HP 152a

Aerosol Propellant

Physical Properties of HP 152a and n-Butane Mixtures

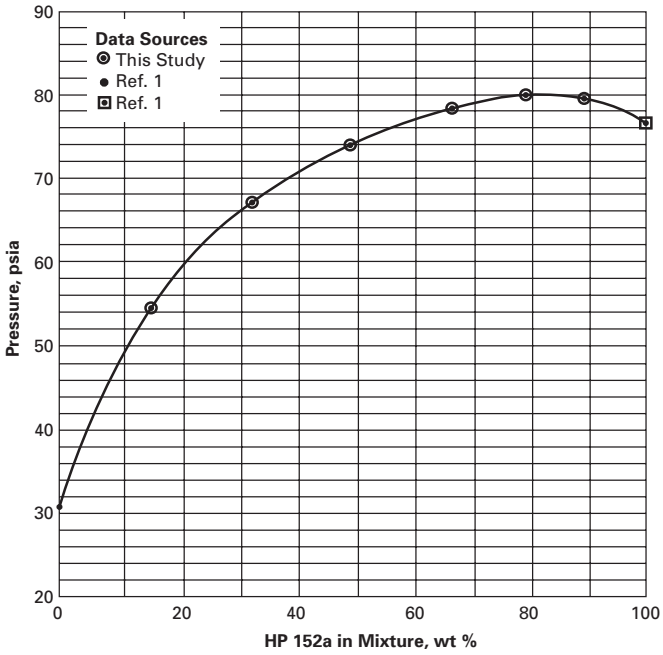
Technical Information

For the full range of HP 152a/B compositions, this bulletin presents the saturated vapor pressures and liquid densities from 70°F to 130°F (21.1°C to 54.4°C) and flammability data for the vapor mixtures in air.

The saturated vapor pressure data for HP 152a/B are shown in Figures 1–4 and Table 1. The graphs are based on on literature data for the pure components (Ref. 1) and on the experimental data given in Table 1. Figures 1 and 2, which show the saturated vapor pressures for the HP 152a/B blends at 70°F and 130°F, reveal that HP 152a and butane form an azeotropic mixture containing 82 weight percent HP 152a at 70°F and 88 weight percent HP 152a at 130°F.

Figure 5 and Table 2 show the liquid densities that were calculated from pure component data (Ref. 1). The flammability of HP 152a/B vapor mixtures in air is shown in Figure 6 and Table 3. These data are based on literature values for the pure components (Ref. 2 and 3) and experimental values for a 50/50 mole percent (53.25/46.75 wt %) HP 152a/B mixture.

Figure 1. Saturated Vapor Pressure of HP 152/B at 70°F—Experimental Data



References

1. ASHRAE, *Handbook of Fundamentals*, 1972.
2. Bulletin 503, Bureau of Mines, "Limits of Flammability of Gases and Vapors".
3. *Handbook of Aerosol Technology*, P.A. Sanders, Van Nostrand Reinhold Company, 1979.

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Figure 2. Saturated Vapor Pressure of HP 152/B at 130°F—Experimental Data

