

# Science for Environment Policy

## Common consumer products contain high levels of perfluoroalkyl and polyfluoroalkyl substances

**Perfluorooctane sulfonic acid (PFOS) and its derivatives** — linked to health problems in animals — have been found in levels exceeding EU thresholds in some outdoor textiles, leather goods and ski waxes, according to a recent analysis of everyday consumer items. Better quality control in the processing and manufacture of goods coated with the substances is among the recommendations made by researchers to reduce human exposure to these toxic chemicals.

Perfluoroalkyl and polyfluoroalkyl substances (collectively known as PFASs) are a class of synthetic chemicals characterised by fluorine atoms attached to a carbon chain. They are valued for their chemical stability and their oil, water and stain repellent properties. PFASs are widely used as coatings, for example, on food packaging, outdoor clothing, carpets and leather goods, as well as in the manufacture of fire-fighting foams and paints.

PFASs have been on the market for over 60 years and have now been found extensively in the global environment, as well as in human blood and breast milk. Many PFASs are highly resistant to breakdown and can persist in the environment for a long time. Animal studies have linked exposure to PFASs with health problems, including liver toxicity, developmental problems, tumour growth and hormonal disruptions.

Perfluorooctane sulfonic acid (PFOS) and its derivatives have been classified as persistent organic pollutants and their production and use is restricted under the [Stockholm Convention on Persistent Organic Pollutants](#) (POPs). For textiles or other coated materials, the amount of PFOS must be lower than  $1 \mu\text{g}/\text{m}^2$  of the coated material ( $10 \mu\text{g}/\text{kg}$  in preparations). In Europe, PFOS and perfluorooctanoic acid (PFOA) have been classified as persistent, bio-accumulative and toxic substances, although Europe-wide regulations for PFOA are not yet in place.

This study investigated the extent to which people may be exposed to PFASs through contact with everyday consumer products. Researchers in Germany collected a random sample of 115 items, representing things people might commonly use: outdoor materials, gloves, ski waxes, baking papers of various sorts, cleaning sprays, impregnating and nanospray agents (for waterproofing), carpets, leather and wood glue.

They analysed the samples for the presence of different PFASs, perfluorinated carboxylic acids (PFCAs) and/or fluorotelomer alcohols (FTOHs, PFCA precursors). The researchers assumed the same PFOS threshold for all other test substances, which are not yet regulated.

Ski waxes, leather and outdoor textile samples all contained high PFAS levels. Ski waxes had the highest PFCA and PFSA levels — up to  $2000 \mu\text{g}/\text{kg}$  PFOA was found in some samples. Most carpets (up to  $1.9 \mu\text{g}/\text{m}^2$ ), outdoor textiles (up to  $10 \mu\text{g}/\text{m}^2$ ) and leather samples (up to  $5 \mu\text{g}/\text{m}^2$ ) exceeded the EU limit of  $1 \mu\text{g}/\text{m}^2$  for PFOS. Outdoor textiles had high levels of PFOA ( $41.03 \mu\text{g}/\text{kg}$ ) as well as of FTOHs, up to  $380 \mu\text{g}/\text{m}^2$  8:2 FTOH (a common FTOH with 8 fluorinated carbons). Some leather samples contained high concentrations of PFCAs — up to about  $200 \mu\text{g}/\text{kg}$  PFBA and  $120 \mu\text{g}/\text{kg}$  PFBS.

*Continued on next page.*



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*(continued)*

Most of the tested substances were found in gloves. One PFCA, PFPA, was the main compound, found at concentrations as high as 47.7 µg/kg.

The authors conclude these results are disturbing and highlight the need for further research, especially for toddlers and children, who are more likely to have contact with carpets and potentially put clothing and gloves in their mouths.

Impregnation and nanosprays had medium concentrations of PFCAs, with a maximum 28.9 µg/kg for PFOA, but very high FTOH levels (up to 719 000 µg/kg 8:2 FTOH). To reduce peoples' exposure, the researchers suggest these sprays should not be used in closed rooms.

Only wood glue and cleaning agents contained no or negligible amounts of PFSA and PFCAs, although cleaning agents were found to have comparatively high levels of FTOH, 73000 micrograms per kilogram (µg/kg) 8:2 FTOH in one instance.

Baking papers made before 2010 (when EU regulations came into force) had high levels of PFCA contamination, whereas post-2010 baking paper levels were considerably lower.

The researchers made a number of recommendations. They say the sources of PFOS contamination are unknown but could have arisen during the processing and manufacture of goods using PFASs. Stricter quality control would reduce the risk to consumers and workers. FTOHs are precursors to PFASs and eliminating them from products would reduce PFAS levels in the environment. Monitoring and screening consumer products for PFASs should be stepped up, and use of PFASs and PFOS should be regulated.



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