



Safe Food Advocacy Europe

STRIVING FOR SAFER FOOD FOR EUROPEAN CONSUMERS



**Food Contact Materials**  
**GUIDELINES FOR SAFE USE**  
**FOR CONSUMERS**

SAFE - Safe Food Advocacy Europe  
Rue du Taciturne 50, 1000 Brussels | [www.safefoodadvocacy.eu](http://www.safefoodadvocacy.eu) | Tel.: +32 (0) 478 650 701



Funded by the LIFE Programme  
of the European Union

# Background

These guidelines aim to inform consumers about the correct use of food contact materials (FCMs) and the possible safety issues triggered by their misuse. Consumers use different types of packaging on a daily basis, without knowing the safest and better conditions of use, and which actions to avoid. Due to difficulties to track and monitor hazardous substances in FCMs, SAFE believed necessary to raise awareness on the articles that are more likely to include these substances.

## What are FCMs?

In the EU, FCMs are defined as all materials and articles intended to come into contact with food products and beverages during their production, processing, storage, preparation and serving, before their eventual consumption (1). These items can be made from a variety of materials including (recycled) plastics, aluminium, rubber, paper, fibre-based and metal.

FCMs include kitchen equipments such as pots and pans and other kitchen utensils. They include tableware and machinery used in processing food. Food packaging and storage items are also FCMs, as well as less obvious items such as water kettles, beer taps, food mixing machinery or a coffee machine.

## What are the issues?

Scientific studies have shown several issues concerning FCMs use. First, the **migration** of hazardous chemicals from FCMs **is the transfer of chemicals from FCMs to food**, which can be potentially hazardous for human health. Many of these chemicals, which are intentionally used in the manufacturing of FCMs, have not been tested for hazard properties, or scientific data is still limited (2).



You may see this 'Glass and Fork' symbol on food and beverages containers, packaging materials and cutlery. This logo helps consumers to identify FCMs.

Secondly, **non-intentionally added substances (NIAS)** are external chemicals that are present in FCMs but have not been added intentionally during the production process. They might be present due to waste management and recycling processes and often remain unidentified (3).

Thirdly, a risk of **"cocktail-effect"** may arise on account of the simultaneous exposure to different chemical substances and NIAS through FCMs and the lack of research concerning the effect of chemical mixtures on human health.

Lastly, the **cumulative exposure** to a wide variety of chemicals, not just from FCMs alone, can increase human health risks.

## Why is this happening?

The overall EU rules on FCMs are set in the EU Regulation (EC) 1935/2004, together with the EU Regulation on Good Manufacturing Practices for materials and articles intended to come into contact with food (EC) 2023/2006.

The specific legislation for plastic FCMs sets a number of specific rules, including a Union list of authorised substances and specific migration limits. Yet it does not currently apply to adhesives or printing inks, nor to colourants and solvents used in plastics.

In addition, several chemical substances that come into contact with food are still not regulated, and the safety of single-use plastic alternatives has still not been assessed at EU level. Consumers are for this reason often misled in opting for packaging options that may be not as sustainable as they initially thought.



# Plastic

## What are FCMs from plastic?

Plastic is widely used as FCM and their use has grown exponentially since the 1950s. Plastic packaging is the largest sector of the plastic industry (40%) (4). The production of plastic has a great impact on the environment as it requires a large amount of fossil fuels and produces greenhouse gases. In addition, plastic recycling is very low and large amounts of plastic litter end up in our environment and oceans (5).

## How are they regulated in the EU?

The use of plastic is regulated by specific EU measures aiming at transforming the way plastic products are designed, produced, used and recycled in the EU (6)(7). For instance, The EU Single-Use Plastics Directive is one of the most ambitious laws to tackle plastic pollution in the world, aiming at reducing pollution from the single-use plastic items most commonly found in the environment. The Directive provides the EU-wide ban of 15 plastic items. On 3 July 2021, it came into force for all EU countries and Norway.

