Warming Refrigerants?

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Abstract

Hydrofluoroolefins (HFOs) are used as fourth-generation refrigerants. They have been thought to be promising chemical replacements for previous refrigerants due to their zero ozone-depleting potential (ODP) and assumed low global warming potential (GWP) [Arora et al. 2018]. However, there has been recent evidence that HFOs could decompose under atmospheric conditions into hydrofluorocarbons (HFCs) [Campbell et al. 2021]. In this work, we explored theoretically the possible tropospheric photolysis pathways of one of the most important HFO breakdown products: fluorinated acetaldehydes. Three HFOs were considered: HFO-1234ze, HFO-1243ze, and HFO-1252ze, producing CF_3CHO, CHF_2CHO, and CH_2FCHO, respectively [Javadi et al. 2008]. Here, we show how their major tropospheric photolysis channels have been characterised by an accurate simulation protocol. A comparative analysis of the results reveals that HFO-1234ze has the highest likelihood of HFC production.

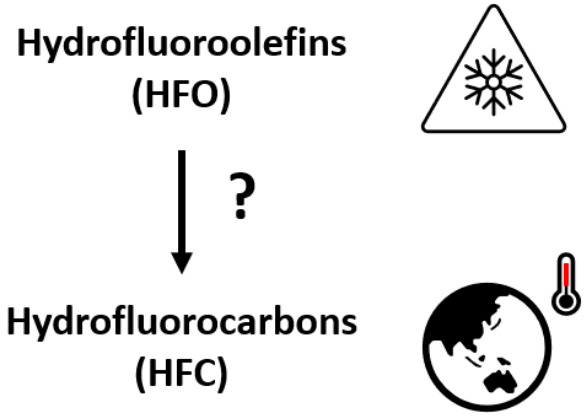

Fig. 1 - Are HFOs source of HFCs?

References

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