LEARN ABOUT…
HCFO-1233zdE, HBFO-1233xfB, Stratospheric Ozone and Climate Change

Created: January 2018
Updated: January 2018

These are chlorotrifluoropropene (HCFO-1233) and bromotrifluoropropene (HBFO-1233). Both are oxidised rapidly in the lower atmosphere with atmospheric lifetimes of 26 days[1] and 7days[2], respectively; hence both are very short lived substance (VSLS)[3] that, in view of their minimal effect on stratospheric ozone, are not listed as Ozone Depleting Substances in the Montreal Protocol.

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 halopropenes can be transported to the ozone layer. For material emitted between 30° and 60°N, the Ozone Depletion Potential (ODP) of HCFO-1233zd(E) is 0.00034[4] and, on the same basis, that of HBFO-1233xf(B) is 0.0028[2].

Due to their very short atmospheric lifetimes, these substances do not accumulate in the atmosphere and the global warming potentials (GWPs) of both substances are less than 1[4,5] (that is less than carbon dioxide at the 100 year time horizon).

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."

---

1 Myhre, G., D. Shindell, F.-M. Bréon, W. Collins, J. Fuglestvedt, J. Huang, D. Koch, J.-F. Lamarque, D. Lee, B. Mendoza, T. Nakajima, A. Robock, G. Stephens, T. Takemura and H. Zhang, 2013: Anthropogenic and Natural Radiative Forcing. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Chan*ge [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

2 Patten, K. O., V. G. Khamaganov, V. L. Orkin, S. L. Baughcum, and D. J. Wuebbles (2011), OH reaction rate constant, IR absorption spectrum, ozone depletion potentials and global warming potentials of 2-bromo-3,3,3-trifluoropropene, J. Geophys. Res., 116, D24307, doi:10.1029/2011JD016518.

3 Ko M.K.W. and 32 others, Very Short-Lived Halogen and Sulphur Substances, Chapter 2 of Scientific Assessment of Ozone Depletion: 2002, Global Ozone Research and Monitoring Project - Report No. 47, World Meteorological Organization, Geneva, 2002.

4 Patten, K. O. and Wuebbles, D. J.: Atmospheric lifetimes and Ozone Depletion Potentials of trans-1-chloro-3,3,3-trifluoropropylene and trans-1,2-dichloroethylene in a three-dimensional model, *Atmos. Chem. Phys*., 10, 10867-10874, https://doi.org/10.5194/acp-10-10867-2010, 2010.

5 Patten, K. O., V. G. Khamaganov, V. L. Orkin, S. L. Baughcum, and D. J. Wuebbles (2012), Correction to “OH reaction rate constant, IR absorption spectrum, ozone depletion potentials and global warming potentials of 2-bromo-3,3,3-trifluoropropene,” J. Geophys. Res., 117, D22301, doi:10.1029/2012JD019051.

EFCTC
Avenue E. van Nieuwenhuyse 4 B-1160 Brussels Belgium
Tel. +32.2.676.72.28 sga@cefic.be www.fluorocarbons.org

A sector group of Cefic
European Chemical Industry Council - Cefic aisbl
EU Transparency Register n° 64879142323-90