## What are the possible health issues?

Legally, most countries have adopted the bare minimum requirements to comply with the Directive or are missing some of the measures to be adopted. The transposition process is still in progress or has barely started. In addition, single-use plastics contain more than 12,000 hazardous chemicals which can potentially transfer to food when used wrongly (8). The reason stands on the difficulties to track all the substances presence in FCMs and in the current methods used to assessed the safety of these items. Studies have shown that endocrine disruptors, known as a group of substances that interfere with humans' hormonal systems, are present in a wide range of plastics FCMs, such as drinking bottles and food containers. These substances can migrate from FCMs to foodstuff, especially in single-use plastic items which are re-used and heated multiple times (9).

## DID YOU KNOW...

Europe's total demand for plastic has risen to 57.9 million tonnes in 2019?

The global average use of plastics is 45 kg per person per year, whereas Western Europe uses three times as much with around 136 kg per person (6).

## How to be more careful?

- ✓ Try using reusable alternatives for tableware, bottles and food containers (e.g. glass, metal).
- ✓ Try opting for fresh unpacked food when shopping for food (e.g. fruits, vegetables).
- ✓ Consider bulk sales, which are an attractive alternative to packaged products, in particular for cereals, pulses, dried fruits, cookies.
- ✓ Avoid heating or using single-use plastic items for other food than originally intended for (e.g. do not re-use single-use ice-cream containers to store hot or fatty foods).



# Recycled Plastic

## What are FCMs from recycled plastic?

Recycled plastics can be defined as plastic packaging that has passed through a mechanical recycling process. Nowadays, consumers tend to prefer sustainable food packaging, such as recycled plastic. Recycled plastics are often used for bottles, refillable drinking bottles, containers, tableware and many other items.

## How are they regulated in the EU?

Materials and articles made either entirely or partially from recycled plastics and used in FCMs should only be obtained from processes assessed for safety by EFSA and authorised by the European Commission.

The FCM regulation is accompanied by a specific legislation on recycled plastics (10). One of the main shortcomings of the legislation is that it does not set a list of recycled plastics (or substances) for FCMs but focuses on setting a list of recycling processes authorised for recyclates to be used in recycled plastic FCMs. Therefore, the current regulation focuses solely on starting substances and the recycling process, lacking attention to the final articles. Another limitation of the existing legislation concerns its efficiency in ensuring compliance and participation of independent researchers to review new scientific data.

## What are the possible health issues?

Various studies show that hazardous substances are more likely to be present in recycled plastics than in virgin plastics. This is the result of contamination due to previous misuses by consumers, cross-contamination from waste disposal and environmental contaminants, as well as faulty sorting systems allowing materials that are prohibited from being recycled into FCM (11).

In addition, the migration of chemicals to food is higher in recycled plastic. Research showed that chemical leakage into vegetable oil was higher in a recycled plastic bottle compared to virgin plastic (12).

**Brominated Flame Retardants**, can be found in the plastic waste of electronic equipment, but studies determined bromine (from BFRs) in 18% of analysed non-electronic plastics consumer product samples (e.g. coffee stirrers, thermo-cup lids) (13). These studies indicate that certain type of **black food-contact materials** have the highest risk of containing BFRs, causing effects on human health (13) (14).

Evidence shows traces of **heavy metals** in FCMs such as recycled plastic drinking bottles and straws (15). Exposure to heavy metals has been associated with a wide range of conditions, including kidney and bone damage, developmental and neurobehavioral disorders, elevated blood pressure (16).

Other chemical substances originally present in virgin plastic, like **endocrine disruptors**, are also present in recycled plastic which are more likely to migrate to foodstuff. When comparing water of the same spring packed in **glass or PET bottles**, estrogenic activity is **three times higher in water from PET bottles**.



## How to be more careful?

- ✓ Opt for other alternative materials, such as glass.
- ✓ Drink tap water rather than bottled water, which often contains recycled PET.
- ✓ Avoid black recycled plastics, as the chance of contamination with harmful chemicals, is greater due to faulty recycling systems.
- ✓ Call on national governments and EU institutions to further support the transition towards reusable packaging while guaranteeing consumer safety.
- ✓ Whenever possible, ensure good recycling practices.



