



The AskREACH Christmas-test

December 2019



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The Project LIFE AskREACH (No. LIFE16 GIE/DE/000738) is funded by the LIFE Programme of the European Union

Introduction

The Christmas test carried out as part of the LIFE AskREACH project shows that in Christmas balls, artificial Christmas trees and light chains, plasticizers have been found which are harmful to reproduction, and toxic flame retardants as well as chlorinated paraffins that are harmful to the environment.

The good news is that consumers have the right to know from the seller or manufacturer of a product whether it contains substances that are harmful to human health or the environment. Under the European chemicals regulation "REACH", these substances have been compiled in a "candidate list" since 2007 and fall under the so-called 'right for information'. On request of a consumer, both producers and sellers are obliged to provide information on such "Substances of Very High Concern" (SVHCs) and instructions on the safe use of the product.

SVHCs are proven to be:

- Carcinogenic,
- Reprotoxic,
- Mutagenic,
- Endocrine disruptive,
- Persistent, bioaccumulative and toxic
- Very persistent and very bioaccumulating or
- Of similar concern.

SVHCs can potentially be found in all types of consumer articles such as toys, shoes, clothing, furniture, jewellery, tableware, electronics or sports equipment.

They include substances such as plasticisers in plastic materials, flame retardants in textiles or furniture, heavy metal compounds, various dyes, and also polycyclic aromatic hydrocarbon compounds.

REACH

The European Union REACH Regulation on the Registration, Evaluation, Authorisation and restriction of Chemicals entered into force in 2007, with the aim of ensuring a high level of protection for human health and the environment, as well as the free circulation of substances on the internal market and the enhancement of competitiveness and innovation.

Candidate list

Certain chemical substances are defined in the REACH Regulation as SVHCs (Substances of Very High Concern). The SVHCs are listed in the "Candidate List", which is updated twice a year and currently contains 201 substances (December 2019). These substances are candidates for the authorisation process under REACH, i.e. their use might be limited to certain applications. In addition, REACH stipulates that these chemicals should be progressively replaced by suitable alternative substances or technologies where economically and technically viable.



Article 33

Article 33 of REACH states that a manufacturer or seller is obliged on request to inform a consumer if a given product contains SVHC substances. This information duty applies as soon as at least one SVHC is present in a concentration of more than 0.1% of the total mass. The information must be made available on request within 45 days and must include at least the name of the SVHC substance.

Not only is this a relatively long time, but in addition, a request only needs to be answered if an SVHC is contained. Thus, if a consumer does not receive a response to an SVHC request, this can either mean that no SVHC substance is contained, or that the request has been lost or remained unanswered.

Article 33 applies to most solid objects such as clothing, furniture, toys or electronics offered for consumer use. In the case of "non-solid" products such as food, medicines, cosmetics, cleaning agents or paints, the obligation to provide information applies only to their packaging.

If a product contains an SVHC substance, this does not necessarily constitute an acute hazard, as the substance may be chemically bound, for example, inside an article. However, during the life cycle of consumer articles certain substances may be released into the environment and might - due to the possible undesirable properties - lead to (cumulative) effects some day. Consumers may request information about the presence of such substances and avoid them.

Methods

At various Austrian, German and Czech retailers, artificial Christmas trees, Christmas balls and light-chains were purchased randomly. A total of 33 samples were subsequently tested for SVHCs in an external accredited test laboratory.

Article	number
Artificial Christmas trees	15
Christmas balls and decoration	11
Electric light chains	7
Total number of articles tested	33

All products were first pre-screened with a NITON XL3t 800 XRF handheld spectrometer (X-ray fluorescence). With the X-ray fluorescence method, metals can be detected in different materials. For the purpose of this test we focused on lead and bromine and, if bromine was detected, also on antimony. X-ray fluorescence measurements can provide good indications of the presence of brominated flame retardants (PBDEs)¹. Bromine is a key component of brominated flame retardants, and antimony trioxide is a common synergist. In addition, XRF scanning also provides information about the materials used in the scanned objects, such as soft or hard plastics.

