



**SAFETY OF**  
**PTFE**

# KEY ELEMENTS

The term PFAS is a generic name that encompasses thousands of very different substances. While some are unquestionably recognized as harmful, others recognized as safe and approved for use by regulatory authorities. This is particularly the case with non-stick cookware (PTFE).

Since the 1970s, public health authorities around the world have taken a unanimous position on PTFE: it is inert, non-bioaccumulative, not water soluble and therefore safe for consumers. As recently as January 2025, FDA states the use of non-stick coatings is approved.



*Some PFAS are approved for use in the manufacture of non-stick cookware coatings. These coatings are made of molecules that are polymerized (i.e., joined together to form large molecules) and applied to the cookware through a heating process that tightly binds the polymer coating to the cookware.*



Other competent, trusted authorities in this area have clearly ruled PTFE can be used for food contact:

- [FDA : \[2025\]](#) : *“The PFAS used in manufacturing of gaskets that **come into contact with food do not pose a safety risk** because they are also made of molecules that are polymerized.”*

- [ITRC \[2023\]](#) : *“[...] a stable, insoluble fluoropolymer such as PTFE may pose little environmental/ecological or health risk once it is in a product.”*

- [American Cancer Society \(2024\)](#) : *“While some PFAS can be used in making some non-stick cookware coatings, they are joined together in large molecules (polymerized) and are tightly bound to the cookware, **so very little is capable of getting into food**, according to the FDA.”*

- [EFSA \(2020\)](#) : *“These studies concluded that **fluoropolymer food contact materials were not likely to be a major source of PFASs.**”*

- [BfR \(Germany, 2018\)](#) : *“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.**”*

This consensus scientific view is shared by environmental advocacy groups, such as the Environmental Working Group (EWG):

*In February 2024, the **Environmental Working Group (EWG)**, stressed that PTFE is not a significant source of exposure : “But even though it’s always been the poster child for PFAS exposure, this cookware is not anticipated to be a major source of exposure.*

[‘Forever chemicals’: Top 3 ways to lower your exposure | Environmental Working Group](#)



## FEDERAL DRUGS ADMINISTRATION (FDA)

### 2015 - The safety of PTFE allows its use in medical implants

PTFE is used in the medical field because of its chemical inertness and surface properties. One example is the Standard established by the FDA, which specifies the characteristics of PTFE grades suitable for use as medical implants. It should be noted that medical implants are approved on a case-by-case basis by the authorities and not by class of materials only.



*Perfluorocarbon high polymers exhibit extraordinary thermal and chemical stability and do not require stabilizing additives of any kind.*



FDA: Excerpted from Recognized Consensus Standards F754-08 (Reapproved 2015)  
[Recognized Consensus Standards: Medical Devices \(fda.gov\)](#)

### 2021 – FDA confirms biocompatibility of PTFE in implants

The independent organization ECRI (Emergency Care Research Institute) was commissioned by the FDA to carry out a literature review and produce a report on the knowledge of the biocompatibility of PTFE. After analysis of 52 studies, no local response to PTFE implants was demonstrated, and no worsening of systemic responses.



*The included studies most often found no difference in local responses, including patency, thrombosis, stenosis, or occlusion, when comparing a PTFE graft to a reference material or technique. The quality of evidence is low.*

*Studies indicate there is no difference in systemic responses, including mortality, myocardial infarction, and ischemia, when comparing a PTFE graft to other materials or techniques. The quality of evidence is low.*

*Studies of stent-grafts indicate PTFE stent-grafts yield better patency and stenosis results than percutaneous transluminal angioplasty (PTA). The quality of evidence is moderate, as this was reported in almost all human studies. Some studies found PTFE stent-grafts to have better patency than bare metal stents, but other studies found no difference.*



ECRI: [Polytetrafluoroethylene \(PTFE\): Medical Device Material Safety Summary \(fda.gov\)](#)

## 2024 - PTFE as well as other fluorinated polymers are authorized by authorities for their use in products intended for food contact

The FDA authorizes the use of fluoropolymers in food contact (with the exception of paper packaging), and more specifically the use of PTFE.



