissue, and are found in human blood and breast milk. They may disrupt hormonal activities by obstructing their normal functions (e.g. blocking the functions of testosterone may lead to a decline in male fertility).

## Where do hazardous substances come from?

By hazardous substances, we are referring in this brochure to man-made synthetic substances that are added to products to ensure certain properties and qualities. They do not occur naturally and therefore become pollutants when released into the environment. They can be emitted into the air or water supply during their synthesis or use in production; they can also be released from products when we use them or after they have been deposited in landfills.



## If they are so dangerous, why are hazardous substances not prohibited?

The substances are cheap and provide the unique qualities for certain items, which cater for our comfortable lifestyles. Are we prepared to surrender these voluntarily? The most prominent hazardous substances are either banned or restricted in the European Union (EU), but every day we also use dozens of products that are produced outside the EU, from countries where hazardous substances are less well-regulated.

## These substances are used in very small amounts – is there really such cause for concern?

In most cases, the properties of these substances are so strong that even very small amounts may have adverse effects. For example, female molluscs are masculinized by a hazardous substance called tributyltin at levels equivalent to one hundredth of a drop of this substance in a full Olympic-size swimming pool. Apart from this fact, we also use many products that contain the same substances or similar properties, and these small amounts add up over time. To date, no-one fully understands or has sufficient proof of how such a “chemical cocktail” can affect our health or the environment.

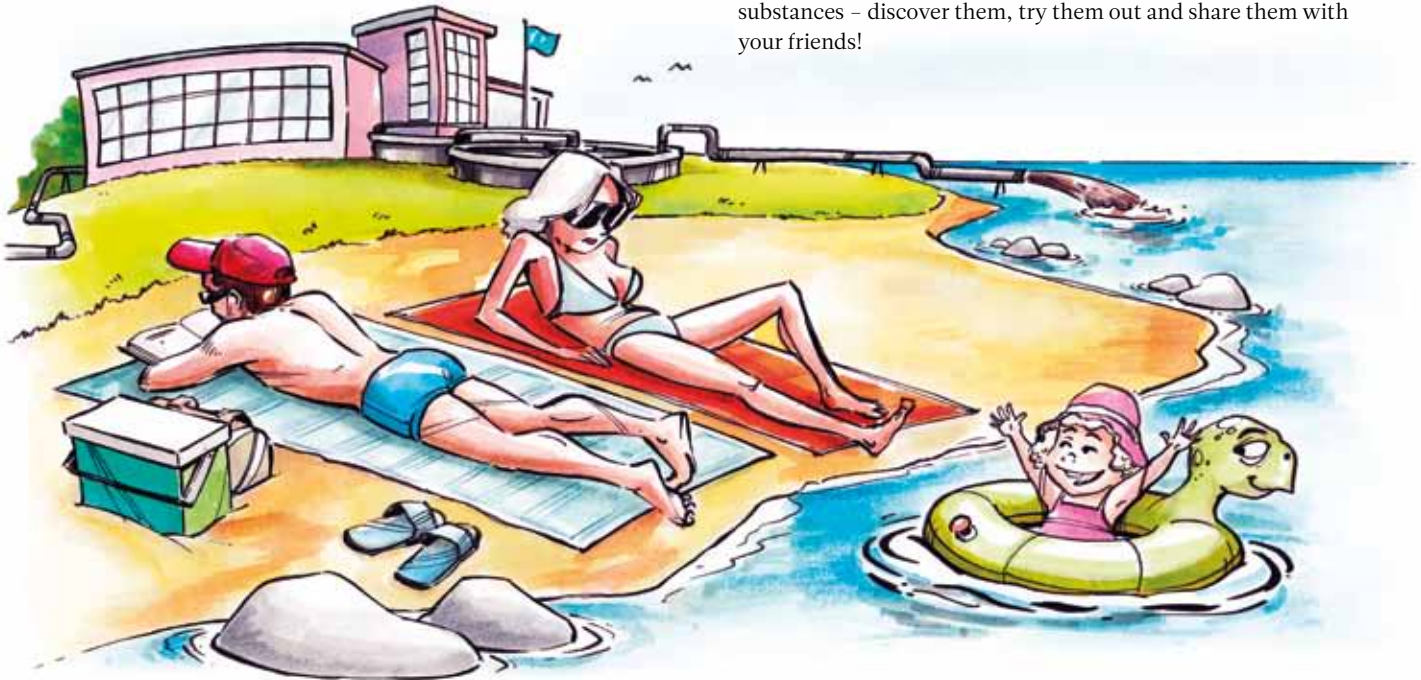
## There are many different hazardous substances, so how can we avoid them?