### #1 PET - Polyethylene Terephthalate

- Used for fizzy drinks, water bottles, salad trays, cooking foil, vegetable oil bottles
- Recycled to tote bags, bottles and food containers



### #2 HDPE- High-Density Polyethylene

- Used for milk bottles, juice bottles, butter and yoghurt tubs, cereal box liners, shopping bags
- Recycled to oil bottles



### #6 PS - Polystyrene (also called Styrofoam)

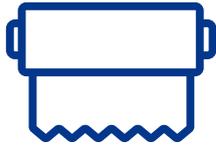
- Used for disposable plates and cups, meat trays, egg cartons, carry-out container
- Recycled to egg cartons, however, very hard to recycle in general.



### DID YOU KNOW...

Mineral water purchased in 0.5L PET bottles had the highest plasticizers concentrations compared to waters of identical brand bottled in 1.5-L or 2.0-L PET bottles, due to the higher surface/volume ratio(28)





# Aluminium

## What are FCMs from aluminium?

Aluminium is a lightweight metal and is widely used in the food sector. However, the production process of aluminium is very energy-intensive, requires large volumes of water and has a variety of environmental impacts. Aluminium is used for its strength and good thermal conductivity. In addition, it has excellent corrosion resistance.

Aluminium can be found in cooking utensils and food packagings such as pots, coffee percolators, disposable oven trays, cans, wrapping foil and coffee capsules.

## DID YOU KNOW...

That for one ton of aluminium, four tons of highly polluting residues are produced in the form of arsenic, titanium, chromium, lead, vanadium and mercury (17)?

## How is it regulated in the EU?

As the FCM regulation only lays down common rules for packaging materials, more specific rules for aluminium intended to come into contact with food are set in the Regulation 10/2011 on plastic materials and articles in FCMs. The Regulation establishes a general list of migration limits for various substances, including aluminium.

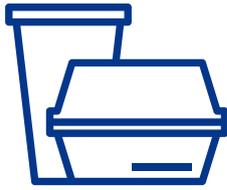
## What are the possible health issues?

Aluminium is mainly ingested through food and tap water. However, aluminium can also enter the food through cooking utensils or food packaging materials. Aluminium does not cause direct damage to health when ingested in very small amounts. In this case, your body only absorbs it in small amounts and removes it through the kidneys.

However, aluminium can enter the food through cooking utensils or food packaging materials when combined with highly acidic or salty food. Its incorrect use can cause health issues, especially for the elderly and children. Excessive aluminium builds up in the body can affect the nervous system and bones. High levels of aluminium have been linked to Alzheimer's disease, yet data remains inconclusive (18).

## How to be more careful?

- ✓ Do not use aluminium cooking equipment for the preparation of highly acidic or highly salty foodstuffs (e.g. tomatoes, rhubarb, salted herring).
- ✓ Intended for contact with foodstuffs at refrigerated temperatures (5-7°C).
- ✓ Intended for contact with foodstuffs at non-refrigerated temperatures for maximum 24 hours.
- ✓ Intended for contact for more than 24 hours at ambient temperature only for dry food (e.g. pasta, dried legumes, spices, dried mushrooms, bakery products).
- ✓ Stop using aluminium coffee capsules and go back to the traditional coffee maker which has fewer health risks and is less polluting. Besides, aluminium coffee capsules contain, next to ground coffee beans, additional animal fats and additives (17).
- ✓ Avoid putting aluminium percolators in the dishwasher, as this might remove the protective layer.



# Packaging with PFAS

## What are Perfluoroalkyl (PFAS) chemicals in FCMs?

PFAS chemicals are a group of chemicals used to achieve oil and water repellency in FCMs. They are used in a wide variety of consumer products and industrial applications, including FCMs. Several kitchen utensils, paper bags, pizza boxes, sandwich and bakery bags, and other take-away food boxes may be treated with PFAS chemicals (19).