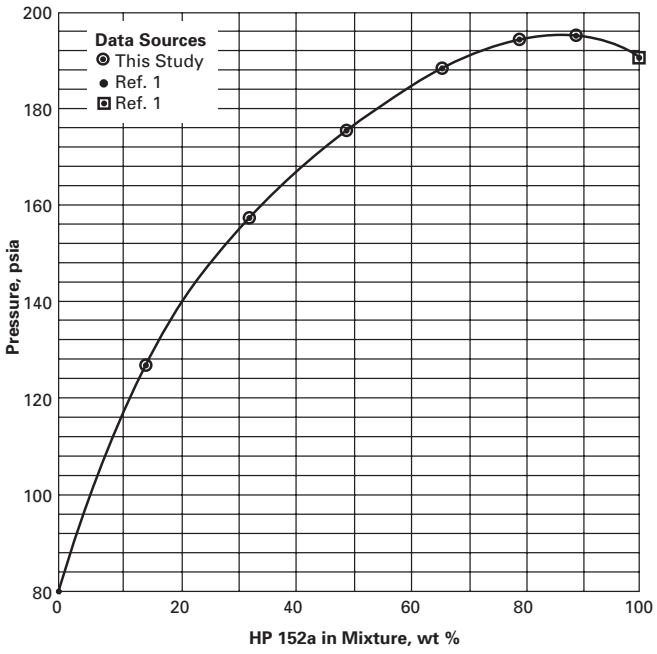
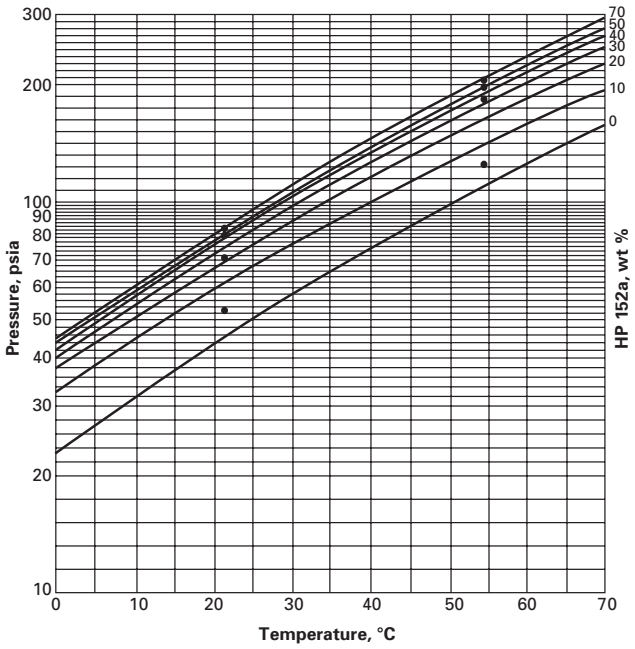
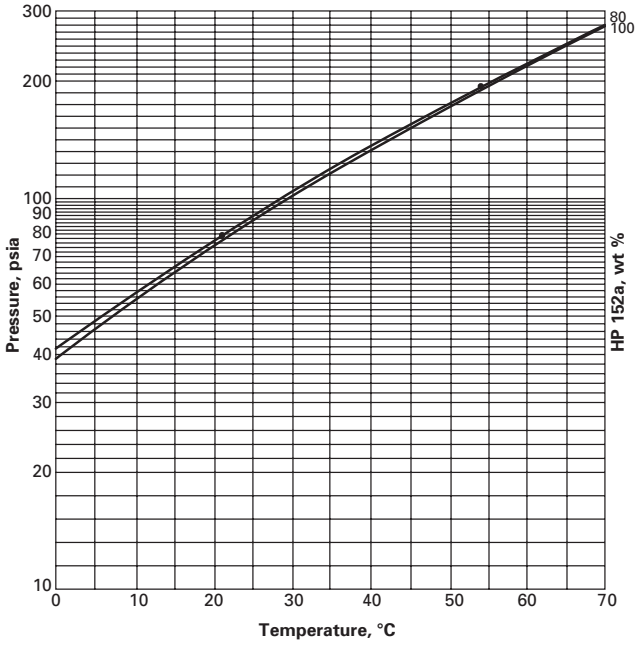


Figure 3. Saturated Vapor Pressures of HP 152/B Mixtures



Note: Data based on pure component data plus shown experimental points (▪)
Note: An 80 wt % HP 152 line falls at or just below the 70 wt % line. An 80 wt % mixture has a pressure of 40.7 psia at 0°C and 276.7 psia at 70°C. The azeotropic mixture contains 82 wt % HP 152 at 70°F and 88 wt % HP 152 at 130°F.

Figure 4. Saturated Vapor Pressures of HP 152/B Mixtures



Note: Data based on pure component data plus shown experimental points (▪)
Note: A 70 and 90 wt % HP 152 line falls at or just below the 80 wt % line. A 70 wt % HP 152 mixture has a pressure of 40.4 psia at 0°C and 270.1 psia at 70°C. A 90 wt % mixture has a pressure of 40.2 psia at 0°C and 279.1 psia at 70°C. The azeotropic mixtures contain 82 wt % HP 152 at 70°F and 88 wt % at 130°F.

