NORMAL BOILING POINT OF HYDROGEN PEROXIDE

The normal boiling points of propellant-grade H_2O_2 solutions have not been experimentally determined by conventional means since these points are in a temperature region where thermal decomposition of the H_2O_2 is significant. The normal boiling pints listed in Table 2.1 and Fig. 2.3 for propellant-grade H_2O_2-H_2O solutions represent extrapolations of the vapor pressure data of Section 2.2.2.4 to 1 atmosphere of pressure. Other references (i.e., Ref. 2.11 and 2.12) give very similar boiling points even though these temperatures were calculated from extrapolations of different individual sets of vapor pressure data. The correlation of these individual sets of data, which results in the newly calculated normal boiling points, is discussed in Section 2.2.2.4.

Critical Properties of Hydrogen Peroxide

There has been no experimental determinations of critical properties of H_2O_2 since the compound undergoes extensive decomposition before the critical temperature is achieved. However, because this property is of academic interest, the critical temperature has been estimated by assuming that the critical temperature/boiling point ratio of H_2O_2 is equal to that of water. Based on this technique, a critical temperature (Tc) of 458.8 C (857.8 F) has been reported for 100 w/o H_2O_2 (Ref. 2.11); another Tc value of 457 C (855 F) for 100 w/o H_2O_2, which was alluded to in Ref. 2.12, was reported in Ref. 2.10. Using a vapor pressure equation established in Ref. 2.12, the critical pressure, Pc was calculated (Ref. 2.10) as 214 atmospheres (3140 psia) at the latter Tc.

Using the estimated boiling point given in Table 2.1 and correlation technique described above, a Tc of 733 1K (460 C, 860 F) is recommended for 100 w/o H_2O_2. An estimation technique suggested in Ref. 2.12 (Pc/Tc is equivalent for both H_2O_2 and H_2O) resulted in a calculated and recommended Pc of 247 atmospheres (3630 psia) for 100 w/o H_2O_2 using the Tc value of 733 K. Pseudo critical constants were calculated for the propellant-grade H_2O_2-H_2O solutions through the use of Kay's method (Ref. 2.13); the results of these calculations are shown in Table 2.1 and in Fig. 2.3.