Although hazardous substances are widely used, they are seldom shown on product labels, which is either due to commercial reasons (e.g. in cosmetics), to the sparse amounts present in the product (as impurities) or simply due to the reason that such labelling is not required for most products.

However, we could avoid or be less exposed to these substances, if we:

- Buy and only use products that are truly essential.
- Use eco-labelled products.
- Read the instructions provided and use the products accordingly.
- Use simple proven substances such as soda, vinegar, salt and citric acid to clean and decalcify.
- Favour non-predatory fish such as carp or smelt that are preferably caught from lakes and rivers undisturbed by human activities.
- Find out more about the potential hazards in products and ask retailers for products with less hazardous substances.

There are many other ways to reduce our exposure to hazardous substances – discover them, try them out and share them with your friends!



# Phthalates

Phthalates are among today's most ubiquitous man-made contaminants. They are predominantly used as a softener to make PVC (polyvinylchloride) plastics more flexible. In flexible plastics, they typically account for up to 30% of the product.

It is impossible to go through a day without coming into contact with plastic. Take a second to think about all of the plastic that you touch each day. This could be your toothbrush, remote control, food containers, toys, pens, debit card, mobile phone and laptop. Phthalates are not tightly bound into plastics and can easily migrate into the environment during a product's lifecycle.

Other well-known uses of phthalates include oily substances in perfumes, additives for hairsprays, lubricants, wood finishers and more.

Phthalates are also among the most abundant contaminants in rivers and wastewater.

## Problems with phthalates:

- Based on research using rodents, phthalates contribute to a decline in fertility, increased incidences of testicular cancer and reduced sperm counts in men.
- Women with higher exposure to phthalates are more likely to give birth to male children who experience adverse effects in genital development as well as altered sex hormone levels.
- They may contribute to premature birth, impaired neurological development and the premature development of children up to puberty.
- They can exacerbate dermatitis.
- They can potentially mimic certain hormones.

## Tips on how to avoid phthalates:

- Avoid the use of PVC products in the construction or renovation of houses.
- Use plastics with the recycling codes (2), (4), or (5), as phthalates are often used in PVC plastics with the recycling code (3). These codes are usually found on the bottom of plastic containers.
- Favour wooden and cloth toys over plastic ones.
- Limit the use of personal care products, cosmetics and fragrances, and reduce the uptake of phthalates via the skin.
- Regularly vacuum the home with a HEPA filter or alternatively use a damp cloth to minimize phthalates exposure through dust. HEPA is a type of filter that can trap a large amount of very small particles, which other vacuum cleaners would simply recirculate back into the air in your home.
- Read product labels. Phthalates can be identified by the following chemical names or abbreviations: DBP (di-n-butylphthalate, dibutyl phthalate), DEP (diethyl phthalate), DMP (dimethyl phthalate), DEHP (di(2-ethylhexyl) phthalate), BBP (butyl benzyl phthalate).
- Be aware of the term fragrance, as such products may include phthalates.

**§ Phthalates are currently restricted in plastic toys for children under 3 years of age. They will be banned in the European Union from 2015 in the majority of products. After this date, choose products that are manufactured in the EU.**

Phthalates in consumer goods are mostly used in plastic and plasticized products, such as PVC flooring, PVC windows, PVC doors, PVC roofing, toys, shower curtains, luggage or shoe soles, sports mats, maps and folders, artificial leather for bags, book covers and bindings, as softeners in cosmetics (creams, deodorants, perfume), in car production and in some pharmaceutical products, such as insect repellent.



**Phthalates might be present in many items in our homes, which becomes a source for this substance in our bodies**

Children may take in higher than average amounts because many chew toys that are made of highly phthalate-softened vinyl (such as teethers).

Many tests on toys have revealed that they contain excessive amounts of the hazardous substance – phthalate.