Table 1. Saturated Vapor Pressures of HP 152/B Mixtures—Experimental Data

HP 152 in Propellant Mixture, wt %	Pressure, psia	
	77°F (25°C)	130°F (54.4°C)
0*	31.2	80.8
15.0	54.4	126.7
33.0	67.3	156.7
50.0	73.7	175.5
67.0	78.3	187.8
80.0	79.9	194.0
90.0	79.5	194.9
100.0*	77.2	191.5

*Ref. 1

Figure 5. Liquid Densities of HP 152/B Mixtures

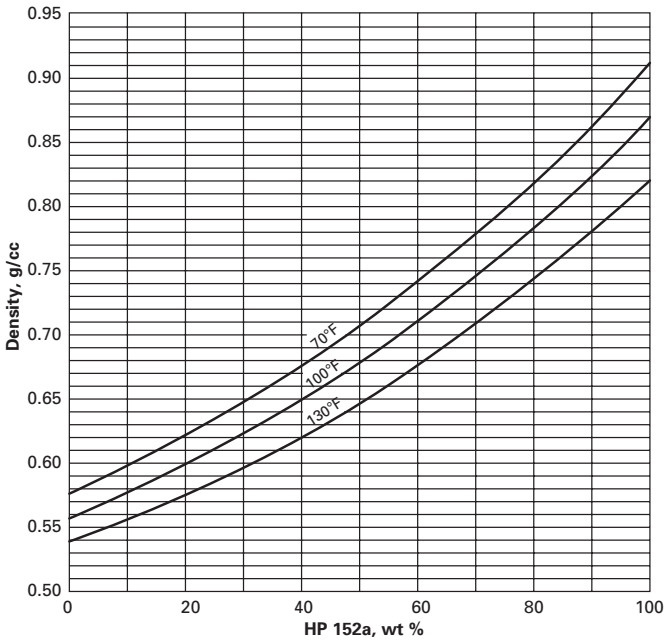
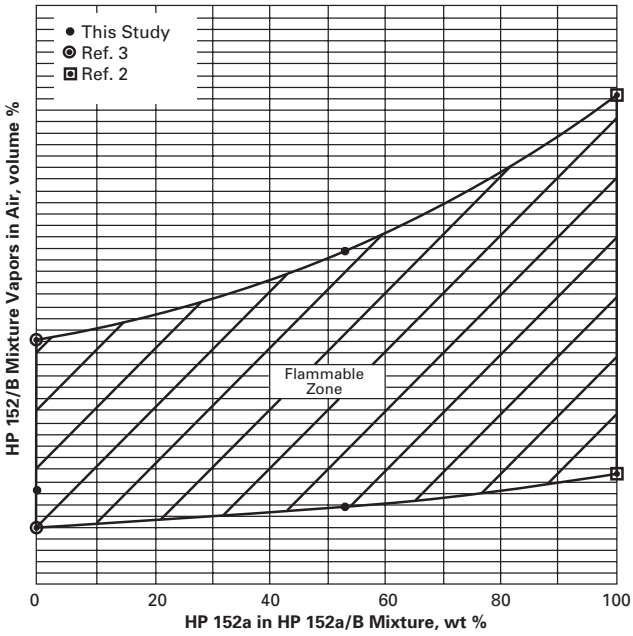


Figure 6. Flammability Limits of HP 152/B Mixtures



Note: Data calculated from pure-component densities.

Table 2. Calculated Liquid Densities of HP152/B Mixtures

HP 152 in Mixture, wt %	Densities, g/cc at		
	70°F	100°F	130°F
0*	0.5775	0.5580	0.5370
20	0.6229	0.6007	0.5764
40	0.6761	0.6504	0.6221
60	0.7393	0.7092	0.6756
80	0.8154	0.7796	0.7393
100*	0.9090	0.8655	0.8161

*Ref. 1

Table 3. Flammability Limits of HP 152/B Vapor Mixtures in Air

Concentration of HP 152 in HP 152/B Mixture		Flammability Limits in Air, vol %	
Weight, %	Mole, %	Lower	Upper
0.0[a]	0.0	1.9	8.5
53.25	50.0	2.7 ± 0.1	9.7 ± 0.1
100.0[b]	100.0	3.9	16.9

[a]Ref. 2
[b]Ref. 3

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