### DID YOU KNOW ...

That PFAS chemicals are also called the '**forever chemicals**' because they are extremely persistent in nature, hardly decompose and contaminate drinking water, soil, air and can eventually end up in the food chain?

## How are they regulated in the EU?

Only a few compounds of the large PFAS family have been tested extensively and restricted at the global and European level, but thousands of other harmful varieties exist and are available for use.

To date, an effective regulation on PFAS is still missing at EU level. Since 2020, the governments of Denmark, Sweden, Germany, and the Netherlands started developing an EU-wide restriction of all non-essential uses of PFAS (20). At the national level, Denmark is currently the only country that has banned PFAS for use in food packaging (21).

## What are the possible health issues?

Scientific studies have associated exposure to PFAS with severe adverse health effects, including cancer, impacts on the immune, reproductive and hormone systems, as well as a reduced response to vaccinations (21, 22). In addition, results show that some food packaging has been treated with a specific type of PFAS, known to disrupt thyroid activity (19).

## How to be more careful?

- ✓ Avoid using disposable food packaging whenever possible. Bring your own reusable food containers.
- ✓ Be aware that food packagings such as paper pizza boxes, paper bags for fries, cardboard takeaway boxes, used by fast-food chains are often treated with PFAS.
- ✓ Be aware not to compost fibre-based food packaging which has been treated with PFAS.
- ✓ Look for PFAS-free cooking utensils and pans. This is usually indicated on the original packaging.
- ✓ Call on national governments and EU institutions to phase out non-essential uses of PFAS chemicals, as is already the case in Denmark.
- ✓ Contact and urge companies, including fast-food chains and food retailers, to phase out PFAS from the products sold in your country.



# Plant-based packaging

## What are plant-based FCMs?

Plant-based food packaging is frequently promoted sustainable alternatives and part of a circular economy. Moulded fibre, palm leaves, paper and bamboo are materials frequently used for these single-use plastic alternatives. Consumers may opt for these options to move away from plastic FCMs, and choose more sustainable options. Common examples of these plant-based FCMs are bowls, plates and to-go coffee cups intended for repeated use.

## How are they regulated in the EU?

no detailed EU rules govern the chemicals present in such food packaging materials at EU level. The FCM regulation does not include general safety requirements for moulded plant fibres, palm leaves, paper and board (1). As a result, there are no harmonised measures and different countries across Europe can apply different rules. For instance, Sweden is the only country banning bamboo-based products for food consumption.

## What are the possible health issues?

Biodegradable and compostable FCMs are often advertised as eco-friendly, plant-based alternatives. However, these products are often made by blending bamboo fibres with plastic substances or treated with increased levels of harmful substances.

As a result, they are neither biodegradable nor compostable and often have an increased migration risk of harmful chemicals to the food (23, 24).

## Which harmful substances are present?

Studies show that moulded fibre FCMs contain the highest **PFAS concentrations**. In all tested products made from moulded fibre, PFAS levels were above EU recommended levels. PFAS levels were also detected in paper straws and palm leaf tableware (19,24).

**Chloropropanols** are carcinogenic substances used in paper packaging and can migrate to liquid foodstuff (25). These substances have been detected above recommended levels in paper straws sold in Europe (24). Chloropropanols have been identified by the EU as a food contaminant of concern, however, their presence in these FCMs is not regulated.

**Pesticide residues** have also been detected in plant-based FCMs items. These pesticide residues were categorized as endocrine disruptors and several were not approved for use in Europe, suggesting the packaging was manufactured outside Europe (24). While the EU has established strict pesticide registration procedures and maximum residue levels in food, EU legislation does not explicitly regulate their presence in food packaging materials.



