Pressure System

The pressure system was purchased from High Pressure Equipment Co., and consists of a hydraulic pump operating on a 64:1 piston intensifier. Pressure fluid consisting of 1 part kerosene and 1 part Shell hydraulic brake fluid was found to be entirely satisfactory throughout the 7 kbar range of the apparatus. Pressure was measured using the resistance of a manganin wire coil calibrated at the 0°C freezing pressure of mercury. The constant, k, for the 329.6 Ω coil was 1.283 kbar/Ω; changes in resistance, ΔRg, of 0.001 Ω could be measured by a Wheatstone Bridge.

An rf lead and a copper-constantan thermocouple were installed into the high pressure chamber by the method discussed by Cornish and Ruoff[3]. The thermocouple emf could be resolved to 2μv by a Moseley 680 recorder and so provided an accurate means to determine when the system came to thermal equilibrium.

Measurements

The transit times of appropriate transverse and longitudinal acoustic waves and their pressure variation were measured by the familiar ultrasonic pulse-echo method[4,5,6,7]. Details of the procedure and the type of electronic apparatus used in these measurements have been presented in an earlier article by Rotter and Smith[1].

Transit time measurements were made by the usual echo-to-echo technique at zero pressure and 25°C. The change in arrival time, ΔT_n, of an appropriate echo was then measured as a function of pressure at the same temperature. In all pressure measurements care was