

TRANSPORT PROPERTIES OF HYDROGEN PEROXIDE - II

Thermal Conductivity

Experimental measurements of the thermal conductivity of H_2O_2 - H_2O solutions have been limited to determinations (Ref. 3) on 98.2 w/o H_2O_2 at 0 C (32 F) and 25 C (77 F) and on 50 w/o H_2O_2 at 25 C; resulting thermal conductivities were 0.321, 0.339, and 0.347 Btu/hr-ft-F, respectively. Using the two experimental data points, the thermal conductivity of 98.2 w/o H_2O_2 was extrapolated to the critical point. This extrapolation, shown in Fig. 2.21, used H_2O as a reference substance and assumed no decomposition and a thermal conductivity of 0.100 Btu/hr-ft-F at the critical point.

Coefficient of Diffusion

The experimental determination of the diffusion coefficient of liquid H_2O_2 into water has been reported (Ref. 6) for 0.17 w/o H_2O_2 from 0 to 40 C (32 to 104 F) and for 0.019, 1.44, and 7.92 w/o H_2O_2 at 20 C (68 F). At 20 C (68 F), the diffusion coefficients were $<1.2 \text{ cm}^2/\text{day}$ for the concentrations studied.

The diffusion coefficient of H_2O_2 vapor into air was experimentally determined in a vertical tube as $0.188 \text{ cm}^2/\text{sec}$ at 60 C (140 F) and 1-atmosphere pressure. This can be compared to a diffusion coefficient of $0.320 \text{ cm}^2/\text{sec}$ reported (Ref. 7) for water vapor under identical conditions.

Sonic Velocity

The velocity of sound was experimentally measured (Ref. 8) in H_2O_2 - H_2O solutions from 3.5 to 33.5 C (38.3 to 92.3 F). These data are plotted for propellant-grade H_2O_2 solutions in Fig. 2.22 and 2.22a.

