



Up close 24/7: Textiles

Textiles are our second skin: we sleep and dress in them. We are in contact with them 24 hours a day, seven days a week. They therefore ought to be safe. A new regulation now lays down limit values for certain chemicals in textiles.

Clothes should protect us from the cold and heat and shelter us from view. We like them to be soft, comfortable and want them to keep their shape. We also want them to look chic, with different colours, materials and functions. Just how this is achieved is something to which we give less thought. Whether made of cotton, wool or polyester; when we buy something, it is not clear which chemical substances are contained in the fabric. Manufacturers have to name the textile fibres. Labelling all substances used in a bed sheet, towel or jumper is not required by law.

Textiles contain chemicals

Shirts in bright, trendy colours, crease-resistant trousers, waterproof outdoor jackets, sportswear that does not smell of sweat; for the fashion world to be able to offer all this, it needs colouring, finishing and auxiliary agents for textile production (see overview). "Manufacturing clothing textiles without chemicals is not possible," says Dr. Ralph Pirow. The biologist works on textile safety at the BfR. "This makes it all the more important to restrict the use of substances of concern and try to replace them." This particularly applies to substances that are carcinogenic, mutagenic or toxic for reproduction, meaning causing cancer, altering the genetic material, impairing fertility or endangering pregnancy. They are referred to as CMR substances.

New limit values for certain CMR substances

There are no uniform and comprehensive legal regulations for clothing textiles. In Germany, they are subject to the Food, Feed and Consumer Goods Code (LFGB) as consumer goods. This prohibits the manufacture or treatment of consumer goods in a way

Limited CMR substances in textiles starting in 2020

- chlorinated aromatic hydrocarbons (solvents for disperse dyes)
- certain phthalates (softening agents for plastics such as PVC)
- formaldehyde (basic material for synthetic resins for crease-resistant and non-iron finishing)
- polycyclic aromatic hydrocarbons (impurities in e.g. spinning, twisting and knitting oils used in production)
- heavy metal compounds with cadmium, chromium (VI), arsenic, lead (i.a. in colourants, as stabilizers in plastics)
- polar aprotic solvents (for spinning synthetic fibres)
- the dyes Disperse Blue 1, Basic Red 9 and Basic Violet 3
- certain aromatic amines and quinoline (including residues from dye production)

that may be harmful to health. In addition, there are individual legal provisions that regulate the use of certain chemicals for textile and leather consumer goods. These are laid down, for example, in the European Regulation on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), which has been in force since 2007.

The regulation made it possible to set limit values for 33 CMR substances at the same time. The BfR, together with other EU member states, contributed

Chemicals in textiles

Dyes	They are the most common chemicals in textiles.
Auxiliary agents	They are required for production and are removed during the production process. However, residues may remain on the textile.
Finishing agents	They are intended to remain on the textile to impart a certain property during use (e.g. water repellency, UV protection, crease resistance).
Biocide finishing	This is intended to protect the textile against infestation with insects, ticks, mites (defensive compound, repellent). Other biocides like silver have an antimicrobial effect and therefore counteract odours through the microbial decomposition of sweat.

to this. “We reviewed and commented on a list of 286 CMR substances from the EU Commission: Are the substances used in textiles? Are there any methods to analyse them?” says Pirow. “Afterwards the proposals of all member states and the expert opinions of professional associations and testing institutes were discussed with the EU Commission and in 2018 the Regulation (EU) 2018/1513 was issued.” This means that the use of these CMR substances in clothing, sportswear, bags and shoes will be restricted from November 2020. “For most of these substances, the limit values are so low that they amount to a de facto ban on use,” says Pirow. The limit values also apply to imported textiles from third countries that do not belong to the EU.

Black box colourants

In terms of health risks, colourants are the most significant substances in textiles. “Of around 4,000 existing dyes, half are azo dyes,” says Suna Nicolai, who works with Ralph Pirow at the BfR on this group of substances. Some of these compounds can be cleaved into carcinogenic aromatic amines by enzymes from the body’s own bacteria on the skin or in the intestine.

The dilemma: “There are hundreds of azo dyes and we don’t know which effect they have if they enter the body,” explains Nicolai, a biotechnologist. 22 aromatic amines are already listed in REACH. The regulation states that azo dyes that can be cleaved into these aromatic amines may not be used. But what other cleavable azo dyes can be found in textiles?

BfR research project on registered azo dyes

Since 2018, there has been a complete overview of the chemicals used in the EU for the first time in Europe. Only through REACH did manufacturers have to register all chemicals intended for use in the EU with the European Chemicals Agency (ECHA). The final deadline for registering chemicals ended in 2018.

As part of an ongoing research project, the BfR and other project partners are now assessing the relevant azo dyes registered for use in textiles. The aim is to test both the dyes and their cleavage products for their possible mutagenic effects. “We have already identified around 400 dyes and over 500 cleavage products,” says Nicolai. However, data is often lacking for a health risk assessment. The next step will be technical discussions held with professional associations and official project partners to collate the available data. “Depending on the data density, a decision will then be made on how to proceed,” explains Nicolai. ■



How can I protect myself?

Wash clothing before first use: this removes residues of releasable chemicals. Instructions such as “wash separately” or “wash with similar colours” indicate that dyes are released during washing and therefore also when worn. Use tested products with a textile seal of quality: these must meet certain requirements, some of which go beyond the statutory regulations.

More information:
www.bfr.bund.de > A-Z-Index: Textiles