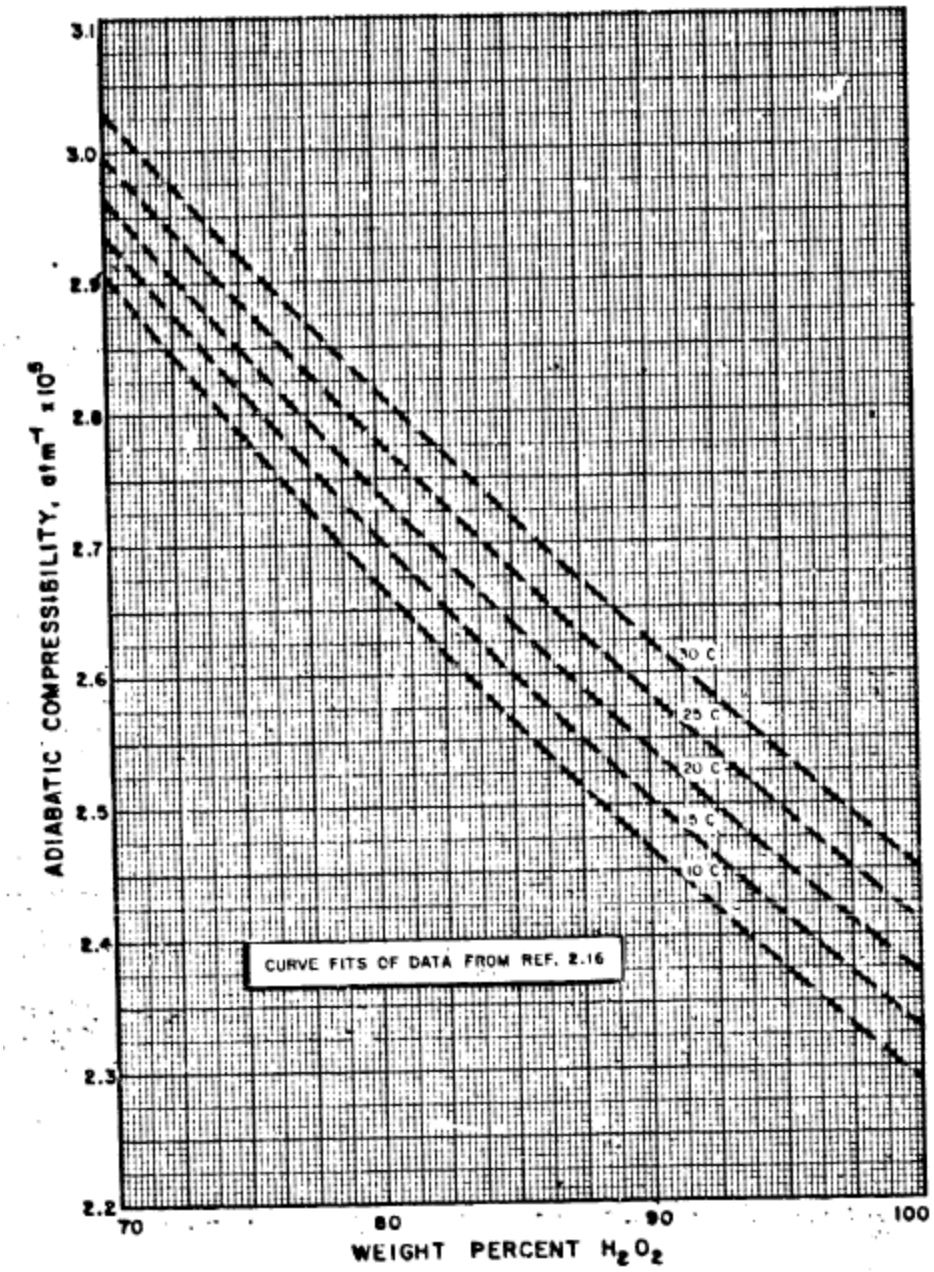

Figure 2.6. Adiabatic Compressibility of Propellant-Grade Hydrogen Peroxide-Water Solutions

