

Summary of Substitute Aerosol Propellants Listed in SNAP Notice 25

The table below provides additional information on the substitutes listed in the end uses within the foam blowing sector noted in Notice 25. The first column provides the name of the substitute. Alternate names or trade names, along with the CAS ID#, are in the second column. The third column refers to the previous *Federal Register* actions in which we found the substitute acceptable for one or more end uses within the refrigeration and air conditioning sector. The fourth through eighth columns provide information about the environmental, health, and safety properties. “ODP” is the ozone depletion potential of the substitute, relative to a value of 1.0 for CFC-11. “GWP” is the 100-year integrated global warming potential of a chemical, relative to a value of 1 for CO₂. “VOC status” indicates whether the substitute contains any components that are defined as, or are exempt from the definition of, volatile organic compounds under Clean Air Act regulations (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the national ambient air quality standards. Substitutes listed as “exempt” in the column for VOC status in Table 4 contain only compounds that are exempt from the definition of VOC under those regulations. “Flammable” indicates whether the propellant is flammable by flashpoint testing using ASTM E 681. (The table does not include results of flame extension testing on aerosol products required by the Consumer Product Safety Commission. This is a test for a formulated product rather than just for a propellant.) Flammable propellants are hazardous waste when disposed. “Exposure limit” indicates the workplace exposure limits for the components of the propellant, typically as an 8-hour time-weighted average. “Type of exposure limit” indicates the source of the exposure limit, such as a Recommended Exposure Limit (REL) from the National Institutes for Occupational Safety and Health (NIOSH), a Threshold Limit Value (TLV) from the American Conference of Government Industrial

Hygienists (ACGIH), a Workplace Environmental Exposure Limit (WEEL) from the American Industrial Hygiene Association (AIHA), an acceptable exposure limit from the substitute's manufacturer (manufacturer AEL), or a recommendation from EPA (either a workplace acceptable exposure limit – AEL – or a consumer exposure limit – CEL).

Summary of Information on Aerosol Propellant Substitutes for HCFC-22 and HCFC-142b

| Name of Substitute | Further Identification Information for Substitute | Previous Federal Register Listings | ODP | GWP | VOC status | Flammable | Exposure limits ¹⁴ (ppm) |
|-----------------------|---|--|--------------------------|--------------------------|------------|-----------|-------------------------------------|
| Alternative processes | examples: pumps, mechanical pressure dispensers, non-spray dispensers | March 18, 1994 SNAP rule (58 FR 13044) | 0 | 0 | N/A | no | N/A |
| Compressed gases | examples: carbon dioxide, compressed air, nitrogen, nitrous oxide | March 18, 1994 SNAP rule (58 FR 13044) | 0 to 0.017 ¹⁵ | 0 to 300 | N/A | no | depends on particular gas |
| Dimethyl ether | DME, wood ether, Dymel A; CAS # 115-10-6 | March 18, 1994 SNAP rule (58 FR 13044) | 0 | 5 or lower ¹⁶ | VOC | yes | 1000 (Manufacturer AEL) |
| HFC-125 | 1,1,1,2,2-pentafluoroethane; CAS # 354-33-6 | March 18, 1994 SNAP rule (58 FR 13044) | 0 | 3500 | exempt | no | 1000 (WEEL) |
| HFC-134a | 1,1,1,2-tetrafluoroethane; CAS ID # 811-97-2 | March 18, 1994 SNAP rule (58 FR 13044) | 0 | 1430 | exempt | no | 1000 (WEEL) |
| HFC-152a | 1,2-difluoroethane; CAS ID #75-37-6 | March 18, 1994 SNAP rule (58 FR 13044) | 0 | 124 | exempt | yes | 1000 (WEEL) |
| HFC-227ea | 1,1,1,2,3,3,3-heptafluoro-propane; CAS # 431-89-0 | SNAP Notice 9, May 22, 1998; 63 FR 28251 | 0 | 3220 | exempt | no | 1000 (Manufacturer AEL) |

¹⁴ Eight-hour time-weighted average worker exposure limit expressed in parts per million (ppm), unless otherwise stated.

¹⁵ According to an August 27, 2009 article in *Science* by A.R. Ravishankara, John S. Daniel, and Robert W. Portman, nitrous oxide has an ODP of 0.017. All other compressed gases mentioned have an ODP of 0.

¹⁶ EPA is unaware of any specific 100-yr GWP value in the peer reviewed literature for this compound. However, its GWP is expected to be low, based on similarity to other compounds with GWPs that have been published in the peer-reviewed literature (see IPCC 4th Assessment Report, Table 2.15).

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|-------------------------------------|--|--|-----|---------|-------------------|-----------|---|
| HFO-1234ze | trans-1,3,3,3-tetrafluoroprop-1-ene; CAS ID# 29118-24-9 | SNAP Notice 24; September 30, 2009 (74 FR 50129) | 0 | 6 | VOC ¹⁷ | no | 1000 (EPA Recommended 8-hr AEL) 420 (Preliminary EPA Recommended Acute Consumer Exposure Limit) ¹⁸ |
| Saturated light hydrocarbons, C3-C6 | examples: propane, butane, isobutane | March 18, 1994 SNAP rule (58 FR 13044) | 0 | 3 to 10 | VOC | yes | 800 to 1000 ¹⁹ (TLV or 10-hr REL) |

¹⁷ EPA has received a petition to exempt HFO-1234ze from the definition of VOC, based on its low photochemical reactivity compared to ethane.

¹⁸ The derivation of EPA's recommended AEL and preliminary recommended consumer exposure limit (acute) are available at www.regulations.gov as item EPA-HQ-OAR-2003-0118-0250.

¹⁹ The range of 800 to 1000 ppm applies to the group of propane, butane, and isobutane. Other saturated light hydrocarbons with 5 or 6 carbons have exposure limits as low as 300 ppm for cyclohexane.