HP 152a

Aerosol Propellant

Stability Overview

Technical Information

HP 152a (also known as HFC-152a or 1,1-difluoroethane) is a relatively inert chemical that is used in several commercial applications. It is used as a propellant in aerosol products, as a fluid in refrigeration systems, and as a blowing agent for plastic foams. HP 152a does not react with the solvents commonly used in aerosol formulations, e.g., ethanol, chlorocarbons, hydrocarbons, etc. It is also very stable to hydrolysis, especially under alkaline conditions.

Over the years, different types of stability testing have been done with HP 152a under test conditions designed to intentionally stress the molecule. Stability testing attempts to relate test conditions to actual use. Some of the testing has stressed HFC-152a at temperatures up to 450 °F (232 °C) (to simulate extrusion conditions for making foams). HFC-152a has been tested in the presence of other materials and metals to determine if there are any catalytic effects from the environment within which it is used. Additionally, these tests are typically carried out for several compounds at a time, so as to offer comparative results. Overall, HFC-152a has demonstrated exceptional stability over a very broad range of use and conditions.

The following test summaries demonstrate the stability of HFC-152a.

Like any molecule, HFC-152a can be cracked if stressed sufficiently; but, this would require extremes, like high temperatures (e.g., fires), unusually reactive chemical systems, or intentional processing to generate decomposition (e.g., glass etching). None of these conditions are found in day-to-day aerosol product filling or use.

Thermal Stability Tests

HFC-152a was tested with napthenic oils and a metal coupon assembly (Fe/Al/Cu) in glass tubes for two time/temperature combinations:

For 90 days at 250 °F (121 °C): no significant HFC-152a decomposition compared to 0.16% decomposition of CFC-12.

For 30 days at 400 °F (204 °C): no measurable decomposition of HFC-152a compared to significant decomposition observed for CFCs 11, 12, 113, and 114.

Hydrolytic Stability

Hydrolytic stability experiments show that HFC-152a is generally stable in aqueous systems, especially in alkaline systems. The attached data compares HFC-152a to other fluorocarbon propellants and shows at least equivalent and/or better hydrolytic stability.

Aerosol Stability Tests

Over the years, HP 152a has been tested in numerous aerosol formulations, typically in unlined tinplate containers at elevated temperatures (e.g., 120 °F [49 °C]). With respect to HP 152a stability, all tests and observations made to date continue to support the basic compound stability. The Chemours Laboratory continues to evaluate all the propellants from Chemours in aerosol product formulations to grow the understanding of performance and behavior.

Chemours™

Hydrolysis of Fluorochemicals in Aqueous Systems

Hydrolysis Rate (g hydrolyzed/L of solution/year)

	Sealed Tube Tests in Specified Solution with Metal Coupon, as Indicated Test Temperature, 30°C (86°F)			Tested in Lined (vinyl over epoxy) Tinplate Aerosol Can Test Temperature, 54°C (130°F)	
System	Freon™ 12	Freon™ 22	Freon™ 114	HFC 114	HP 152a
Neutral					
Water Alone	<0.005	<0.01	<0.005	0	0.0056
Water + Fe	0.8	0.12	1.4		
Water + Sn	<0.002	0.009			
Water + Al	1.6	0.087			
Alkaline					
1% Sodium Carbonate	0.04	220	<0.01		
3% Sodium Bicarbonate				0	0.001
1% Sodium Carbonate + Fe	0.03	220			
Acidic					
0.5% Acetic Acid				0.002–0.005	0.0604

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