FCMs made from bamboo or corn fibre often contain **melamine**, which is used as glue for the fibres. The combination of melamine and bamboo is dangerous, as it can release high levels of **formaldehyde**, a well-known carcinogen (26). Formaldehyde levels in plastic are regulated plastic FCMs (7), however, no EU rules are available for bamboo or corn fibre.

Many Member States started their actions towards these bamboo-melamine FCMs, including Austria, Belgium, Denmark, Finland, Germany, Ireland, Luxembourg, Netherlands, Slovakia and Spain. Actions include advising consumers to stop using these products, prohibition of production, importation, distribution and sale of these products, withdrawing from the EU market (including online stores) and appropriate enforcement actions (27).

### DID YOU KNOW ...

That 45% of consumers have avoided single-use plastic goods or bought reusable plastic products within the past six months, according to a March 2020 Eurobarometer survey?

### How to be more careful?

- ✓ Do not use FCMS made from a mixture of melamine and bamboo/corn fibre.
- ✓ Do not use melamine tableware for warm foodstuff and do not put melamine table ware in the microwave or dishwasher.
- ✓ Avoid the disposal of moulded plant fibre compostables into the compost waste bins or your home compost, as they are heavily treated with PFAS chemicals.
- ✓ Watch out for misleading claims like 'eco-friendly', 'compostable' and 'biodegradable' on FCMs, as they may contain harmful chemicals for human health and the environment.
- ✓ Try using reusable alternatives for tableware, bottles and food containers (e.g. glass, metal).
- ✓ Call on national governments and EU institutions to further support the transition towards sustainable packaging while guaranteeing consumer and environmental safety.



# Literature

- (1) Regulation (EC) 1935/2004 of 27 October 2004 on materials and articles intended to come into contact with food and repealing Directives 80/590/EEC and 89/109/EEC
- (2) Groh, K. J., Geueke, B., Martin, O., Maffini, M., & Muncke, J. (2020). Overview of intentionally used food contact chemicals and their hazards. *Environment International*, 106225.
- (3) Food Packaging Forum, (2018) Plastic packaging contains thousands of chemicals, including hundreds of hazardous substances.
- (4) European Environment Agency. (2021). Plastics, the circular economy and Europe's environment-A priority for action. EEA, Copenhagen. <https://www.eea.europa.eu/publications/plastics-the-circular-economy-and>
- (5) Jenna R Jambeck and others. (2015). Plastic Waste Inputs from Land into the Ocean. *Science*, 347 (6223), 768-771.
- (6) Plastics Insight. (2016). Global consumption of plastic materials by region (1980-2015). Market Statistics. <https://www.plasticsinsight.com/global-consumption-plastic-materials-region-1980-2015/>
- (7) Commission Regulation (EU) No 10/2011 of 14 January 2011 on plastic materials and articles intended to come into contact with food
- (8) Groh, K. J., Geueke, B., Martin, O., Maffini, M., & Muncke, J. (2020). Overview of intentionally used food contact chemicals and their hazards. *Environment International*, 106225.
- (9) Darbre, P. D. (2020). Chemical components of plastics as endocrine disruptors: Overview and commentary. *Birth Defects Research*, 112(17), 1300-1307.
- (10) Commission Regulation (EC) No 282/2008 of 27 March 2008 on recycled plastic materials and articles intended to come into contact with foods and amending Regulation (EC) No 2023/2006
- (11) Geueke, B., Groh, K., & Muncke, J. (2018). Food packaging in the circular economy: Overview of chemical safety aspects for commonly used materials. *Journal of Cleaner Production*, 193, 491-505
- (12) Kanwal et al. (2007). FT-IR analysis of recycled polystyrene for food packaging. *Journal – Chemical Society of Pakistan*, 29(3): 239-242
- (13) Kim, Y. R., Harden, F. A., Toms, L. M. L., & Norman, R. E. (2014). Health consequences of exposure to brominated flame retardants: a systematic review. *Chemosphere*, 106, 1-19, and Turner, 2018.