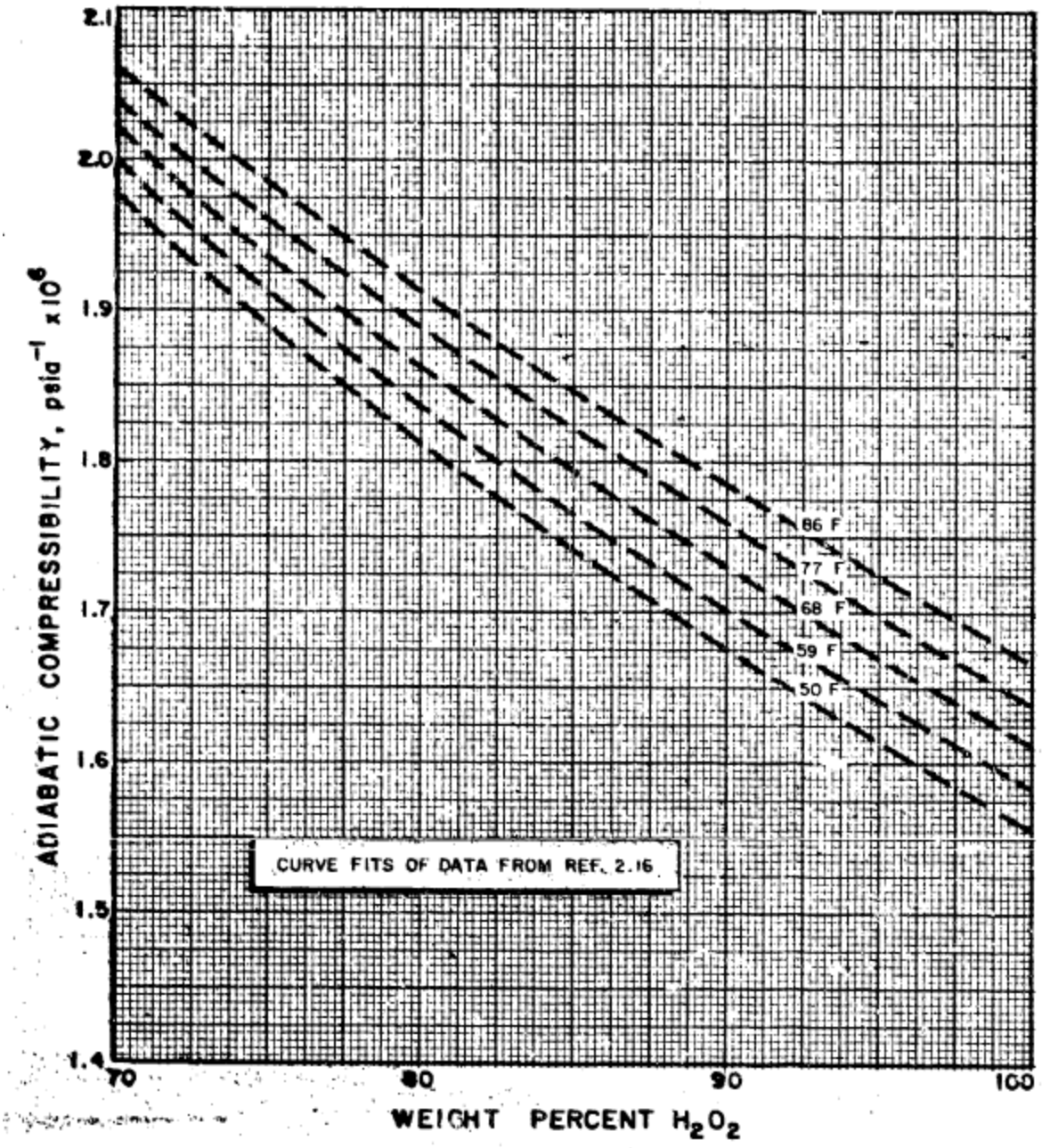

Figure 2.6a. Adiabatic Compressibility of Propellant-Grade Hydrogen Peroxide-Water Solutions

