Risiken erkennen – Gesundheit schützen

Selected questions and answers on cookware, ovenware and frying pans with a non-stick coating made of PTFE

FAQ of 18 December 2018

Cookware with a non-stick coating offers advantages: nothing gets baked on, easy to clean and low-fat preparation. The polymer polytetrafluoroethylene (PTFE) is often used as the coating material.

PTFE as a non-stick coating on cookware and frying pans can become a health hazard if the dishes are used without being filled and the coating overheats, because PTFE develops toxic vapours at temperatures above 360 °C.

The transfer of fluorinated substances from PTFE coatings to food is currently being discussed. According to the latest available data, the quantities of these substances which can potentially be released if the dishes are used for their intended purpose are so low that no risk to health should be assumed.

In the following paragraphs, the BfR has compiled and answered the most frequently asked questions about cookware, ovenware and frying pans with a non-stick coating made of PTFE.

What is PTFE?

PTFE is an abbreviation for polytetrafluoroethylene. PTFE is a cold, heat and chemical-resistant synthetic polymer marketed under various trade names, including use as non-stick coating for cookware, ovenware and frying pans. A slightly waxy surface is a prominent feature of PTFE-coated pots, pans, baking forms and other cooking receptacles. Their water and grease-repellent properties prevent foods from sticking during the heating process. PTFE is non-flammable.

PTFE and various auxiliary substances (e.g. emulsifiers, colourants and fillers) are used to produce a PTFE non-stick coating. The emulsifiers include per- and polyfluorinated substances. At the end of the manufacturing process, the cookware and ovenware is generally sintered, which means that the substances are partially melted under heat and pressure so that they bake together and solidify as they cool down. During the sintering process, the majority of the auxiliary substances are either removed from the PTFE coating or bonded into it so strongly that their release into the surroundings is very difficult. If overheated, however, a degradation process of the PTFE can occur from temperatures of 360 °C during which vapours toxic to humans are released.

Where else is PTFE used?

PTFE has many different uses. Due to its chemical resistance, PTFE tends to be used where aggressive chemicals occur. PTFE is used to coat hoses, seals and technical plastic parts. It is also used in the aviation and aerospace industry, as well as in textiles, medical implants, in the manufacture of dental floss and in piercing jewellery. Household irons and hair straighteners can also have a PTFE-coated surface.

What should be observed when cooking, baking and frying with PTFE-coated utensils?

Utensils coated with PTFE should not be overheated because the polymer can begin to degrade (from approx. 360 °C) and release toxic substances into the ambient air even without

developing any smoke. PTFE-coated utensils should therefore never be heated when empty. Particular caution is called for with induction and gas cookers, as heating can be very quick. Overheating is highly unlikely if the cooking dishes are filled with food. As long as water or aqueous foods are contained in the cookware, the temperature cannot rise much above 100 °C, the boiling point of water. Oil, depending whether it is of plant or animal origin and whether or not it has been hardened, starts to vaporise at temperatures between 110 und 270 °C. Consumers are warned about impending overheating by the smoke caused by the vaporising oil or the smell of burning food. When baking in conventional ovens/stoves, the maximum temperatures of 250 °C are also clearly below the values at which the release of substances from the coating is to be expected. The BfR recommends treatment of the utensils in compliance with manufacturers' instructions prior to first-time use.

Are chemicals released from PTFE-coated cookware and frying pans?
Using state-of-the-art, highly sensitive analysis methods, it was possible to prove for several items used for cooking and frying, that fluorinated chemicals can be released from the coating in very small quantities during warming and especially during overheating. The BfR has no experimental data of its own. Different cooking and frying utensils, different test temperatures, empty or filled pans and different heating times were used in the scientific studies already published. As substances of this kind are only transferred in very small quantities if the utensils are used as instructed, no impairment of consumer health is to be expected on the basis of the evaluable data.

What health risks do PTFE-coated cookware, ovenware and frying pans pose to humans?
The BfR advises against the overheating of coated cooking, baking and frying utensils when empty. Toxic vapours from fluorinated compounds and particles develop at temperatures above 360 °C. To date Cases of illness are only known from the industrial manufacture of PTFE and not from its use in private households. Fluorinated substances can be released from coated cookware, especially when it is overheated. The transfer to food cannot be excluded according to the latest available knowledge. The BfR has no data which would indicate that, under normal usage conditions (no overheating), any PTFE-coated cookware, ovenware or frying pans currently available on the market transfer fluorinated chemicals to food in quantities suitable for endangering human health.

It is still safe to health if minute particles are released from scratched coatings and swallowed when eating. As PTFE is inert, these particles are not digested and are excreted from the body unchanged.

How are consumers protected against health risks from cookware, ovenware and frying pans and what should they observe?
According to valid EU law, materials that may have contact with food (such as cooking utensils) must be manufactured in such a way that, under normal or foreseeable conditions of use, they do not transfer any chemicals to food in quantities suitable for endangering human health. The BfR does not have any data which would prove that legal requirements are not met. The manufacturers' instructions should be followed, however, especially before using kitchen utensils with a non-stick coating for the first time.

This text version is a translation of the original German text which is the only legally binding version.