

# There's something in the air ...

We spend a lot of time indoors. We are constantly breathing in substances emitted from carpets, paints, cleaning products, and even decorative items and toys. How much? This was now determined by the BfR for the first time.



Scientist Morgane Even measures volatile organic substances in test chambers of different sizes at the BfR.



Today, people in industrialised western countries spend an average of 80 to 90 percent of their time indoors. Efficient insulation keeps the air inside. The consequence: volatile organic compounds, so-called VOCs, which are emitted from materials, accumulate in the indoor air. These substances are most frequently released by building materials, cleaning agents or by cooking. However, toys and decorative items are also possible sources. The problem is that besides from bad smell, these chemicals can also impair our health. “So far, we don’t have sufficient data to estimate the amount of VOCs emitted from consumer products,” says Morgane Even from the “Chemicals and Product Safety” department, which is carrying out the relevant tests at the BfR. This complicates the assessment of health risks imposed by VOCs.

### Finding a practical method

The aim of Even’s research project was therefore to develop analytical methods to measure the release of volatile chemicals from everyday consumer goods. “The new processes are based on methods that are usually applied to measure emissions from building materials but which had to be adapted to test consumer products,” says Even.

Emissions are typically determined in closed chambers made of stainless steel or glass – materials that themselves emit or absorb no or only small amounts of volatile compounds. The temperature, humidity and air exchange within the chamber can be varied to simulate the conditions in a real indoor space. Emission chambers come in different sizes: for building materials, they are usually very large-scale; however, smaller ones are needed for measuring rubber ducks, mobile phone covers or designer lamps. The advantage of small chambers is that several samples can be analysed in parallel and that they are lower in cost – important criteria for official control laboratories that intend to use these new analytical methods in the future.

### Small test chambers deliver accurate results

But do “micro-chambers” also produce realistic results? Morgane Even has tested different sizes in her research. For this purpose, she placed plastic plates with the same VOC quantities in the chambers for 28 days. The result: emission chambers with a volume of 44 millilitres, 24 or 203 litres give similar results if the ratio of air exchange to loading is kept constant. Her conclusion: “The smaller micro-chambers are an alternative to determine emissions from consumer products.”

### VOCs escape more easily from soft plastics

In further experiments – this time with real toy samples – Even showed that toys made of soft plastics such as polyvinyl chloride (PVC) or polyethylene (PE) release more volatile substances into the environment than toys made of harder plastics such as polypropylene (PP). Emissions decreased significantly in the first few hours after unpacking, as time-dependent measurements revealed. It would therefore be advisable to ventilate toys outdoors for a while before using them for the first time. Converted to indoor air concentrations, the measured emission values were in all cases well below the existing national and European guideline values for indoor air. However, for multiple toys or in significantly smaller air volumes these values may indeed be exceeded. “That would be the case in small children’s rooms with lots of toys,” says Even. But also when children play with toys at close distance, as it is usually the case. ■

#### More information:

Even, M. et al. 2019. Emissions of VOCs from polymer-based consumer products: from emission data of real samples to the assessment of inhalation exposure. *Front Public Health* 7: 202. doi: 10.3389/fpubh.2019.00202

Even, M. et al. 2019. Emissions of volatile organic compounds from polymer-based consumer products: comparison of three emission chamber sizes. *Indoor Air*. 00: 1-9. <https://doi.org/10.1111/ina.12605>