ECGA position on the ECHA proposal to ban PFAS

The current ECHA regulation proposal on PFAS is unjustified and disproportionate in relation to **fluoropolymers.**

- **Fluoropolymers** do not pose any risk to the environment or human health.
- They are non-mobile, non-bioaccumulative, non-toxic and flame retardant.
- The carbon and graphite industry explicitly supports a ban on demonstrably harmful and substitutable PFAS substances and thus in part also the PFAS restriction approach. However, we do not consider the current approach of undifferentiated group regulation to be suitable.
- Fluoropolymers are important enablers for numerous key industrial and future topics and for achieving the goals of the EU Green Deal. A ban, among other things, would significantly impede, if not entirely prevent, the further expansion of the hydrogen economy in the area of fuel cells and the production of green hydrogen.

For this reason, we urgently ask the responsible government representatives in the European Union to expressly exclude fluoropolymers, which are recognized as safe materials, from the PFAS regulation or the application restrictions.

On February 7, 2023, the European Chemicals Agency (ECHA) published a proposal to re-regulate the group of per- and polyfluorinated alkyl compounds (PFAS). This proposal provides for an undifferentiated, far-reaching total ban on the manufacture and use of a very large number (approx. 5,000 – 10,000) of substances.

One measure does not fit all

The grouping of substances within the framework of PFAS was created on the basis of chemical structural elements. Hence, within the scope of this group regulation, almost risk-free, only persistent chemicals/materials are also recorded and equated with substances of very high concern ("SVHC") and their properties that require regulation. Differentiating criteria such as toxicity, behavior in the environment, accumulation, toxicity to animals and plants, ... were not taken into account.

Fluoropolymers as a safe subgroup within PFAS

Although fluoropolymers belong to the PFAS group, they represent a very small subgroup there and their properties differ significantly from the majority of per- and polyfluorinated alkyl compounds (PFAS). Depending on the definition, the entire group of chemicals includes more than 5,000 substances, of which less than 40 are fluoropolymers.

There are studies [1] and [2], in which toxicity, clinical, physical, chemical, thermal and biological data for a selection of fluoropolymers covering more than 95% of the current fluoropolymer brand were collated and critically evaluated. Accordingly, fluoropolymers can be classified as "polymers of low concern" (PLC) according to the recognized OECD criteria. They are among all those plastics that have successfully passed tests based on a total of 13 criteria defined by the OECD. PLCs pose no risk to the environment or human health. Fluoropolymers are non-mobile, non-bioaccumulative, non-toxic and flame retardant.

General overview of the importance of fluoropolymers

Production of green hydrogen

The high-performance plastics are indispensable, for example, for the production of green hydrogen, where they provide the central components of the electrolyser. They are also used as currently non-substitutable components in the production of so-called gas diffusion layers, without which no PEM (proton exchange membrane) fuel cell works. They are therefore crucial for the defossilization of the European economy.

Semi-conductor industry

Fluoropolymers help with faster data transmission with 5G, the semiconductor industry needs them in chip production.

Digitisation and electronics

They can be found in other central components of smartphones and computers.

e-Mobility

In climate-friendly vehicles, they increase the performance of lithium-ion batteries and fuel cells and thus help to reduce greenhouse gas emissions in the mobility sector.

White goods and medical applications

They can be found in everyday products for the kitchen, as medical products such as stents for heart surgery.

Fluoropolymers in applications

Fluoropolymers are used in several areas within the carbon and graphite industry. The following product examples are intended to show the essential contribution and benefits of fluoropolymers in selected applications. The interaction of the unique properties of this group of materials with the often complex and demanding conditions in the respective applications is fundamental for the use of fluoropolymers.

Example fuel cell / gas diffusion layer (GDL)

Fluoropolymers (polytetrafluoroethylene (PTFE), tetrafluoroethylene-hexafluoropropylene copolymer (FEP), fluoroelastomers, etc..) are used in PEM (proton exchange membrane fuel cells) fuel cells and in the production of green hydrogen via membrane electrolysis of water from eminent importance.

In recent years, the world's most modern and largest production lines for gas diffusion layers, the heart of hydrogen fuel cells, have been set up in Europe. These gas diffusion layers are currently installed in more than 50% of all fuel cell-powered cars worldwide.

There are currently no suitable material alternatives that can even approximate the functional properties of fluoropolymers (in particular corrosion stability or water-repellent properties). A ban on fluoropolymers would lead to a significant drop in performance while at the same time significantly reducing the service life and increasing vehicle weight. This in turn comes with increased maintenance, increased waste and an increased carbon footprint.