- (14) Turner (2018). Black plastics: Linear and circular economies, hazardous additives and marine pollution. *Environment International*, 117(2018): 308–318.
- (15) Turner & Filella (2017b). Field-portable-XRF reveals the ubiquity of antimony in plastic consumer products. *Science of the Total Environment*, 584–585(2017): 982–989.
- (16) Mahurpawar, M. (2015). Effects of heavy metals on human health. *International Journal of Research-Granthaalayah*, ISSN-23500530, 2394–3629.
- (17) Il Fatto Alimentare (2020), Moka e capsule di alluminio: quali sono i rischi per i consumatori? <https://ilfattoalimentare.it/alluminio-caffe-moka-capsule.html>
- (18) European Food Safety Authority. (2008). Safety of aluminium from dietary intake[1] - Scientific Opinion of the Panel on Food Additives, Flavourings, Processing Aids and Food Contact Materials (AFC). *The EFSA Journal*. 754, 1-34.
- (19) Straková, J., Schneider, J., Cingotti, N. et al., (2021). Throwaway Packaging, Forever Chemicals: European wide survey of PFAS in disposable food packaging and tableware. 54 p.
- (20) Wolz, G., et al., Levels of perfluorinated carboxylic acids (PFCA), perfluorinated sulfonic acids (PFSA), and fluorinated telomers (FTOH) identified in paper-based food contact materials from the german market. *Organohalogen Compounds*, 2010. 72.
- (21) OECD, Toward a new comprehensive global database of per- and polyfluoroalkyl substances (PFASs): Summary report on updating the OECD 2007 list of per- and polyfluoroalkyl substances (PFASs). Joint meeting of the Chemicals Committee and the Working Party on Chemicals, Pesticides and Biotechnology, in Series on Risk Management No. 39. 2018, Environment Directorate. p. 24.
- (22) Powley, C.R., et al., Polyfluorinated chemicals in a spatially and temporally integrated food web in the Western Arctic. *Chemosphere*, 2008. 70(4): p. 664-72.
- (23) Service de la consommation et des affaires vétérinaires. (2021). Coup de bambou sur la vaisselle végétale! <https://www.ge.ch/actualite/coup-bambou-vaisselle-vegetale-30-03-2021>
- (24) BEUC. (2021). Towards safe and sustainable food packaging. European consumer organisations call for action on single-use tableware made of alternatives to plastic. [https://www.beuc.eu/publications/beuc-x-2021-050\\_towards\\_safe\\_and\\_sustainable\\_fcm\\_report.pdf](https://www.beuc.eu/publications/beuc-x-2021-050_towards_safe_and_sustainable_fcm_report.pdf)
- (25) Korte, R., Schulz, S., & Brauer, B. (2021). Chloropropanols (3-MCPD, 1, 3-DCP) from food contact materials: GC-MS method improvement, market survey and investigations on the effect of hot water extraction. *Food Additives & Contaminants: Part A*, 1-9.
- (26) Nederlandse Voedsel- en Warenautoriteit. (2021). Keukenartikelen met bamboe- en maisvezels 2019. <https://www.nvwa.nl/documenten/consument/eten-drinken-roken/contactmaterialen/publicaties/keukenartikelen-met-bamboe--en-maisvezels>
- (27) TÜV SÜD. (2021). EU: Market withdrawal of harmful food contact bamboo melamine plastics. <https://www.tuvsud.com/en-gb/e-ssentials-newsletter/consumer-products-and-retail-essentials/e-ssentials-4-2021/eu-market-withdrawal-of-harmful-food-contact-bamboo-melamine-plastics>
- (28) Keresztes et al., 2013



## CONTACT US

### SAFE-Safe Food Advocacy Europe



[www.safefoodadvocacy.eu](http://www.safefoodadvocacy.eu)



[info@safefoodadvocacy.eu](mailto:info@safefoodadvocacy.eu)



SAFE - Safe Food Advocacy Europe



@SAFEFoodAdvocacy



@SafeFoodEurope



Discover more  
about SAFE's  
action on FCMs!

