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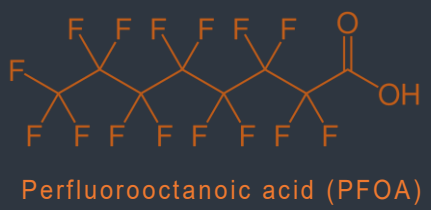
Poison of the month



Perfluorooctanoic acid (PFOA)

PFAS in drinking water were selected as Poison of the Month for March

…because, since 12 January 2026, PFAS have been explicitly included for the first time as a substance group in German drinking water legislation under the revised Drinking Water Ordinance of 2023, and a sum limit value has been established for PFAS-20. Thus, regulation no longer addresses a single contaminant, but rather a large group of highly persistent compounds of considerable toxicological relevance.

PFAS-20 and PFAS-4

Under the German Drinking Water Ordinance, PFAS-20 refers to the sum of 20 defined individual PFAS substances relevant to drinking water. These include 10 perfluorocarboxylic acids and 10 perfluorosulfonic acids. PFAS-4 is the smaller, toxicologically particularly relevant subgroup comprising perfluorooctanoic acid (PFOA), perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS) and perfluorooctanesulfonic acid (PFOS).

For the sum limit value, only those individual substances that are detected and quantitatively determined are added together.

PFAS in Drinking Water: Sum Limit Values at the Interface of Precaution and Toxicological Assessment

The revised German Drinking Water Ordinance (TrinkwV) of 2023 transposes the EU Drinking Water Directive into German law and establishes a risk-based approach along the entire supply chain. This is particularly relevant for per- and polyfluoroalkyl substances (PFAS). Since 12 January 2026, a sum limit value of 0.1 µg/L has applied to PFAS-20; from 12 January 2028, an additional value of 0.02 µg/L will apply to PFAS-4. A sum limit value means that the analytically quantified concentrations of the PFAS covered by the respective parameter are added together. Thus, the decisive factor is not a single substance alone, but the sum of defined compounds.

PFAS are a large group of anthropogenic fluorinated compounds that have been, and continue to be, used in a wide range of applications because of their water-, grease- and dirt-repellent properties, including food packaging, outdoor clothing, cookware, cosmetics, fire-fighting foams, electronics and technical coatings. From a toxicological perspective, however, they do not represent a homogeneous class of substances: carbon chain length, functional groups, bioaccumulation behaviour, thus, the ability to accumulate in organisms and potency may differ considerably.

The regulatory focus on PFAS in drinking water is based on the growing body of evidence from epidemiological studies, supported by *in vivo* and *in vitro* data. In its 2020 Scientific Opinion *Risk to human health related to the presence of perfluoroalkyl substances in food*, the EFSA Panel on Contaminants in the Food Chain (CONTAM Panel) identified a reduced antibody response following routine vaccinations in children, in association with elevated serum concentrations of PFOA, PFNA, PFHxS and PFOS, as the most critical endpoint. On this basis, EFSA derived a group-based tolerable weekly intake (TWI) of 4.4 ng/kg body weight per week for the sum of these four PFAS. Further epidemiological findings include associations with increased serum cholesterol, reduced birth

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weight and, for PFOA, elevated serum levels of the enzyme alanine aminotransferase as a biomarker of hepatocellular injury.

The toxicological relevance of these findings is supported by *in vitro* and animal experimental data, which show hepatotoxicity, developmental toxicity, and alterations in lipid metabolism, thyroid hormones and immune function for well-studied PFAS such as PFOA and PFOS. In addition, particularly long-chain PFAS are highly persistent and are eliminated only slowly in humans, animals and the environment, which is why PFAS are often referred to as “forever chemicals”.

Especially because of this persistence, continuous low-dose exposure may also lead to a relevant internal body burden. The limit value of 0.1 µg/L for PFAS-20 should therefore be understood more as a regulatory sum and control value than as a toxicological safety threshold.

The German Environment Agency emphasises that drinking water limit values are not based solely on health considerations, but also take regulatory and practical feasibility into account. For PFAS, this means that the PFAS-20 sum limit value should be regarded as a pragmatic control value: assuming an intake of 2 L of drinking water per day and a body weight of 70 kg, a concentration of 0.1 µg/L (= 100 ng/L) would already correspond to approximately 20 ng/kg body weight per week and would therefore clearly exceed the EFSA group-based TWI of 4.4 ng/kg body weight per week for PFAS-4.

In summary, further efforts are therefore required to reduce PFAS contamination in drinking water in the long term to a level that ensures compliance with the weekly PFAS intake considered by EFSA to be tolerable.

By Ute Haßmann

Risk-based drinking water protection

In its revised version, the German Drinking Water Ordinance no longer requires only control of the final product, but also a risk assessment along the entire drinking water supply chain. Potential hazards are considered from water abstraction and treatment through storage and distribution to the point of withdrawal. The aim is preventive management, meaning that risks should be identified as early as possible and addressed before a limit value is exceeded. Accordingly, the Drinking Water Ordinance requires water suppliers to provide regular information on drinking water quality and, in the event of an incident, to issue immediate warnings. In cases of limit value exceedances or other health risks, affected consumers must be informed promptly about the cause, the risk, countermeasures, possible restrictions on use and the safe handling of the drinking water.

Additional new or tightened substance parameters

In addition to PFAS, the amended Drinking Water Ordinance introduces new or stricter monitoring requirements for bisphenol A, chlorate, chlorite, haloacetic acids (HAA-5) and microcystin-LR. These substances represent very different risk profiles: bisphenol A as a substance of relevance due to its endocrine activity, chlorate/chlorite and HAA-5 as by-products relevant to drinking water hygiene or treatment processes, and microcystin-LR as a cyanobacterial toxin. Stricter requirements have also been introduced for lead, chromium and arsenic.

Literature and links:

- TrinkwV.pdf
- Neue Trinkwasserverordnung sichert hohe Qualität unseres Trinkwassers | Umweltbundesamt
- Perfluoroctansäure (PFOA) | Umweltbundesamt
- Risk to human health related to the presence of perfluoroalkyl substances in food - - 2020 - EFSA Journal - Wiley Online Library
- Gekommen, um zu bleiben: Per- und polyfluorierte Alkylsubstanzen (PFAS) in Lebensmitteln und der Umwelt
- Foto of Jacek Dylag in Unsplash