# Perfluorinated compounds (PFCs)

PFCs are fully fluorinated man-made chemicals. The carbon-fluorine chemical bond is the strongest covalent bond in organic chemistry. This makes PFCs able to tolerate very high temperatures, resistant to degradation and environmental breakdown and also repellent to water, dirt and grease. These unique properties are used to make materials stain and stick resistant. PFCs are utilised in numerous different applications, such as non-stick cookware (Teflon®), textiles (Gore-Tex®), the coating of wires and cables, electronics, semiconductors, and many more. Even though they have only been in use for about 60 years, many studies have reported the worldwide presence of PFCs, even in remote areas such as the Arctic. This means that if worldwide production were to end today, levels of PFCs would continue to increase in the environment for many years to come.

## Problems with PFCs:

- The predominant toxic effect of PFCs include developmental toxicity, hormonal effects and carcinogenic risk.
- Associations have been found between PFCs levels in the general population and reduced female fertility and sperm quality as well as reduced birth weight.
- The occupational exposure of workers may result in an increased risk of prostate and bladder cancer.

## Tips on how to avoid PFCs:

- Always check food packaging: avoid greasy or oily packaging on foods and fast foods, as the packages often contain chemicals that give a grease-repellent coating.
- Avoid the use of staining/waterproofing products to treat furniture, carpets, shoes and clothing.
- Check your personal-care products made with Teflon or products that have ingredients containing the words fluoro or perfluoro. PFCs can be found in dental floss and cosmetics such as nail polish, facial moisturisers and eye make-up.
- Regularly vacuum using a HEPA filter.
- Avoid Teflon or non-stick cookware. Instead, choose cast iron, ceramic-coated or non-coated pans.

## How might you be exposed to PFCs?

- Directly, by coming in contact with consumer products such as grease-resistant food packaging and paper products including microwave popcorn bags and pizza boxes.
- Inhaling household dust and dust on children's mouth toys from upholstered furniture and carpets.
- Through food, mostly sea food.
- Even from Gore-Tex® clothing, loved for its ability to repel water yet remain breathable.
- Through the use of non-stick cookware.
- By using some cleaning and personal care products (e.g. dental floss, shampoo, denture cleansers).

## What exactly is a non-stick (Teflon) pan?

- Teflon pans are cheap and have a non-stick feature; therefore, they are very popular.
- They are made of a synthetic material called polytetrafluoroethylene (PTFE), later called Teflon®.
- A non-stick pan left to preheat can easily reach 371°C within a few minutes; at 360°C, Teflon pans begin releasing tiny particles of PFOA.

## § High concentrations of PFCs are restricted in products within the EU; however, small concentrations can also accumulate in the human body.

Perfluorinated chemicals in consumer goods are mostly used to make products water, dirt and fat resistant. Typical such consumer goods include carpets, upholstered furniture, non-stick pans, tents, waxes, window cleaning agents, fire-fighting foams, rain clothes, shoes, floor polish, floor paints, car care products, fat repellent packed food containers and more.





PFCs are presented as household miracles of modern chemistry but they are not so innocent. Scientific research has proven them to have toxic effects on human health and the environment.

- Fumes from Teflon at a very high temperature are fatal to some birds due to an intake of toxins, to which human lungs are not as sensitive.
- Rare cases have occurred in humans where the excessive inhalation of Teflon fumes (at temperatures ranging between 300 °C and 450 °C) may cause polymer fume fever or “Teflon flu” for which the symptoms are flu-like (chills, headaches, fever). The most common forms of PFCs are PFOS (perfluorooctane sulfonate) and PFOA (perfluorooctanoate or perfluorooctanoic acid).

# Polybrominated diphenylethers (PBDEs)

PBDEs are members of a broader class of brominated chemicals used as flame retardants; these are called brominated flame retardants, or BFRs. About 80 different types of BFRs are used commercially. They occur in different forms depending on the number and location of bromine atoms. PBDEs can be found in almost anything that carries an electrical current or is highly flammable, such as furniture foam (pentaBDE), plastics for TV cabinets, consumer electronics (decaBDE), and plastics for personal computers and small appliances (octaBDE). The benefit of these chemicals is their ability to slow ignition properties. When heated, PBDEs suppress the spread of fire by releasing bromine atoms (Br), creating a very thin layer of bromine gas on the surface of the TV or mattress, which keeps oxygen away. Although the use of flame retardants saves lives and property, there are unintended consequences. PBDEs prevail in the environment and accumulate in living organisms. They have been detected in wildlife, including fish, birds (particularly marine species and in their eggs) and marine mammals such as seals, dolphins and killer whales. In areas such as the Arctic, PBDE levels have been shown to be increasing exponentially in wildlife.

