

EFCTC Position Paper on the HCFOs and their very low but non-zero ODPs

The Guidance to Regulation (EC) No 1272/2008 [1] on classification, labelling and packaging (CLP) of substances and mixtures Version 5.0 – July 2017 in section 5.1 Hazardous to the Ozone Layer states that *“Any substances having an Ozone Depleting Potential (ODP) greater or equal to the lowest ODP (i.e. 0.005) of the substances currently listed in Annex I to Regulation (EC) No 1005/2009 should be classified as hazardous to the ozone layer (category 1).”* The HCFOs have very low ODPs that are well below the threshold in the CLP guidance.

HCFO-1233zd(E) is oxidised rapidly in the lower atmosphere with atmospheric lifetimes of 42.5 days [2], hence is a very short lived substance (VSLs) [3] that, in view of its minimal effect on stratospheric ozone, is not listed as Ozone Depleting Substances in the Montreal Protocol.

The Montreal Protocol has a defined process for assessing new substances that the Scientific

Assessment Panel has estimated to have a significant ozone-depleting potential (See Montreal Protocol Decisions on new substances, including Decision IX/24). HCFO-1233zd(E) has been reviewed and assessed by the Scientific Assessment Panel [2].

It takes several months for a substance released in northern temperate regions of the world to be transported through the lower atmosphere before it is injected into the stratosphere. Consequently, very little of these HCFOs can be transported to the ozone layer. In the case of HCFO-1233zd(E), for material emitted between 30° and 60°N, an average Ozone Depletion Potential (ODP) has been calculated to be 0.00034 [4]. A more recent paper reported essentially the same ODP of HCFO-1233zd(E) at 0.0003 [5]. The authors of the papers which reported these data stated that "The short lifetime, low ODP, and low GWP indicate that [these substances] should have minimal effects on ozone and climate." The SAP 2018 Assessment Report [2] takes into account these recent papers confirming that the ODP of HCFO-1233zd(E) is <0.0004.

The ozone depletion potential (ODP) concept was initially developed to measure the potential impact of long-lived gases, those with multi-year atmosphere lifetimes, on stratospheric ozone.

For very short-lived substances (VSLs) with atmospheric lifetimes less than a few months, such as the HCFOs and CF₃I (iodotrifluoromethane), most of their effect occur in the troposphere. A recent paper [5] reconsiders the concept of ozone depletion potentials (ODPs) for such short-lived chemicals to properly account for their impact on stratospheric and tropospheric ozone, noting that it is important to recognize that tropospheric ozone has increased substantially over the last century, largely as the result of emissions from human activities.

The ODP concept uses the decline in total ozone column (troposphere and stratosphere) because it is the total column decrease that is of concern to protecting humans and the biosphere from

increases in ultraviolet radiation. The paper [6] suggests that policy considerations for VSLs not only consider the traditional total column values for ODP but should also account for the ODP due to stratospheric ozone loss only, termed Stratospheric ODP (SODP), to help the ODP concept satisfy its primary requirement of protecting stratospheric ozone. For long-lived species, ODP and SODP values should be nearly the same because almost all the ozone depletion occurs in the stratosphere. However, for many VSLs, especially those with very short atmospheric lifetimes, ODP and SODP values can be quite different.

To further investigate the SODP concept, the paper [6] examined the most recent published literature for ODPs determined for other VSLs, including HCFO-1233zd(E). For this HCFO the paper concluded that most of the total ozone column decrease occurred in the troposphere (~ 53%), reducing the already extremely small potential effect on stratospheric ozone even further.

The HCFOs are included in Annex II section 1 of F-gas Regulation 517/2014. Article 19 and Annex VII sets out reporting requirements including production and quantities placed on the EU market. Inclusion of the HCFOs, for example, in Annex II Part B of the ozone regulation would be double regulation and furthermore is not justified by their properties, impact on the stratospheric ozone layer, and very low ODPs below and the minimum ODP threshold for classification as hazardous to the ozone layer.

References

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About EFCTC

The European FluoroCarbons Technical Committee is a Cefic Sector Group that monitors legislation related to HFCs (hydrofluorocarbons), and HFOs (hydrofluoro-olefins) in the EU and at global level. Fluorocarbons are used as feedstock, as refrigerants, as solvents and as blowing agents for insulation plastic foams.

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