

FACT SHEET

Air Quality: Revision to the Regulatory Definition of Volatile Organic Compounds – Exclusion of *trans*-1,1,1,4,4,4-hexafluorobut-2-ene, and HFO-1336mzz(E); (also known as HFO-1336mzz-E)

ACTION

- On January 31, 2023, the U.S. Environmental Protection Agency (EPA) revised the regulatory definition of volatile organic compounds (VOC) under the Clean Air Act by adding *trans*-1,1,1,4,4,4-hexafluorobut-2-ene (also known as HFO-1336mzz(E); CAS RN 66711-86-2) to the list of compounds excluded from the regulatory definition of VOC. Some VOCs contribute significantly to the formation of ground-level ozone. Exposure to ozone can cause serious respiratory illness.
- EPA's final decision is based on consideration of HFO-1336mzz(E)'s negligible contribution to ground-level ozone and the low likelihood of risk to human health or the environment associated with its use. EPA does not expect emissions of this compound to contribute to violations of the ozone National Ambient Air Quality Standards.
- HFO-1336mzz(E) may be used in a variety of applications in foam expansion or as a blowing agent where it has significant performance and energy-saving advantages. Manufacturers and formulators of polyurethane foams and refrigeration equipment can benefit from access to HFO-1336mzz(E) to meet VOC limits on their products without impairing performance.
- In comparison to alternatives, HFO-1336mzz(E) has health and environmental benefits. EPA estimates the global warming potentials (GWP) for HFO-133mzz(E) as 26, 7, and 2 for time horizons of 20, 100, and 500 years, respectively. This compound can be used as a replacement for several higher global warming potential (>700 GWP) compounds for use in polyurethane rigid insulating foams, among others. HFO-1336mzz(E) has a lower stratospheric ozone depletion potential than other alternatives, and based on the available toxicity data, it is less harmful compared with other chemicals used for the same purpose.
- This action allows, but does not require, states to remove regulatory controls on HFO-1336mzz(E) that are part of State Implementation Plans (SIP) designed to help states meet the ground-level ozone standards.
- This action will be effective 60 days after publication in the *Federal Register*.

BACKGROUND

- A compound may be excluded as a VOC as a result of public petitions and scientific data that demonstrate its negligible effect on the formation of ground-level ozone. Since 1977, EPA has removed 62 specific compounds or classes of compounds from the list of VOCs that contribute to ozone formation.
- The Chemours Company submitted a petition to the EPA on November 30, 2016, requesting that (2E)-1,1,1,4,4,4-hexafluorobut-2-ene (HFO-1336mzz(E); CAS number 66711-86-2) be exempted from the regulatory definition of VOC. The petition was based on the argument that HFO-1336mzz(E) has low reactivity relative to ethane. HFO-1336mzz(E) has a low MIR (i.e., 0.011 g of O₃/ g of HFO-1336mzz(E)) when compared to the MIR of ethane (0.28 g O₃ / g of ethane).
- EPA carefully reviewed all available scientific data before proposing in April 2022 to exclude this compound from the list of VOC. During the comment period, EPA received only two comments, and both supported the exemption. These comments were submitted by the industry and professional organizations including the US chamber of commerce. Response to these comments was provided in the final action.
- Both HFO-1336mzz(E) and its atmospheric breakdown product trifluoroacetic acid (TFA) are members of the broad class of compounds known as per- and poly-fluoroalkyl substances (PFAS). These compounds though, are not among the PFAS currently listed or targeted for specific Agency action.
- After evaluating the overall risks to human health and the environment, EPA's [Significant New Alternatives Policy \(SNAP\) Program](#) identified HFO-1336mzz(E) as an acceptable substitute for other more potent stratospheric ozone-depleting substances.
- Other EPA programs would control any new use of this compound as required.

FOR MORE INFORMATION

- Interested parties can download a copy of the final rule from EPA's website at the following address: <https://www.epa.gov/ozone-pollution/ozone-volatile-organic-compound-voc-exemptions-rules>.
- Today's action and other background information are also available electronically at <https://www.regulations.gov/>, EPA's electronic public docket <https://www.epa.gov/dockets>.
- For further information about this action, contact Dr. Souad Benromdhane of EPA's Office of Air Quality Planning and Standards, at (919) 541-4359 or by e-mail at benromdhane.souad@epa.gov.