The following components are primarily affected within the fuel cell:

o Gas diffusion layers (PTFE, FEP, contain up to 20% by weight)

o Gasket materials

According to the current state of the art, it is not possible to operate fuel cells and PEM electrolysis systems economically and stably without fluoropolymers. All fluorine compounds used are of high molecular weight and are not washed out.

Fluoropolymers in the chemical process industry

Fluoropolymers are widely used within process technologies for pipe linings, connections and seals. They are the means of choice for safely transporting aggressive chemical substances over long distances. They provide solutions for handling and processing of highly corrosive media, mainly for the chemical industry, e.g. pipelines, fittings and reaction columns with fluoropolymer lining as well as PTFE-based expansion joints to compensate for vibrations and thermal expansion as well as fluoroplastic bonded graphite for the manufacture of heat exchangers.

Fluoropolymer-based components are used in key positions in many other products (e.g. PTFE seals). In these products, PTFE ensures the best possible stability against highly corrosive and organic media within a large temperature window.

Heat exchangers

In addition, a number of different heat exchangers enable our customers to recover thermal energy from aggressive media and thereby minimize their carbon footprint. Within these heat exchangers, fluoropolymer-based, heat exchanger plates, PTFE-based gaskets and linings are used. Fluoropolymer-coated bursting discs complete the range of applications.

All of the above components typically represent either pressure-bearing components, pressure vessels or safety-relevant components, where the fluoropolymer material ultimately **represents the decisive factor in protecting people and the environment.**

Alternatives and substitutes

There are a few alternative solutions to fluoropolymers based on graphite, silicon carbide (SiC) ceramics, but also through enamelling and rubber coatings. Tantalum would be another alternative material but due to its classification as a conflict material and the unclear production and delivery situation is not much used.

When comparing these alternative materials, fluoropolymers are usually the more expensive material option. Fluoropolymers are therefore used by us and our customers in applications where other materials have to be excluded due to the mostly complex requirement profile (corrosive medium, concentration, temperature, pressure, etc.).

Ultimately, the following can be concluded for the use of fluoropolymers in the carbon and graphite products for the chemical process industry: fluoropolymers are used where alternative materials can usually not be used safely. The extreme chemical resistance, which is also the reason for the persistence of the fluoropolymers, is usually an essential requirement for the material choice in question. This chemical resistance is fundamentally due to the strong bond between carbon and fluorine, which acts as the PFAS-defining structural element.

Any non-PFAS alternative material intended to be used under the conditions described must also have a chemical resistance equivalent to that of fluoropolymers. If a fluoropolymer were to be replaced within an application by a new material that has yet to be identified, a material that is already established, safe and classified as safe by the OECD would be replaced by a material that is also persistent. This contradicts the objective of the currently proposed ban.

Fluoropolymer recycling

A reliable legislative framework allowing for planning and investments is important for the sustainable use of fluoropolymers at the end of their life. Some countries already have market-ready upcycling plants, e.g. Germany, that enables fluoropolymers to be used in a circular economy fashion.

Germany is a pioneer and leading innovator when it comes to such modern recovery plants for fluorochemicals, which are directly connected to the production. Collection systems ensure that fluoropolymers do not end up in the environment at the end of their life cycle.

Conclusions

The current ECHA regulation proposal on PFAS is unjustified and disproportionate in relation to fluoropolymers. Fluoropolymers do not pose any risk to the environment or human health. They are non-mobile, non-bioaccumulative, non-toxic and flame retardant. Fluoropolymers are important enablers for numerous key industrial and future topics and for achieving the goals of the EU Green Deal.

This applies to the chemical process industry, mobility using fuel cells, and many other applications. If "alternatives" to fluoropolymers exist, they are usually less safe, increase the carbon footprint and perform less well. Due to the strict chemicals legislation of the EU and other central environmental guidelines, fluoropolymer production and processing is nowhere as clean and reliable as in Europe. In addition, there are legal requirements in place to prevent environmental pollution from production and processing.

For the EU, an imminent ban on fluoropolymers means at least significantly slowing down the pace of innovation in important key technologies, provoking greater dependency on important technologies and migrating the local safe fluoropolymer value chain to regions with lower environmental and health standards

References

[1] Henry et al., A Critical Review of the Application of Polymer of Low Concern and Regulatory Criteria to Fluoropolymers, Integrated Environmental Assessment and Management — Volume 14, Number 3—pp. 316–334, 2018

[2] Korzeniowski et al., A critical review of the application of polymer of low concern regulatory criteria to fluoropolymers II: Fluoroplastics and fluoroelastomers, Integrated Environmental Assessment and Management — Volume 19, Number 2—pp. 326–354, 2022