1 Gallen C, Banks A, Brandsma S, Baduel C, Thai P, Eaglesham G, Heffernan A, Leonards P, Bainton P and Mueller JF (2014) Towards development of a rapid and effective non-destructive testing strategy to identify brominated flame retardants in the plastics of consumer products, Science of the Total Environment 491-492: 255-265



On the basis of the XRF results, we decided which SVHCs to investigate in the laboratory. Samples in which high levels of bromine or antimony were found (> 500mg/kg) were tested for flame retardants, and products made of PVC or other soft plastics were tested for phthalates and short-chain chlorinated paraffins. For samples with lead contents above 0.04 %, an additional lead measurement was carried out in the laboratory.

Tested substances:

substance group	individual substances
phthalates	DEHP, BBP, DHNUP, DIHP, BMEP, DBP, DIBP, DNPP, DIPP, PIPP, DPP, DnHP, DHP, DCHP ²
flame retardants	Deca-BDE, HBCDD, TCEP ³ , trixylyl phosphate
chlorinated paraffins	SCCPs (short-chain chlorinated paraffines)
heavy metals	lead, cadmium, chromium, boron

The REACH Regulation stipulates that consumers have to be informed about an SVHC in an article on request if its contents in the article exceeds 0.1 percent w/w. According to a judgement of the European Court of Justice, information has to be given for all parts of an article which meet the REACH article definition. For example, for an assembled article like a bicycle, information has to be given for components such as handles, tyres, frame, screws etc. The limit value of 0.1 mass percent refers to the components individually. Therefore, the components of the purchased products were also examined in our test. For example, we had the plastic needles of a Christmas tree evaluated separately from the metal construction of the trunk.

Depending on their composition, the products were examined in individual or in pooled samples. For example, in the case of a Christmas tree with green and brown needles, both were examined together; in the case of a tree with only white needles, they were analysed as a single sample. If more than 0.1 % SVHCs were found in a composite sample, the individual samples were again subjected to a separate individual analysis in order to be able to make definitive quantitative statements.

When purchasing the articles, they were scanned with the Scan4Chem app and an SVHC request was sent to the seller in accordance with REACH Article 33.

If no feedback was received from companies after 45 days of our SVHC request, they were asked again by e-mail. If after another two weeks there was still no answer, the request was repeated.

The tested substances

Phthalates

Phthalates are plasticizers used in plastics such as PVC to make them supple.

Phthalates can have an effect similar to hormones. Some phthalates have been shown to be harmful to reproduction, such as diethylhexyl phthalate (DEHP), dibutyl phthalate (DBP), benzyl butyl phthalate (BBP), and diisobutyl phthalate (DIBP). In children, for

² Di-(2ethylhexyl)-phthalate, butylbenzylphthalate, 1,2-benzenedicarboxylic acid di-C7-11, 1,2-benzenedicarboxylic acid di-C6-8, bis(2-methoxyethyl)phthalate, dibutylphthalate, di-iso-butylphthalate, Di-n-pentyl phthalate, diisopentyl phthalate, N-pentyl isopentyl phthalate, 1,2-benzenedicarboxylic acid dipentyl ester, di-n-hexyl phthalate, dihexyl phthalate, dicyclohexyl phthalate

³ Decabromodiphenyl ether, hexabromocyclododecane, tris(2-chloroethyl)-phosphate

example, they can interfere with sexual maturation. The exposure to hormone-like substances is also held responsible for the declining fertility of men which has been observed in Europe for decades. For example, the plasticizers mentioned above show anti-androgenic effects such as reduced testosterone production and can have a damaging effect on testicular function.

A study carried out by the German Federal Environment Agency between 2003 and 2006, in which 1,790 children aged between 3 and 14 years were examined, revealed alarming results, particularly for plasticizers. Metabolites of selected plasticizers were found in the urine of almost all children, in some cases in considerable concentrations⁴.

Phthalates enter the body mainly through food, but also through the air children breathe or through direct contact with the skin. Because children often play on the floor, they take in plasticizers via household dust. Infants and young children also frequently put things in their mouth. Through the saliva, the phthalates can be absorbed into the body.