### **177.1550 Perfluorocarbon Resins.**

*Perfluorocarbon resins identified in this section may be safely used as articles or components of articles intended to contact food, subject to the provisions of this section:*

**Identity.** *For the purpose of this section, perfluorocarbon resins are those produced by:*

- *The homopolymerization and/or copolymerization of hexafluoropropylene and tetrafluoroethylene,*
- *The copolymerization of perfluoropropylvinyl ether and tetrafluoroethylene (CAS Reg. No. 26655-00-5). The resins shall meet the extractive limitations in paragraph (d) of this section.*



FDA: Excerpt from Code of Federal Regulation Title 21 Section 177.1550 [CFR - Code of Federal Regulations Title 21](#) (fda.gov)

## 2025 – The Food and Drug Administration reaffirms that PTFE is approved for food contact

In January 2025, the FDA confirmed that fluoropolymers intended for use in the manufacture of coated cookware and food contact seals are approved and do not pose a safety risk, as they are made of polymerized molecules.



*Some PFAS are approved for use in the manufacture of non-stick cookware coatings. These coatings are made of molecules that are polymerized (i.e., joined together to form large molecules) and applied to the cookware through a heating process that tightly binds the polymer coating to the cookware.*

*Studies show that this coating contains a negligible amount of PFAS capable of migrating to food. Similarly, the PFAS used in manufacturing of gaskets that come into contact with food do not pose a safety risk because they are also made of molecules that are polymerized.*



FDA: [Questions and Answers on PFAS in Food](#) | FDA

# AMERICAN CANCER SOCIETY

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## 2024 - The American Cancer Society Confirms That PTFE is Safe to Use in Cookware

In its updated publication in March 2024, the American Cancer Society reaffirms that the use of fluoropolymers in coated cookware is safe:



*While some PFAS can be used in making some non-stick cookware coatings, they are joined together in large molecules (polymerized) and are tightly bound to the cookware, so very little is capable of getting into food, according to the FDA.*



American Cancer Society: [Perfluorooctanoic Acid \(PFOA\)](#), [Perfluorooctane Sulfonate \(PFOS\)](#), and [Related Chemicals](#) | American Cancer Society

# INTERSTATE TECHNOLOGY REGULATORY COUNCIL (ITRC)

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## 2023 - The ITRC confirms the special status of fluoropolymers, and particularly PTFE

The ITRC, in its search for criteria for determining the environmental impact of PFAS, found that PTFE poses little risk to the environment and human health, distinguishing it from other PFAS considered to be of concern:



*[...] a stable, insoluble fluoropolymer such as PTFE may pose little environmental/ecological or health risk once it is in a product.*



ITRC: [Per and Poly fluoroalkyl substances](#) / Interstate Technology Regulatory Council





# World Health Organization

## WORLD HEALTH ORGANISATION (WHO)

### 1979 - The WHO acknowledges that PTFE is not toxic if ingested

The International Agency for Research on Cancer (IARC), an intergovernmental agency created in 1965 by the United Nations World Health Organization. IARC regularly publishes monographs, which are reviews of the body of knowledge established on the carcinogenicity of the agents examined.

In a review of a rat study, IARC concluded that after ingestion of 25% PTFE for 90 days, PTFE had no toxicological impact. IARC also specified that the material did not produce skin irritation and did not act as an allergen.



*No toxicity was observed in male and female rats fed PTFE for 90 days, even with a level of 25% in the diet.*

*The polymer has not been found to produce skin irritation or to act as an allergenic agent. (Clayton, 1962; Zapp, 1962).*



Extract of IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans Volume 19, page 295 (1979) [IARC Publications Website - Some Monomers, Plastics and Synthetic Elastomers, and Acrolein](#)

### 1987 - IARC classifies PTFE in Group 3

In its 1987 monograph, IARC classified PTFE as Group 3 of agents that are not classifiable as carcinogenic to humans.

*Source : IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans, Supplement 7, page 70 (1987) IARC Publications Website - Overall Evaluations of Carcinogenicity: An Updating of IARC Monographs Volumes 1-42.*

These IARC elements are crucial in establishing the safety of PTFE. They are widely used in the sector and the fluoropolymer industry in general.