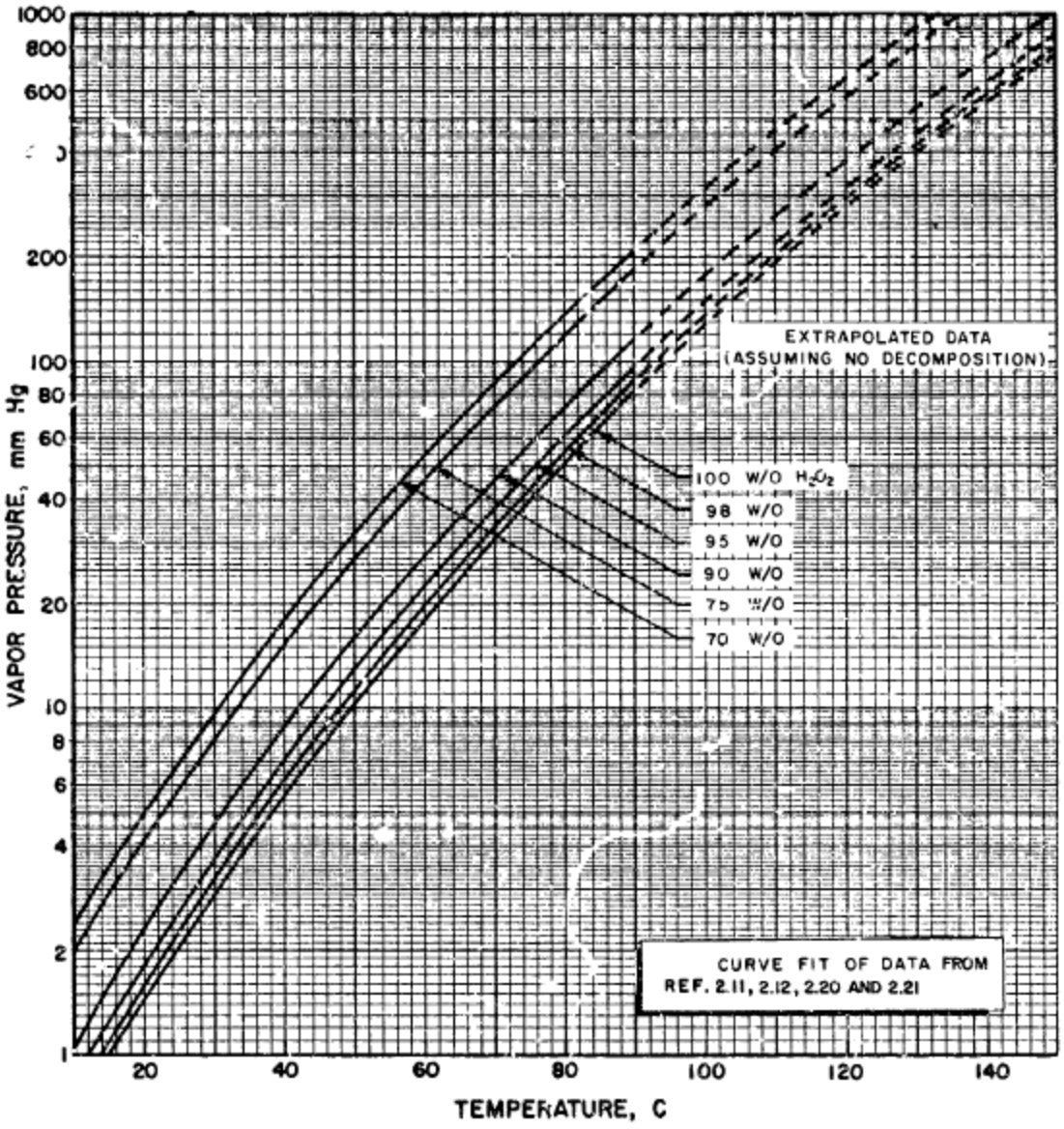

Figure 2.7. Vapor Pressure of Propellant-Grade Hydrogen Peroxide-Water Solutions