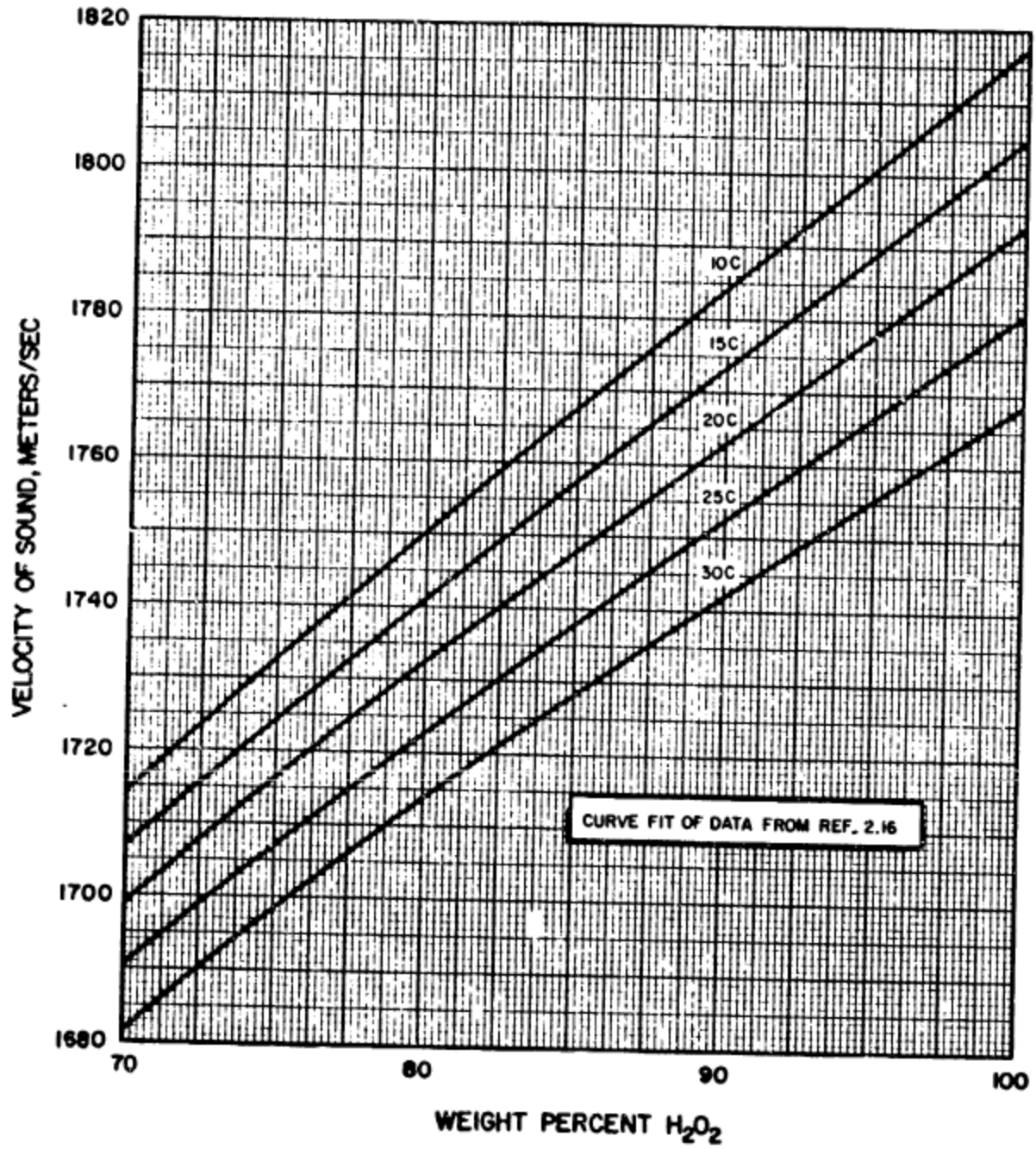


Figure 2.22. Velocity of Sound in Propellant-Grade Hydrogen Peroxide-Water Solutions

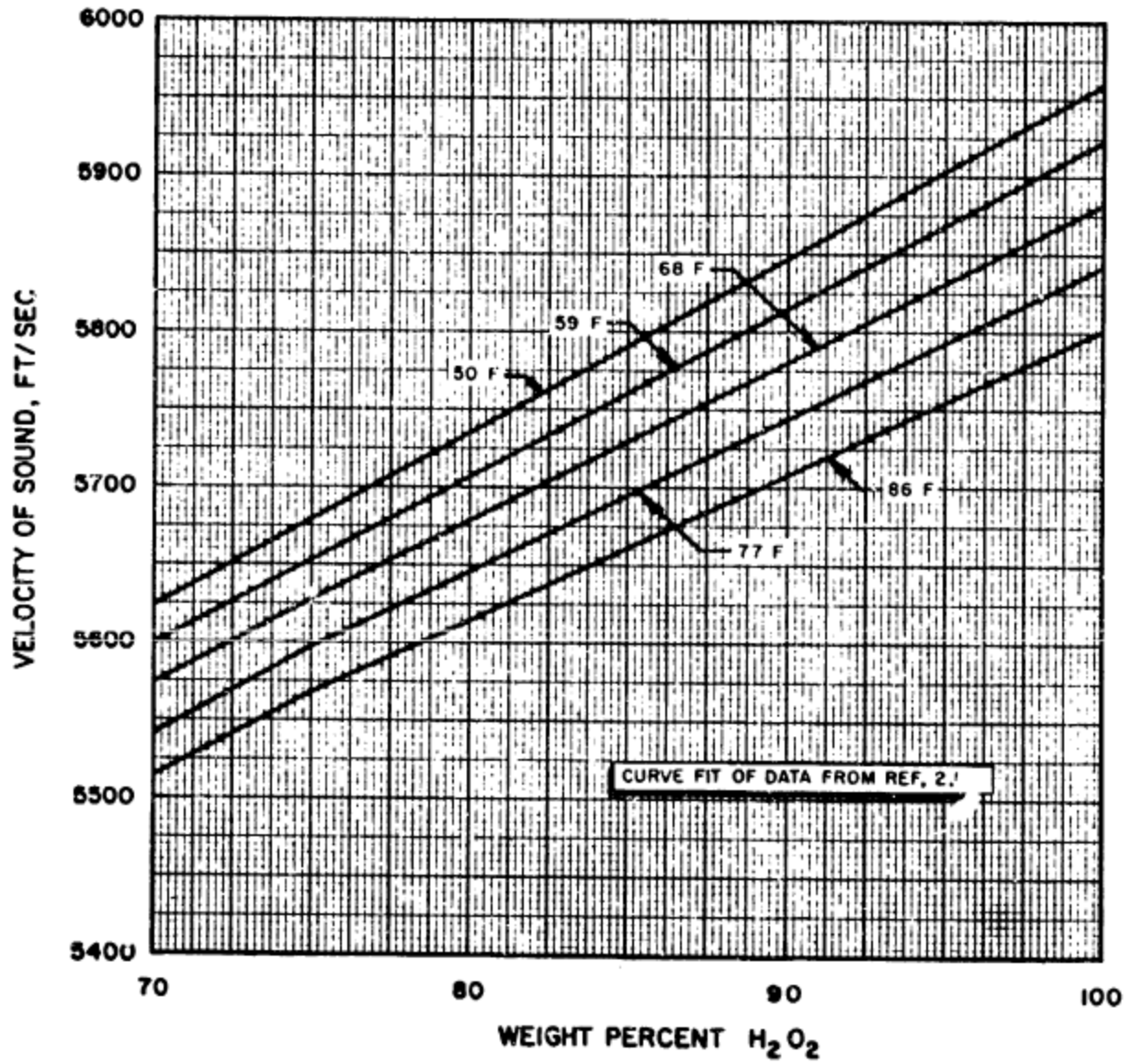


Figure 2.22a. Velocity of Sound in Propellant-Grade Hydrogen Peroxide-Water Solutions

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