# EUROPEAN FOOD SAFETY AUTHORITY (EFSA)

## 2016 - EFSA clarified that a high molecular weight fluoropolymer poses no risk if ingested

EFSA is the European authority responsible for establishing scientific opinions to ensure food chain safety. In a 2016 scientific opinion on the risk analysis of chemicals in food, EFSA's Scientific Committee specified that the risk analysis of polymers used in food additives, i.e. those that can be ingested, must consider the molecular weight, i.e. size. For fluoropolymers, EFSA proposed a threshold of 1,500 Daltons (a unit of measurement for the mass of a polymer). Above the threshold size, EFSA states that polymers are unlikely to be absorbed across the gastrointestinal barrier and therefore are not considered to be a health hazard.

By comparison, PTFE is characterized by sizes ranging from hundreds of thousands to tens of millions of Daltons, well above the threshold of 1500 Daltons.



*The safety assessment of polymeric additives and oligomers should take into consideration the molecular mass. Compounds with a molecular weight above 1,000 Da are unlikely to be absorbed by the gastrointestinal tract and so they are not considered to present a toxicological hazard, unless they are hydrolysed or induce a local effect on the gastrointestinal tract, such as stomatitis, esophagitis and or mucositis. If the latter can be excluded, a cut-off value for the molecular mass at 1,000 Da is recommended, as it covers any shape of molecules influencing the likelihood of absorption. 11 Most substances below 600 Da are absorbed and the rate of absorption is determined by factors other than size and shape of the molecule. For poly- and per-fluoro compounds, a cut-off value of 1,500 Da could be appropriate, because the molecular volume of C-F is smaller than that of C-H molecules of the same molecular mass.*



Extrait de EFSA Journal 2016;14(1):4357  
Recent developments in the risk assessment of chemicals in food and their potential impact on the safety assessment of substances used in food contact materials - 2016 - EFSA Journal - Wiley Online Library



## 2020 - EFSA again confirmed that fluoropolymers in contact with food were not a major source of exposure to PFAS

Although migration to food is possible, the amount would be minimal, on the order of  $\mu\text{g}/\text{kg}$ , a level much lower than the background levels of PFAS in food, which are the main source of exposure.



*These studies concluded that fluoropolymer food contact materials were not likely to be a major source of PASs. PFCAs, particularly PFOA, and fluorotelomer alcohols (FTOHs) have been shown to be released from coated cookware at normal cooking temperatures (179-233°C surface temperature). Therefore, they have the potential to migrate into food during the cooking process, but studies are inconclusive and show that only relatively small amounts are released into foods, when compared to concentrations that are found in the raw food.*