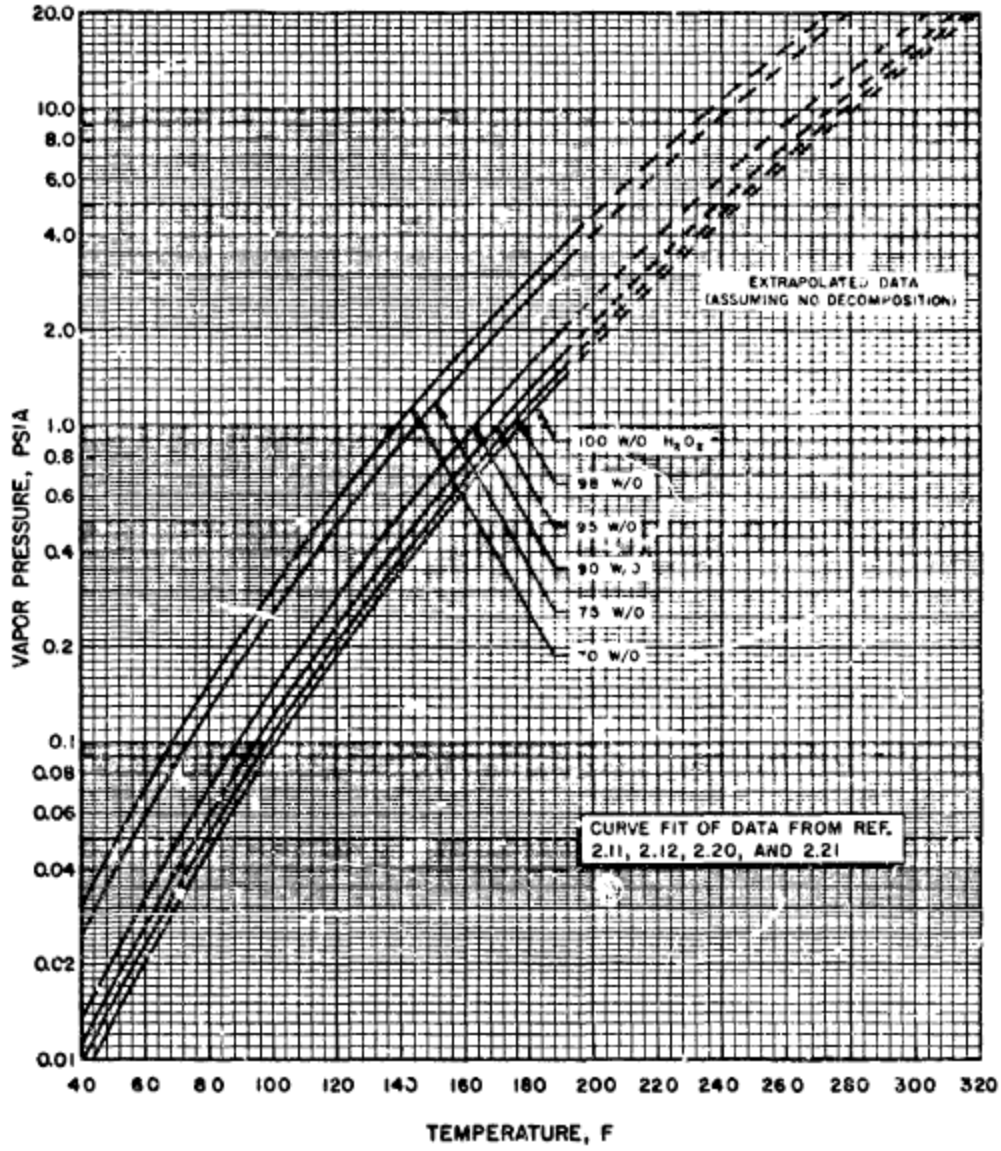

Figure 2.7a. Vapor Pressure of Propellant-Grade Hydrogen Peroxide-Water Solutions

