Will UK follow EU lead and massively restrict use of PFAS? Your chance to influence regs which will affect refrigeration, medical equipment, centrifuges and more

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PFAS have been on the hit list for UK and EU environmental regulation bodies since they began to feature in media headlines as 'forever chemicals'. They can bioaccumulate up the food chain and affect development in children, increase risk of cancer, contribute to elevated cholesterol levels, interfere with women's fertility and weaken immune systems and the UK Government will shortly issue its plans on how the chemicals will be controlled. This is in the wake of the EU's publication last month of its plans to restrict 10,000 per- and polyfluoroalkyl substances (PFASs) and in the expectation of a US Environmental Protection Agency announcement on PFAS in drinking water in the next few months. The EU estimates that without action, around 4.4 million tonnes of PFASs will end up in the environment over the next 30 years. Details of the proposed EU restrictions are available on ECHA's website: https://echa.europa.eu/-/echa-publishes-pfas-restriction-proposal.

Famously used in coatings on non-stick pans, PFAS are in fact used very widely, often in applications where there are few alternatives. The German lab industry is lobbying hard to dissuade the EU from overreaching in it's control of PFAS, and the cooling industry in the UK too is expressing concerns.

The UK newsletter, Cooling Post has reported that the banning of just five refrigerants under the new PFAS regulation proposals will lead to the banning of virtually all the current lower Global Warming Potential (GWP) refrigerants made of Hydrofluorocarbon (HFC) and Hydrofluoro-Olefins (HFO) blends. Cooling Post reports that: "Excluding the current refrigerant blends that are already banned in Europe for containing CFCs or HCFCs, only 13 of the remaining 106 current ASHRAE-listed R400 series blends would escape a PFAS ban."

Lab industry uses of PFAS

The inclusion in the PFAS potential banned list of single component gases including R125, R134a, R143a affects virtually all new and current lower Global Warming Potential HFC/HFO refrigerant blends. R23 falls outside the PFAS definition and is commonly used in low temperature refrigeration applications, but it is already under pressure from the F-gas regulations because of its very high GWP of 18,400.

While laboratory suppliers who manufacture or distribute cabinet or process chillers will be most concerned about the proposals, manufacturers of medical devices, PPE, and those whose equipment requires high-performance lubricants or wear-resistant components may also be considering how to replace PFAS in their products.

PFASs are used in the production of semiconductors and as lubricants in bearings, gears, and in seals, hoses, cable insulation and medical devices that have contact with the human body, such as implants, endoscopy equipment, catheters, centrifuges, dialysis equipment, respirators and anaesthesia equipment where they are useful for their resistance to concentrated oxygen and anaesthetic gases among other things.

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They are also present in much of the filtration media used in exhaust air and wastewater purification, clean rooms and pollen filters. A fluorine-free substitute is currently not available in the same quality, and the service life of alternative impregnated systems is significantly shorter.

There is still scope to influence the final shape of any regulations. Scientific committees of the European Chemicals Agency (ECHA) will shortly begin evaluating the EU proposal in terms of the risks to people and the environment, and the impacts on society. A six-month consultation is planned to start on 22 March 2023. Peter van der Zandt, ECHA's Director for Risk Assessment said: "While the evaluation of such a broad proposal with thousands of substances, and many uses, will be challenging, we are ready."

German industry bodies argue that, due to the often highly complex international supply chains and the associated difficulty in analysing and preparing for the exact impact of a ban on many thousands of substances, there is a great risk of unforeseen disruptions to supply chains with all the associated economic impacts. They are pleading for sufficient time to be given to analysis of the precise impact of the ban per substance, especially since the costs of replacing PFAS will be high, given there are so few viable alternatives. They are also worried about the impact that regulation could have on industry's ability to innovate and the effects on the roll out of heat pumps.

If accepted, the EU proposals would enter into force in 2025 and allow an 18-month transition period to alternatives. However, a number of exemptions are proposed for certain applications. These include recommended exemptions for refrigerants in heating and ventilation equipment in buildings, where national safety standards and building codes prohibit the use of alternatives. Exemptions are also proposed for low temperature refrigeration applications and refrigerants in laboratory test and measurement equipment and in refrigerated centrifuges. The ban on PFAS refrigerants in low temperature refrigeration below -50ºC seeks a transition period of 18 months and a five-year exemption.

Laboratory test equipment and centrifuges would receive a 12-year exemption as no alternatives are currently available.

The UK government has confirmed the imminent publication of its analysis and proposals to amend UK REACH, which currently retains the key principles of the EU REACH Regulation.

The UK has been working under the same definition of PFAS as the European proposals. But experts agree that this might not be the most suitable approach. Craig Butt, one of Sciex's PFAS expert team commented: "There is a big push to ban PFAS as a class, but there are applications for which we will need to carry on using some of the 5000 – 12000 substances currently classed as PFASs. It might be better to concentrate on those highly fluorinated compounds which can bioaccumulate".'

Meanwhile, recognition of the pervasive and persistent nature of PFAS has led to them being identified all over the world, even in remote locations and uncertainties on how best, to treat PFAS have led to additional requirements for testing of surface water and foodstuffs.

What analytical laboratories are asking for according to Craig Butt, who did his PhD in PFAS in 2004, is appropriate methods for identifying 5000-12000 different substances. “We have seen a huge growth in monitoring for PFAS and we expect it to continue to grow given the global regulatory action which is driving testing. We help by developing methods for our customers to use, either for targeted work or to bridge the screening gap.”

A recent research report from Penn State University in the US, identified that the increasingly common use of treated wastewater for irrigation provides an opportunity for the soil to act as an additional filter for PFAS, reducing the immediate impact of direct discharge of PFAS to surface water. However, the chemical structures of PFAS make them difficult to degrade, and the risks and potential trade-offs of using treated wastewater for irrigation practices are not well understood.

“PFAS have been shown to be taken up by crops and enter the food chain when the crops are consumed, so when treated wastewater is used for irrigation activities in agricultural fields, understanding these trade-offs is of critical importance,” the Penn State research says.

The research team found several PFAS compounds in crop tissue samples suggesting that PFAS may enter the food chain when crops are fed to livestock with potential risks to livestock health and the potential implications of PFAS presence in meat and dairy products, including milk. For more on the report see the Journal of Environmental Quality vol 51 issue 6.

Recent United States Environmental Protection Agency health advisories for two of the most important PFAS - PFOA (Perfluorooctanoic acid) and PFOS (Perfluorooctanesulfonic acid) state that ‘any detectable level is considered a risk to human health so detection down to low levels will be key for laboratories working in this field.

If you would like to get your views heard on PFAS, the GAMBICA Refrigeration Group will be leading on putting together a UK response. If you would like to be part of the discussion, please email me on jacqueline.balian@gambica.org.uk

Single component refrigerants affected by the PFAS proposals include:

HFC125
HFC134a
HFC143a
HFO1234yf
HFO1234ze(E)
HFO1336mzz(E)
HFO1336mzz(Z)
HCFO1224yd
HCFO1233zd(E).

For a full list of affected components see The Cooling Post 12 February.