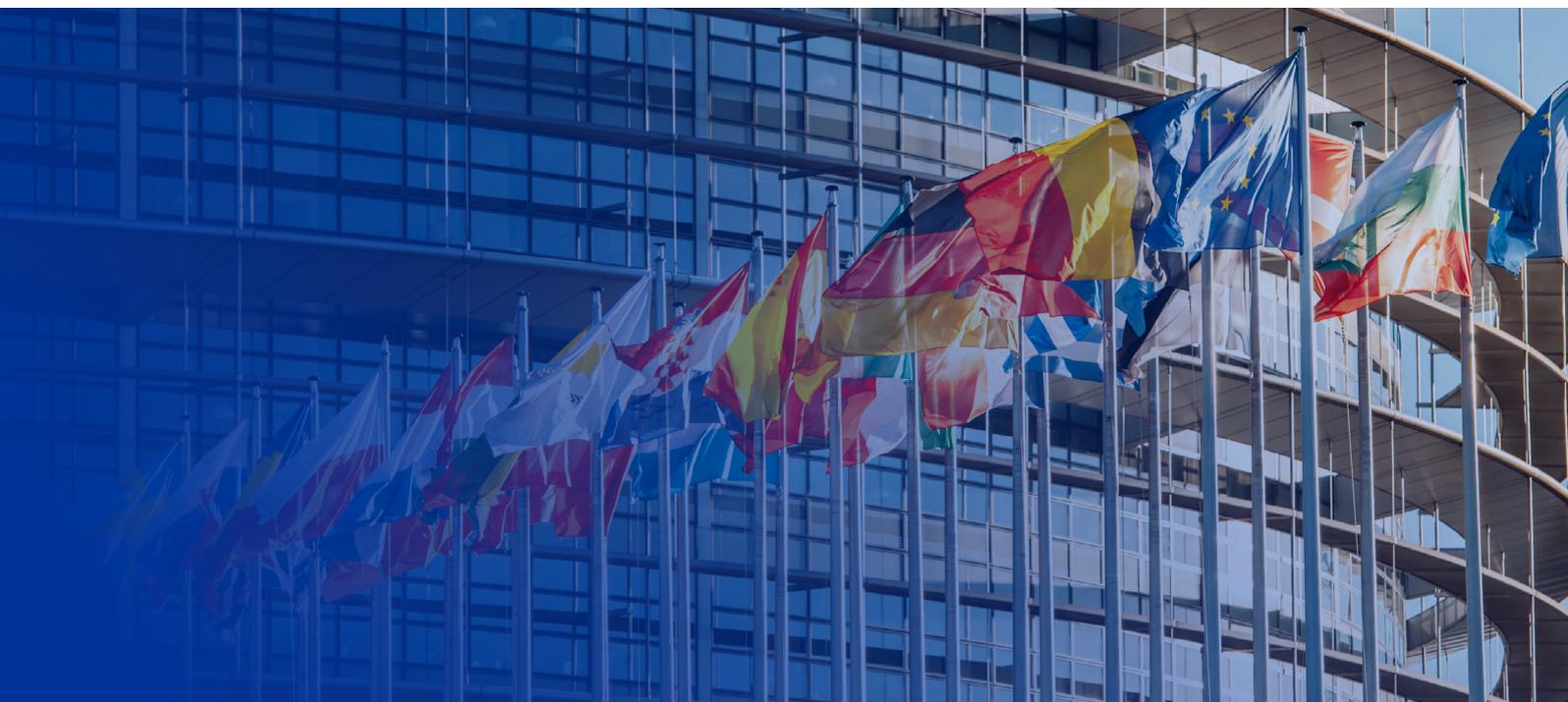
EFSA 2020: [Risk to human health related to the presence of perfluoroalkyl substances in food - 2020 - EFSA Journal - Wiley Online Library](#)

## EUROPEAN UNION

### 2011 - EU Regulation (10/2011) authorizes TFE (PTFE monomer) in food contact articles

Regulation 10/2011 on plastic materials and articles coming into contact with food includes the TFE (CAS No. 116-14-3) in Annex I, as a monomer that can be intentionally used for the production of polymers intended to come into contact with foodstuffs. TFE can therefore be used for the polymerization of PTFE intended for food contact.

[Règlement EU 2011](#)



# FRANCE

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## The Institut national de Recherche et de sécurité (INRS) confirms that PTFE does not degrade under normal conditions of use of cookware appliances

The INRS reference body for occupational risk prevention in France confirms that the normal operating temperatures of stoves are much lower than the temperatures at which PTFE begins to deteriorate, i.e. from 350°C, and that PTFE degrades from 450°C.

[Fiche INRS PTFE](#)

## 2024 - French Ministry of Health confirms the safety of PTFE

In June 2025, the Public Health Information Service (SPIS) of the Ministry of Labour, Health, Solidarity and Families confirmed that the use of non-stick kitchen utensils is safe.



*PTFE is theoretically a PFAS, but its stability and safety have been confirmed, which is not the case for the vast majority of PFAS.*



Service public d'information en Santé (SPIS) : [Les poêles anti-adhésives sont-elles dangereuses ?](#) | Santé.fr, June 6th, 2024

# UNITED KINGDOM – HEALTH AND SAFETY EXECUTIVE

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## 2023 - HSE confirms that PTFE is a 'low hazard' substance

Fluoroplastics (including fluoropolymers, including PTFE) are considered "low hazard" substances and therefore eligible for an exemption or derogation from a potential restriction proposal under the upcoming UK REACH.