## Problems with PBDEs:

- Animal tests with mice have shown that decaBDE can cause cancer and developmental problems in motor skills and learning.
- The levels of PBDEs in human organisms have doubled approximately every 3 to 5 years over the past three decades and are continuing to rise.
- The greatest potential threat from BDEs is to developing fetuses and children.
- Burning PBDEs can create potentially toxic and cancer-causing chemicals.

## Tips on how to avoid exposure to PBDEs:

- Vacuum your home regularly, using a HEPA filter.
- Cover tears in upholstery that expose polyurethane foam, particularly if the foam is crumbling.
- As PBDEs accumulate in fat, eat less animal fat.
- Remember: electronic and electrical equipment (such as PCs, TVs, mobile phones) produced within the EU since 2008 do not contain decaBDEs. However, in some cases, older items may contain decaBDEs.
- Get to know companies' policies – many companies have refused to use PBDEs in their products, including Nokia and Sony Ericsson mobile phones, Samsung MP3 players, Apple laptops and others.

**§Penta and octaBDEs are restricted in products, due to safety concerns. In the EU, it is permitted to use decaBDE in all products except in electronic and electrical equipment since July 2008, but the exception does not apply in Japan, US, Taiwan or China, where many electronic equipment goods are produced. Currently, decaBDE is primarily used in plastics and textiles in the EU.**

Polybrominated diphenylethers in consumer goods are mostly used to make flame retardant textiles (e.g. mattresses, upholstered chairs, upholstered sofas, curtains, carpet padding, polyurethane foam) and electrical equipment (e.g. computers, dishwashers, hairdryers, microwaves, refrigerators, remote controls, electrical outlets, washing machines, coffee makers, fans, wires and cables, toasters, lamp sockets) as well as control panels in cars and pipes in households.



PBDEs are not permanently bound to the products in which they are used. Some PBDEs are semi-volatile and may be released from PBDE containing products (e.g. in your vehicles). Other PBDEs are released from furniture, electronics and other products as they physically degrade.

For most people, the level of PBDE contamination is low – around 30 to 70 parts per billion (ppb). However, in some cases people are exposed to concentrations approaching 10,000 ppb. That brings them dangerously close to exposure levels that have been known to harm animals in experiments. One part per billion is roughly a teaspoon of PBDE per Olympic-size pool.

# Organotin substances

Organotins are man-made chemicals that are based on a hydrocarbon structure combined with tin.

Organotin compounds are widely used as stabilizers for PVCs, antifouling biocides, agricultural biocides and catalysts for the production of polyurethanes and silicones. While the inorganic forms of tin are generally considered non-toxic, its organic derivatives exhibit a complex pattern of toxicity.

The biological effects of organotin species are mostly dependent on the number and kind of organic moieties bound to the tin atom. The most well-known organotin is tributyltin (TBT), which is also the most toxic. It is known for its biocidal properties, and for many years in the past it was widely used in marine anti-fouling paints to prevent the growth of organisms such as barnacles on the hull of ships and to avoid increased fuel consumption. Extensive use of anti-fouling paints on watercrafts led to the global presence of TBT (and its breakdown products mono and dibutyltins) in marine and freshwater environments, being present in water, sediment and wildlife species. Mono and diorganotin compounds, which have one and two tin carbon bonds, are used as stabilizers, catalysts and in glass coating applications.

## Currently, organotins are used:

- To avoid PVC degradation.
- To speed up chemical reactions – for example, when making polyurethane foams for furniture, etc.
- To prevent micro fractures on glass containers.
- In carpets and textiles to preserve them from fungi.
- As pesticides for protecting crops such as potatoes, sugar beet, pecans, citrus fruits, vines, vegetables and hops in countries outside of the EU.

## Problems with organotins:

- Sperm lack flagella or have impaired motility (e.g. in fish, rats).
- Sex reversal in fish, resulting in more males than females and unbalancing the fertility of the population.
- Toxicity to liver, nerve cells and the immune system.

