NON- CONFIDENTIAL ATTACHMENT

SABIC IP's Inputs to the Public Consultation Comments to Annex XV PFAS Restriction Proposal

Question number 6: Missing uses – PTFE as an anti-drip Additive in Flame Retarded Engineering Thermoplastics (ETP) for e.g. critical Industries applications.

Substance Name: Polytetrafluoroethylene
Synonyms: PTFE
Molecular formula: $(C2F4)_n$
EC Name: 618-337-2
CAS number: 9002-84-0

USE: as an anti-drip Additive in Flame Retarded Engineering Thermoplastics (ETP) for e.g. critical Industries applications but not limited to:

- Electronics
  - Consumer Electronics
    - Mobile Phone
    - Computers / Notebook / Desktop
    - Charger / Adaptor
    - Game Console
    - Document Handling
    - TV / Monitors
    - Multimedia players / Audio
    - Streaming consoles, routers.
  - Industrial Electronics
    - Telecom infrastructure
    - Telecom 5G (radomes)
    - Security systems
    - Automation
    - ATM / POS
    - Power Tools

- Electrical
  - Electrical distribution
    - Meters
    - PV Inverters
  - Electrical Components
    - Enclosures
    - Switches / Sockets
    - Circuit breakers
    - Connectors
    - Controls (Frequency controllers)
  - Lighting (LED)
    - Lenses
    - Reflectors
    - Housing
    - LED drivers
  - Energy Storage
    - Battery pack and sub components
    - Battery enclosure
    - Cell holders
  - EV Supply Equipment
    - Charger enclosure
- Appliances:
    - Home small appliances
    - White goods
    - HVAC

Executive summary

SABIC Innovative Plastics business (SABIC IP) produces a range of highly differentiated products, which meet complex thermal, mechanical, optical, and electrical property requirements.

PTFE is used primarily in the form of encapsulated PTFE, as an anti-dripping agent in flame retardant engineering thermoplastic resins. In these applications, TPFE is indispensable for meeting plastic flame resistance requirements.

Flame retardant engineering thermoplastics (hereinafter FR ETPs) designed for a broad range of applications such as but not limited to electronics and electrical applications play a critical role in consumer safety. FR ETP's need to be inherently tough materials to provide device integrity during and after an impact event, so the device continues to function, and does not produce an electrical hazard (short circuit, shock hazard) or a fire hazard throughout its lifetime (e.g. electronic>3 yrs, electrical>10 yr). Because these plastics are inherent insulators, they provide a significant reduction in electrical shock resistance when used in the assembly of powered devices. By increasing ignition resistance, these materials help prevent injuries and property damage by lowering the probability of a, potentially catastrophic, fire event. If a flame event does occur, they help to minimize damage, injuries and/or casualties by reducing flame spread risks that will allow e.g. individuals more time to escape a fire.

In addition to product safety advantages, these FR ETPs offer design freedom, part- and function integration, and weight saving versus conventional materials such as metals and glass and reduce the amount of material used hence the amount of plastic waste produced during manufacturing and at the electronic devices' end of life. Thinner walls can lead to smaller, lighter products, resulting in lower overall CO2 footprint. Lighter products use less energy during transport, which can lead to significantly less CO2 produced over their lifetime.

Flaming drips can spread a fire, enlarging the area of the safety hazard. PTFE is often the only viable additive for many classes of thermoplastics, which can inhibit dripping and can retain all the other properties necessary to meet a variety of application requirements.

The use of PTFE is the state-of-the –art anti-drip technology used in most flame-retardant resin systems , since it meets crucial criteria of being an inert, intrinsically flame-retardant, immiscible- and semi-crystalline thermoplastic resin and which melts only above the processing temperature of Polycarbonate, its blends and polyesters.

In other words, melt strength compatible polymers do not offer the same anti-dripping performance while maintaining other critical properties as PTFE does [1].

Fluoropolymers have documented safety profiles, are thermally, biologically and chemically stable, negligibly soluble in water, nonmobile, nonbioavailable, nonbioaccumulative and nonontoxic [2].

Fluoropolymers are not expected to degrade under environmental conditions or normal use and processing conditions [3].

The Society of Environmental Toxicology and Chemistry published an Environmental Toxicology and Chemistry and Integrated Environmental Assessment on fluoropolymers [4]. In this report, they state that emissions during the use phase of final articles are negligible, because PTFE is bound within the polymer matrix. There is considerable data demonstrating that fluoropolymers such as PTFE do not degrade in the environment or release substances of toxicological or environmental concern [3][4][5][6][7][8]

Given the absence of commercially available effective alternatives, time is needed to qualify new alternatives in production and lengthy specification processes at end-users (tiers and OEMS), we feel it would be appropriate to allow for a 12-year derogation to have sufficient time to invent new materials or develop viable alternatives.

Since the proposed derogation is only for PTFE, one additional point of reference is the UK's recently published PFAS regulation proposal. They limited their proposed restriction to certain and specific PFAS substances and did not apply the restrictions to an entire class of fluorine substances. Of particular note, they are excluding fluoroplastics and fluoroelastomers (such as PTFE, PVDF, etc.), which they consider as low hazard groups, from their proposed regulation. Presumably, this is because fluoropolymers (such as PTFE) are not water soluble, are not mobile, and do not present the same level of environmental hazards as low-molecular-weight non-polymeric PFAS.

SABICIP believes this also provides a basis for a total exemption of PTFE from the potential REACH restrictions if one is to be considered.

References

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[2] (Henry et al., 2018) https://setac.onlinelibrary.wiley.com/doi/10.1002/ieam.4646#ieam4646-bib-0076
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[4] Korzeniowski, S.H., Buck, R.C., Newkold, R.M., kassmi, A.E., Laganis, E., Matsuoka, Y., Dinelli, B., Beauchet, S., Adamsky, F., Weilandt, K., Soni, V.K., Kapoor, D., Gunasekar, P., Malvasi, M., Brinati, G. and Musio, S. (2023), A critical review of the application of polymer of low concern regulatory criteria to fluoropolymers II: Fluoroplastics and fluoroelastomers. Integr Environ Assess Manag, 19: 326-354. https://doi.org/10.1002/ieam.4646
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[6] (FPG, 2021a) https://setac.onlinelibrary.wiley.com/doi/10.1002/ieam.4646#ieam4646-bib-0059
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[8] (Hintzer & Schwertfeger, 2014) https://setac.onlinelibrary.wiley.com/doi/10.1002/ieam.4646#ieam4646-bib-0075