*Exemptions could also be considered for PAS (as individual substances or groups) for which comprehensive reliable evidence of low hazard or safe use can be provided or consideration may be given to exemption on socioeconomic grounds and subject to the availability of alternatives.*

*The restriction(s) set out above need not apply to low hazard groups or low risk uses, for example; fluoroplastics or fluoroelastomers (low hazard groups), intermediates, uses in sealed/contained systems (including use as heat exchange fluids in heat pumps and refrigeration systems), (low risk uses). These could be highlighted as derogations to any restriction proposal.*



UK HSE avril 2023 : [Analysis of the most appropriate regulatory management options](#)



## GERMANY - DAS BUNDESINSTITUT FÜR RISIKOBEWERTUNG (BfR)

**2018 - German Institute for risk assessment clarifies that coated cookware does not pose a danger to human health**



*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.*

Das Bundesinstitut für Risikobewertung (BfR) , German Federal Institute for Risk Assessment BfR: [Selected questions and answers on cookware, ovenware and frying pans with a non-stick coating made of PTFE - BfR \(bund.de\)](#)

In addition, the BfR reaffirms that the concentration of compounds emitted from coated cookware is so low that it does not pose a health risk to users.



*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.* 

Das Bundesinstitut für Risikobewertung (BfR) , German Federal Institute for Risk Assessment BfR: [Selected questions and answers on cookware, ovenware and frying pans with a non-stick coating made of PTFE - BfR \(bund.de\)](#)



## SCIENTIFIC STUDIES

### 2010 - Cooking oils degrade at much lower temperatures than PTFE

The degradation temperature of oils and greases is typically below 200°C. For example, formaldehydes are emitted from 180°C for coconut oils, virgin olive oils, etc.

 Emissions of volatile organic compounds, including aldehydes, formed during heating of cooking oils: coconut, safflower, canola, and extra virgin olive oils were studied at different temperatures: 180, 210, 240, and 240 °C after 6h. 

Katragadda and al (2010). Emissions of volatile aldehydes from heated cooking oils - Science-Direct

### 2020 - PTFE is a polymer of low concern

A 2018 scientific paper argues that PTFE should be considered a polymer of low concern. The concept of polymer of low concern, developed by the OECD, is taken up by the authors and applied to fluoropolymers. The authors base their analysis on the molecular mass of the polymers considered, their chemical inertia, insolubility, the absence of reactive functional group, etc.

In a subsequent article, Ian Cousins, a leading advocate against PFAS, nevertheless acknowledges that polymer size is a factor in assessing the safety of these substances.

Source : *Environ. Sci. Technol.* 2020, 54, 12820-12828  
Are Fluoropolymers Really of Low Concern for Human and Environmental Health and Separate from Other PFAS? | Environmental Science & Technology (acs.org)

 Molecular weight (MW) is an important predictor of biological effect because very large molecules (>1000-10000 Da) are too large to penetrate cell membranes (Supplemental Data in Beer 1993, p.14). Because large molecular weight polymers cannot enter the cell, they cannot react with "target organs," such as the reproductive system, and are not bioavailable. "Therefore, as the Mn of a polymer increases, a reduced incidence of potential health concern effects might be expected." 

(OECD 2009, p 20).

Extract of: Integr Environ Assess Manag 2018:316-334 A critical review of the application of polymer of low concern and regulatory criteria to fluoropolymers - Henry - 2018 - Integrated Environmental Assessment and Management - Wiley Online Library

### 2024 - Korean study again demonstrates the safety of PTFE if ingested

A Korean study has once again demonstrated the safety of PTFE when ingested. No toxic effects were observed in mice that ingested PTFE fragments. Additionally, PTFE was not detected in the blood following administration.

 The single-dose toxicity test confirmed the LD50 of PTFE using doses of 500, 1000, and 2000 mg / kg. During the two-week observation period after a single administration, no deaths or clinical signs of toxicity were recorded (data not shown) and no weight changes (Figure 2a-d) due to PTFE microplastic administration were observed.

A single-dose toxicity study was performed to identify an approximate lethal dose of FIFE microplastics in two size ranges. No morbidity or death in mice was observed, and no specific clinical symptoms were recorded. Further, no significant weight changes were associated with exposure to microplastics when compared to control animals (Figure 2a-d). 

Extract of: Polymers 2022, 14, 2220. Polymers | Free Full-Text | In Vivo Toxicity and Pharmacokinetics of Polytetrafluoroethylene Microplastics in ICR Mice (mdpi.com)

