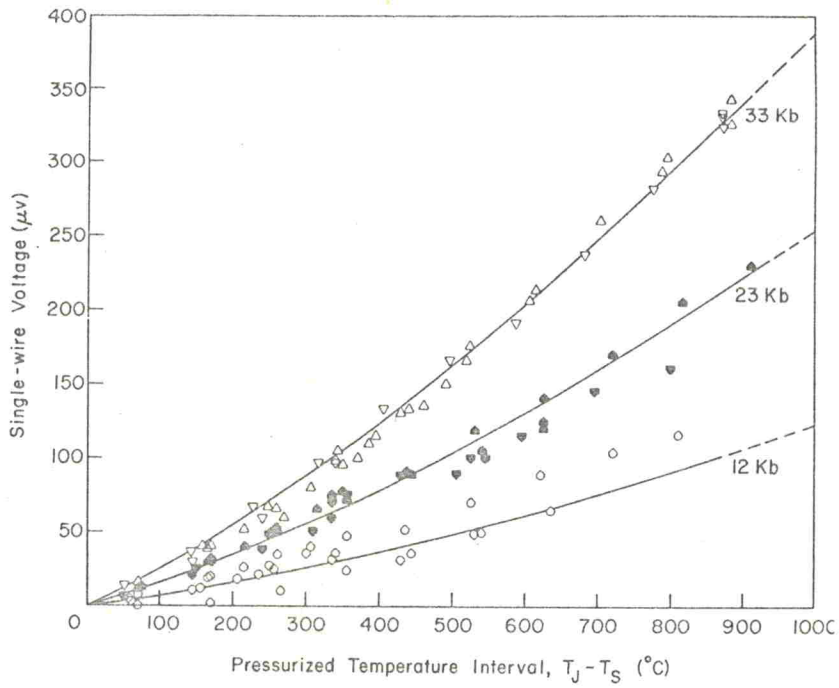

FIG. 6. Single-wire voltage for Pt10Rh.

negative thermoelement, Pt, shows a consistently larger single-wire voltage than does the positive thermoelement, Pt10Rh. Thus, a Pt–Pt10Rh thermocouple will read low under pressure. The signs of the single-wire voltages of both Pt and Pt10Rh, however, are everywhere positive. Thus the effect of pressure on each thermoelement largely compensates for the effect of pressure on the other. The difference in the single-wire voltages for Pt and Pt10Rh is only about 30% of their mean.

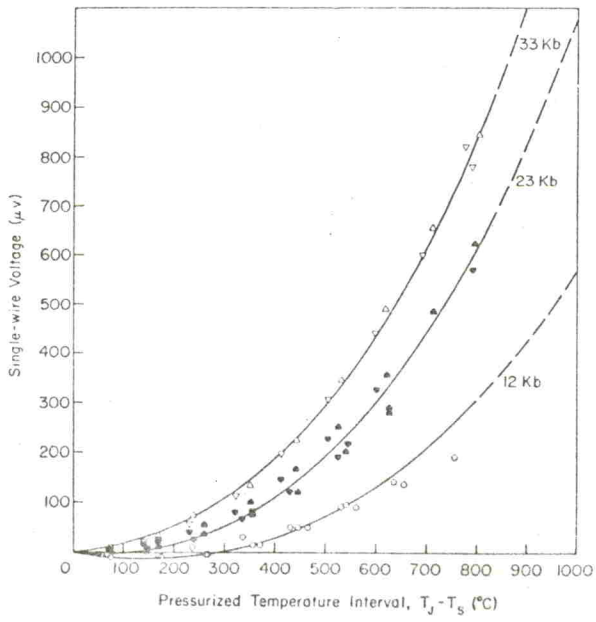

FIG. 7. Single-wire voltage for Chromel.

The signs of a single-wire voltage for Chromel and for Alumel are also everywhere positive except for a small part of the range for Chromel where temperatures and pressures are relatively low. Both Chromel and Alumel show curvature towards the voltage axis with increasing temperature, but are nearly linear with pressure. The difference in single-wire voltages for Chromel and Alumel is not of constant sign, however. The pressure correction is positive at low temperatures but becomes negative at approximately 400°–600°C and is strongly negative at very high temperature. (See Fig. 12.)

DATA REDUCTION

Mechanical and chemical failures led to the rejection of a certain amount of data. Pressure and temperature were limited by collapse of the tungsten carbide bushing during the course of the experiments. When this took place, the wires could not be pulled freely from the bushing after the run. In such cases all the data taken above the first arrival at 25 kbar were discarded.

Mechanical failure of the wires took place in the pressure-seal regions. Since these regions were essentially isothermal, the plastic deformation associated with mechanical failure should have had little effect on the thermoelectric voltages. In fact no anomalous results were associated with wires which subsequently failed at a seal. Thus data from runs terminated by