This calibration technique may be used with several gases of accurately known thermal conductivity (permissively at atmospheric pressure). In particular, a gas of high thermal conductivity, such as helium, is required. However, it was demonstrated that the use of helium at atmospheric pressure was severely limited in this cell because of temperature discontinuities at the gas-copper interfaces (7). To avoid this error the cell was calibrated under pressure using the measured values obtained by Sengers, et al. (22) for carbon dioxide at 75°C. It is judged that these values away from the critical conditions have an error of less than 1%.

Using a single calibrating gas at many pressures provides values more evenly distributed over the range of values to be measured, thus reducing interpolation errors and making the regression analysis more accurate. In addition, argon was used for some of the calibrations based on the data of Michels, et al (23). However, the conductivity of argon at the highest pressures was not as great as that of carbon dioxide, thus limiting the maximum conductivity which could be measured.

Conditions of Measurement and Results

Determinations were made on the two pure gases nitrogen and ethane, and on twelve binary mixtures of approximately 20, 40, 60, and 80 mole per cent, nitrogen, ethane, and carbon dioxide at 75°C. Sengers' (22) data on carbon dioxide was used to complete