Everyday objects such as clothing, vinyl wallpaper, carpeting, shoe soles, imitation leather furniture, kitchen and bathroom articles, or cables can contain phthalates.

Flame retardants

Since the 1970s, so-called flame retardants have been added to a variety of products. They are most frequently found in furniture, electronic products, construction and building materials, and in vehicles. They are intended to reduce the flammability of products. Often brominated and chlorinated flame retardants or organophosphorus compounds are used. However, it is known for long time that many flame retardants are poorly degradable, accumulate in the environment, and are toxic to humans and the environment. For these reasons, they are now detected in air, soil, water, humans and animals. Various studies show a link between brominated flame retardants and thyroid cancer.

Due to their negative effects on humans and the environment, many flame retardants have been identified as SVHCs, and some additionally as persistent organic pollutants (POPs) according to the POP Regulation.

Short-chain chlorinated paraffins (SCCPs):

Chlorinated paraffins are divided into long-, medium- and short-chain chlorinated paraffins. The shorter the chain, the more toxic they are. SCCPs - short-chain chlorinated paraffins - are used in a wide variety of applications, for example as plasticizers in plastics, as binders in paints, as flame retardants, or as fat liquors for leather and furs.

Chlorinated paraffins are extremely durable and very toxic to aquatic animals. They pollute waters, soils and living organisms. SCCPs are classified by the International Agency for Research on Cancer as "potentially carcinogenic to humans". They can also damage the kidneys, liver and thyroid gland. Short-chain chlorinated paraffins accumulate in human fatty tissue and are passed on to infants through breast milk. SCCPs are common all over the world and can be found in soils, waters, plants, humans and animals. They are

4 Umweltbundesamt (2009): telegramm: umwelt + gesundheit, Information des Umweltbundesamtes "Die Belastungen der Kinder mit Phthalaten sind zu hoch!" 25 August 2009, <http://www.umweltbundesamt.de/sites/default/files/medien/845/dokumente/ausgabe05-2009.pdf>



regulated in the EU Regulation on Persistent Organic Pollutants (POP Regulation (2019/1021/EU), which sets a limit concentration of 0.15 percent.

Heavy metals

Heavy metals are metals with a density above 5.0 g/cm³. Heavy metals and their compounds usually only occur in traces in nature. Many of them are vital for plants, animals and humans, but on the other hand even minimally higher concentrations can often be harmful to health. Worldwide, some soils are heavily polluted with problematic heavy metals, which can in turn enter groundwater. Subsequently, they accumulate in plants, but also in the skeleton, liver, kidneys and red blood cells of animals and humans. Some heavy metals and/or their compounds are carcinogenic, harmful to reproduction or have negative effects on the nervous system and organs such as kidneys and liver. Heavy metals may be found for example in electric/electronic devices, household items, jewellery and toys.

Results

Detected substances

In half of the articles tested SVHCs were found in concentrations above 0.1 % (see table), thus these products fall under the 'right for information' according to Article 33 (2) of the REACH Regulation.

Plasticizers above concentrations of 0.1% were found in 13 products, especially the phthalate DEHP. The front runners were two light chains which contained up to a quarter of phthalates (24% and 27%). DEHP is also specified in the EU Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS, 2011/65/EC), which states that articles with more than 0.1% DEHP may not be made available on the market. Six of the light chains are therefore not marketable.

Short-chain chlorinated paraffins (SCCPs) were found in 13 products, 8 of them at concentrations above 0.1%. SCCPs are also regulated in the EU POP Regulation (POP = Persistent Organic Pollutants), which states that products with more than 0.15% SCCPs may not be sold. Four Christmas trees and four light chains are therefore not be made available on the market either.

Flame retardants were detected in three Christmas balls at concentrations above 0.1%, in all 3 cases the substance Deca-BDE (decabromodiphenyl-ether). This substance is regulated by both the POP Regulation and the RoHS Directive and articles with a concentration above 0.1% may not be made available on the market. This also means that the 3 balls are not marketable.