## Tips on how to avoid exposure to organotins:

- Avoid PVC at home. This should help to minimize the amount of organotins in household air and dust.
- Avoid clothing and footwear treated with anti-fungal agents.
- Choose eco-labelled nappies (e.g. Nordic Swan eco label, German Öko Test) and female hygiene products, but research more about the producers and their environmental and health policy beforehand.

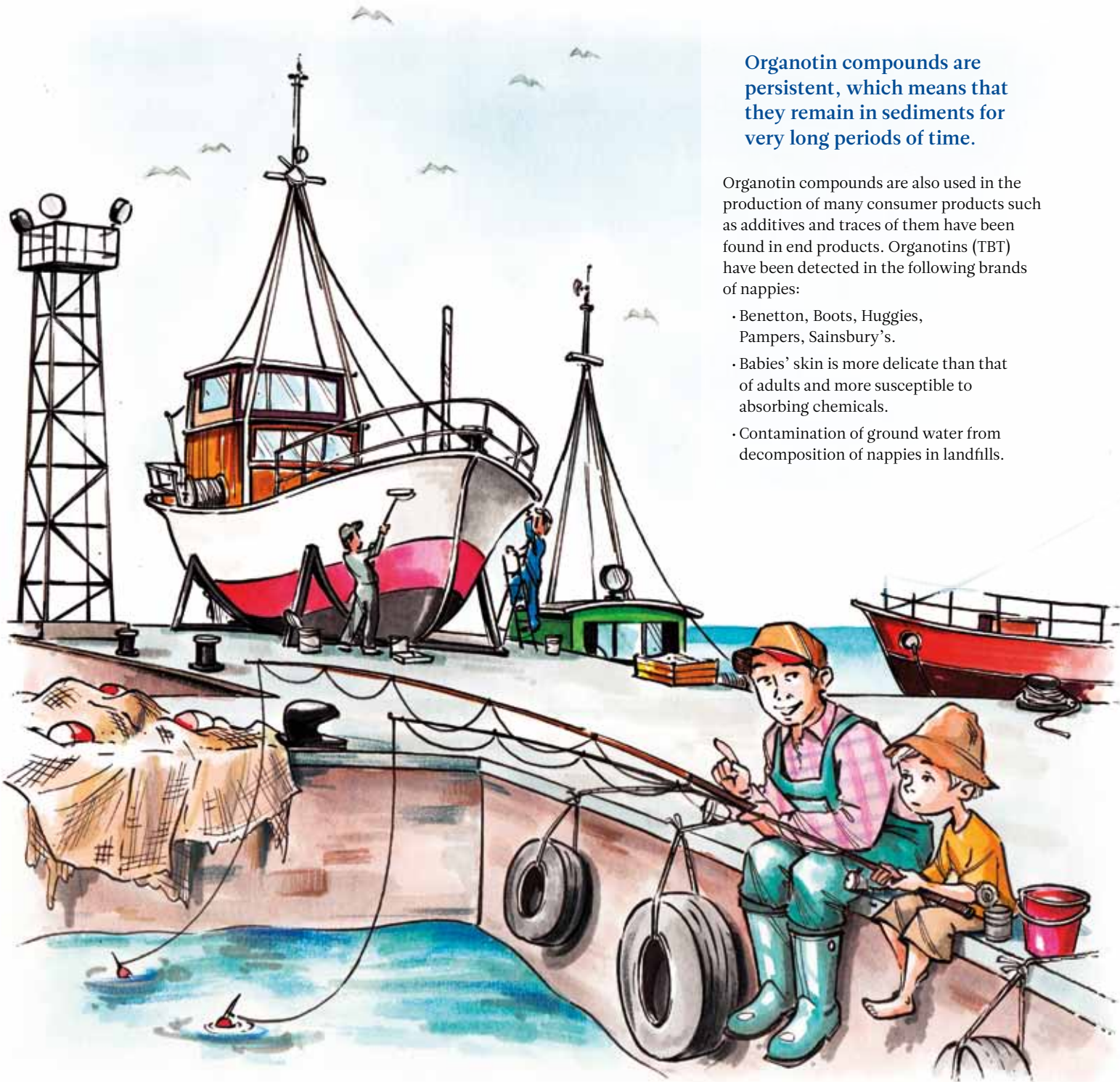
**§ In the EU, the use of tributyltin and triphenyltin compounds has been prohibited since 1 July 2010 in articles where the concentration in the article or part thereof is greater than the equivalent of 0.1% by weight of tin. Articles that do not comply with the ban cannot be placed on sale after this date, except for articles already in use in the EU before the deadline. From 1 January 2012, similar bans will be introduced for dibutyltin compounds in mixtures and products and dioctyltin compounds in certain products.**