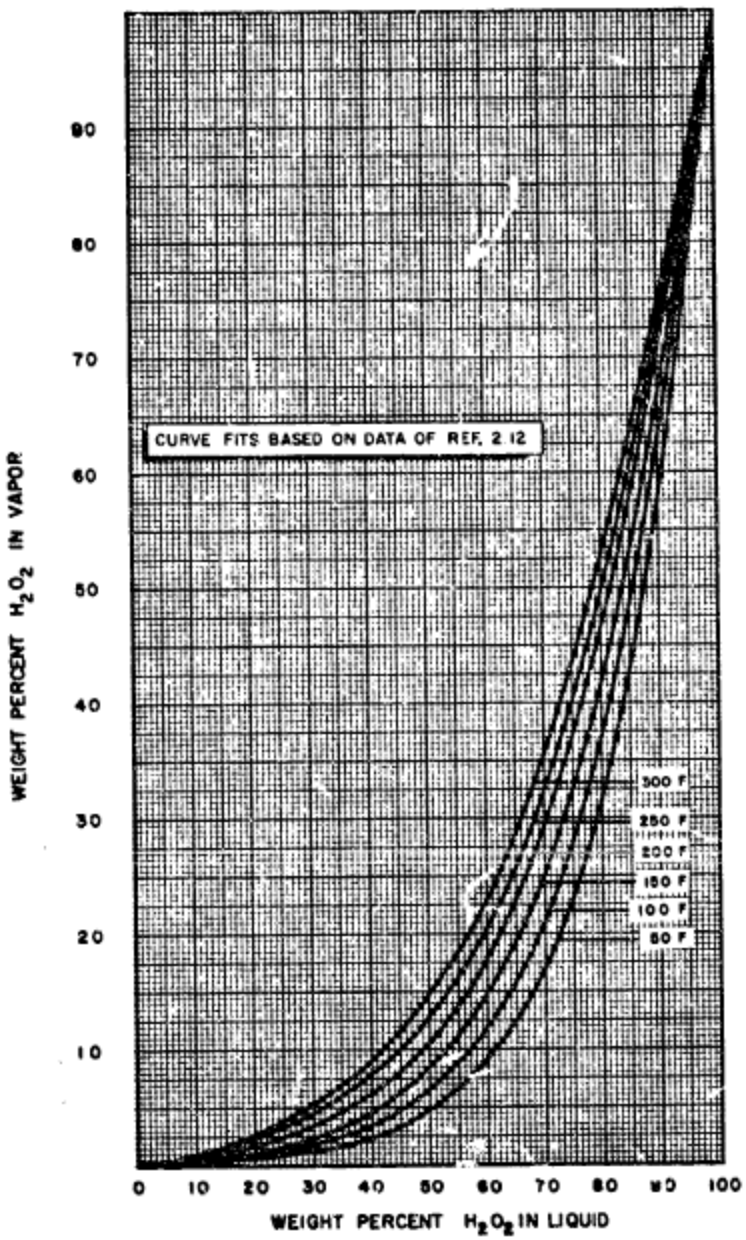

Figure 2.8. Vapor Composition Over Hydrogen Peroxide-Water Solutions (Ref. 2.22)

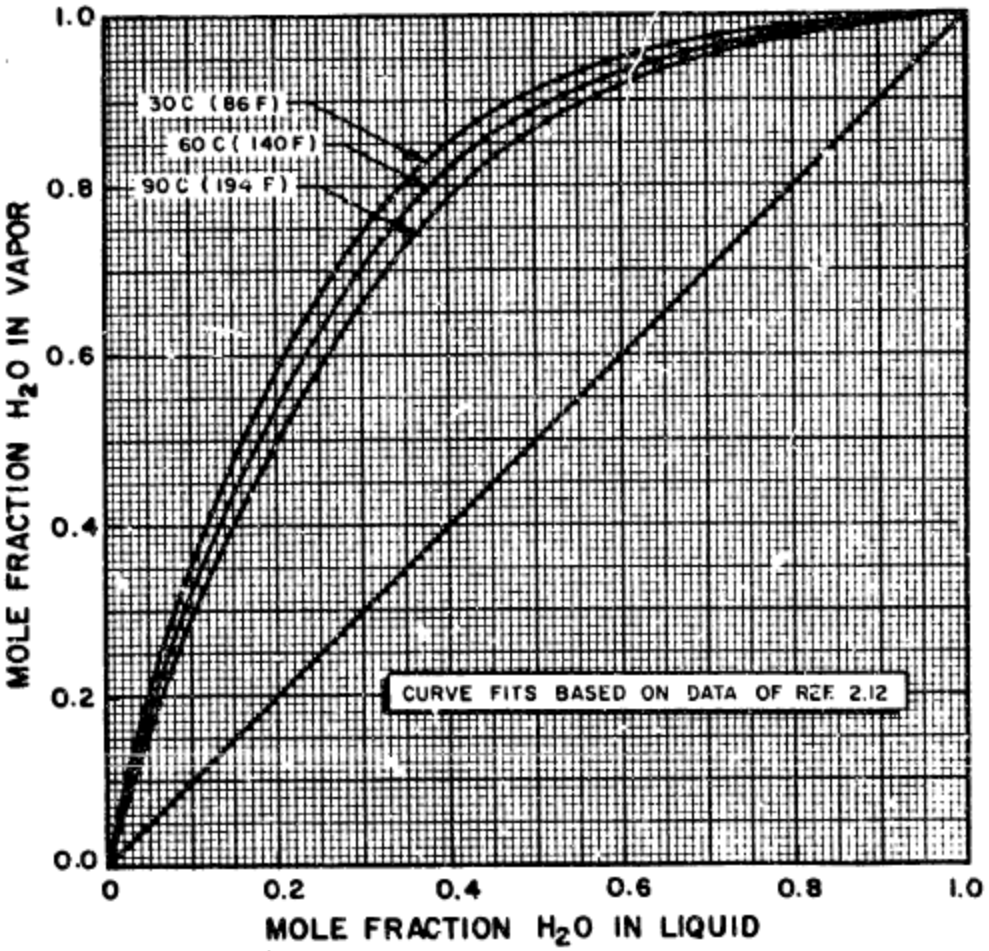

Figure 2.9. Vapor-Liquid Equilibrium for the Hydrogen Peroxide-Water System (Ref. 2.22)

Source : http://www.diyspaceexploration.com/general-identification-of-hydrogen-peroxide/