was stored below atmospheric pressure in a 12-l tank. It was pumped by a pressure-vacuum, reversible, 2-stage vane pump[2] through a purifying train consisting of a charcoal trap cooled to liquid N_2 temperature and a charcoal trap cooled to liquid H_2 temperature. The gas then entered a cryogenic pump where it was liquefied at $\sim$2°K and 2 kg/cm^2 gauge pressure. Upon warming, the purified high-pressure gas was forced either into the ΔV_m apparatus or into a small compression cylinder for additional pressure boosting. At the completion of an experiment, He^3 in the low-pressure metering system was transferred back to the storage reservoir by the same vane pump. Residual gas at a few microns pressure was removed by a conventional vacuum system. Mass spectrometer analysis of the purified gas indicated the following impurities: 0.06 percent He^4, $<$0.015 percent H_2, $<$0.005 percent D_2, $<$0.005 percent T_2, $<$0.01 percent N_2, $<$0.002 percent O_2.

The source of the He^4 was an A.E.C. cylinder (H size) filled at the Bureau of Mines Amarillo Station. The gas was pressured by a 3-stage compression cylinder and passed through a liquid-N_2 cooled trap into the measuring system. Mass spectrometer analysis indicated the following impurities: 0.01 percent H_2, 0.03 percent N_2, 0.002 percent O_2.

B. General Procedure

The experimental technique used in measuring ΔV_m was essentially the same as that described earlier (*15*). However, the temperatures employed in freezing and melting the sample were, in general, much closer to the equilibrium melting points. This obviated large corrections for the thermal expansion of solid and fluid.

At pressures below 1000 kg/cm^2, the fluid coefficient of thermal expansion α_f was determined by the following piston displacement method. Fluid in the cell was brought to pressure equilibrium with the piston gauge at a cell temperature near the freezing point. A valve was closed, isolating the cell, whereupon the cell temperature was raised $\sim$0.2°K. After temperatures had equilibrated, the valve was opened and the corresponding piston travel in the piston gauge was observed. From known PVT of the gas, the volume change could be computed. This procedure was repeated over several ΔT's at the same pressure and for both warming and cooling. At pressures above 1000 kg cm^2 the earlier technique (*15*) was used.

The fluid compressibility coefficient β_f was measured similarly. At constant temperature the cell was balanced against the piston gauge. The cell valve was closed, an additional weight was added to the piston pan, the valve was opened and the piston displacement observed. At a given temperature the procedure

[2] A brief description of this pump is given by Sydoriak and Roberts (*19*).