Organotin substances in consumer goods are mostly used to improve the antibacterial properties of products (e.g. non-allergenic pillows, nappies, athletes' foot spray), make flexible plastic and rubber products (e.g. PVC flooring, shoe insoles, rain clothing, vinyl wallpaper) and create PVC prints on clothing (e.g. T-shirts, bags, beach balls, cycling shorts, shower curtains, earplugs).

Organotin compounds are persistent, which means that they remain in sediments for very long periods of time.

Organotin compounds are also used in the production of many consumer products such as additives and traces of them have been found in end products. Organotins (TBT) have been detected in the following brands of nappies:

- Benetton, Boots, Huggies, Pampers, Sainsbury's.
- Babies' skin is more delicate than that of adults and more susceptible to absorbing chemicals.
- Contamination of ground water from decomposition of nappies in landfills.



# Alkylphenols (AP)

## Alkylphenoethoxylates (APE)

Alkylphenols (APs) are man-made chemicals that are primarily used to manufacture alkylphenol ethoxylates (APEs). They have been used for over 50 years and are important for a number of industrial processes, including pulp and paper, textiles, coatings, agricultural pesticides, metals and plastics. The most commercially important APEs are nonylphenol ethoxylates (NPEs) and the less widely-used are octylphenol ethoxylates (OPEs). The main function of NPEs is to act as surfactants to make stable emulsions in different products. They are especially renowned for their cleaning ability in detergents and cleaning agents. Therefore, more than half of NPEs that are used literally go down the drain and are commonly found in wastewater discharges and effluents from sewage treatment plants; they also reach our rivers, and later, via fish and other edible organisms, can appear on our tables. The degradation of APEs in wastewater treatment plants generates more persistent and toxic APs such as NPs (nonylphenols) and OPs (octylphenols). Prior to imposed restrictions on their use, NPEs were widely used in industrial and domestic cleaning products, textile and leather processing, paints, spermicidal lubricants, pesticide formulations, hair dyes and cosmetics and personal care products, such as hair products. Nowadays, they can still be found in the same products that are imported to the EU. APs are moderately persistent, bind to fatty tissue and can become bioconcentrated in aquatic biota. APs and APEs have been detected in fish and invertebrates inhabiting polluted waters.

### Problems associated with APs:

- The breakdown products of NPEs and OPEs are endocrine disruptors. Exposure to endocrine disrupting chemicals are thought to play a role in certain types of cancer (breast, testicular, prostate), obesity, diabetes, precocious puberty, fertility problems and impacts on neurological development.
- Adverse effect on fish – decrease in size of testes, reduction in fertilized eggs, reduced embryo survival, abnormal embryos.

- Adverse effect on mammals – reduced male fertility, testicular size, sperm quality, NP and OP induced growth of human breast cancer cells.

### Tips on how to avoid exposure to APs:

- Avoid cosmetics produced in non-EU countries, as they may contain APEs.
- Avoid textiles produced in non-EU countries, as they may contain APEs, but bear in mind that even EU companies have production facilities outside of Europe.
- Choose textiles with eco-labels such as EU Flower or Öko-TEX 1000 (these companies prohibit the use of APEs in their products).