Heavy metals were detected in two products in small quantities.

Overall, nearly 40% of the products tested are not marketable.

SVHC contents by article

For the artificial Christmas trees, SVHCs at concentrations above 0.1% were found in every second sample. More than a quarter of all the trees are not marketable, because they exceed limit values of other regulations than REACH.

Six out of 7 light chains tested contained SVHCs above 0.1 % and were not marketable.

In 3 out of eleven Christmas balls, SVHCs were found at concentrations above 0.1%. These 3 balls are not marketable either.

Answers from the companies

Although SVHCs in concentrations above 0.1% were found in half of the articles tested, and these products therefore fall under the 'right for information', we did not receive information about SVHCs from any of the sellers of these articles.

Only one retail company - Spar - responded transparently that further research would have to be carried out. This subsequently led to an official product recall of the tree concerned. All the other companies replied that the articles in question did not contain SVHCs. However, at our request most of them withdrew the articles from their shops. In general, only three of the replies met the requirements of Article 33 REACH. Some companies answered that their products were "REACH compliant". However, this answer is misleading as SVHCs are allowed in articles under REACH, but Article 33 states that the seller must provide information to consumers. To answer only about "REACH conformity" is therefore insufficient information.

The manufacturer whose light chain contained 27 % of the plasticizer DEHP, even claimed to use "only ecological materials" for their articles. Other sellers said that we should get in touch with their suppliers. An Internet company sent us some test reports, for example about a flammability test of a black plastic mat, whereas we had asked for information about coloured Christmas balls. Some sellers even questioned the results of the accredited testing laboratory, while from some companies we did not receive answers at all - even after three to five repeated enquiries.

A trendy furniture shop even refused to sell us their articles after we asked about hazardous substances in their articles. It was therefore not possible to test their articles.

In general, there is a very low level of awareness about SVHCs among companies.

Answering consumer requests about SVHCs must become much more self-evident in the future.



Recommendations

What is needed?

- That SVHCs in everyday products are replaced by safe alternatives as soon as possible.
- Substances for which no safe limits can be derived, e.g. chemicals that interfere with the hormone system or non-threshold carcinogens, should be replaced as a matter of priority.
- That all potential substances of very high concern are rapidly identified and evaluated and, where appropriate, added to the candidate list.
- That for companies at every stage of the supply chain, the passing on of SVHC information becomes a matter of course in compliance with REACH Article 33. Information on SVHCs must be disseminated both along the supply chain and to the competent authorities and ultimately made available to the public and consumers.
- That companies are made more aware of REACH obligations so that they are correctly implemented.
- That the 45-day response period is shortened, and that replies have to be given to any SVHC request, even if no SVHCs are present, in order to avoid misunderstandings.

What can consumers do?

- Enjoy your Christmas with a natural Christmas tree from regional, organic cultivation.
- Use Christmas decorations made of natural materials such as wood, straw or glass.
- Prefer candles made of beeswax to light chains - of course taking appropriate precautions.
- Avoid articles made of plastic, especially soft PVC or cheap articles made of dark hard plastic. Return strongly smelling plastic articles to the retailer.
- Look out for eco-labels such as the EU Eco-label or the Blue Angel.
- Scan products you want to buy in advance with the Scan4Chem app and send an SVHC request to the seller or manufacturer of the item. Scan as many products as possible with the Scan4Chem app to show companies that consumers want safe products!

The AskREACH project and the Scan4Chem app

LIFE AskREACH is a five-year project funded by the EU LIFE programme. Under the coordination of the German Environment Agency, 20 partner organisations in 13 EU member states are cooperating to make the REACH consumer rights more widely known. As part of the project, a smartphone app (in most countries named "Scan4Chem") allows consumers to scan the barcodes of articles to see if they contain SVHCs. We also work with companies to make it easier for them to respond to SVHC requests. The project offers a database in which companies can register their products for faster response, and we support companies in supply chain communications. The Scan4Chem app can be downloaded for free in the app stores.

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