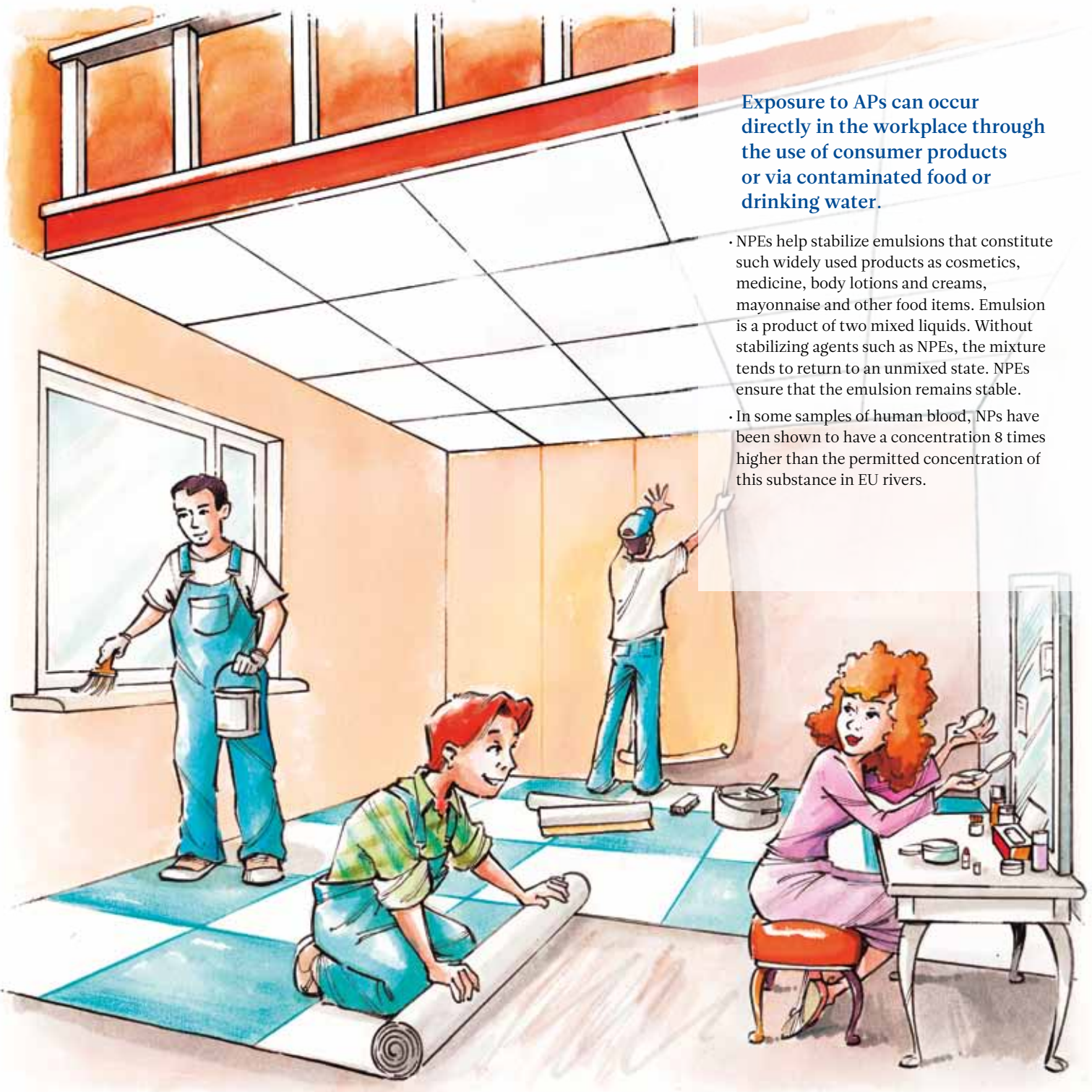
**§ Any mixture that contains 0.1% or more of NP or NPE cannot be placed on the market or used for cosmetic products within the EU and some other countries (e.g. in the EU, OPEs are restricted and NPs are banned in plant protection products).**

In consumer goods, alkylphenoethoxylates are mainly used in car wash and car care products, cleaners and degreasers, cosmetics, laundry detergents, paint & varnishes, pesticides, pharmaceuticals, spot removers and textiles.

About 20,000 tons of OPs per year are produced within the EU and they are used for making tyre rubbers, electrical insulation coating and printing inks.

Exposure to APs can occur directly in the workplace through the use of consumer products or via contaminated food or drinking water.

- NPEs help stabilize emulsions that constitute such widely used products as cosmetics, medicine, body lotions and creams, mayonnaise and other food items. Emulsion is a product of two mixed liquids. Without stabilizing agents such as NPEs, the mixture tends to return to an unmixed state. NPEs ensure that the emulsion remains stable.
- In some samples of human blood, NPs have been shown to have a concentration 8 times higher than the permitted concentration of this substance in EU rivers.



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